

**THE DEVELOPMENTAL DYNAMICS BETWEEN CAUSAL ATTRIBUTIONS AND
SELF-CONCEPT OF ABILITY FROM 7TH GRADE THROUGH 9TH GRADE**

Anna-Leena Palosaari
Master of Psychology- thesis
Department of Psychology
University of Jyväskylä
June 2014

UNIVERSITY OF JYVÄSKYLÄ

Department of Psychology

PALOSAARI, ANNA-LEENA: The developmental dynamics between causal attributions and self-concept of ability from 7th grade through 9th grade

Master of Psychology-thesis, 49 pp., 2 appendices

Supervisor: Professor Aunola Kaisa

Psychology

June 2014

The aim of the present study was to investigate how and to what extent mathematics- and Finnish language-related causal attributions and self-concept of abilities related among adolescents in upper comprehensive school. The present study also examined whether it is self-concepts that predict subsequent attributions or vice versa. A total of 237 students participated in the study. The data was gathered via questionnaires (attributions and self-concepts) and tests (performance in math and in Finnish language) when the students were in 7th grade and again when they were in 9th grade. The results showed that in both school subjects high self-concept was associated with internalizing success and externalizing failure. The only exception was that in 9th grade mathematics adolescents with high self-concept were more likely to attribute failure to effort than to lack of guidance, thus indicating some sense of control over failure outcomes. Overall, the results suggest that adolescents with high self-concept show signs of an adaptive attributional style and adolescents with low self-concept show signs of a maladaptive attributional style. The results showed further that it was previous self-concept that predicted subsequent attributions rather than vice versa: self-concepts were positively related to attributing subsequent success to abilities, and attributing failure to lack of guidance, and negatively related to attributing subsequent success to task and attributing failure to ability in both school subjects. Only one attribution was related to subsequent self-concept among boys: the more boys attributed their failure in mathematics to lack of guidance, the better their subsequent self-concepts in 9th grade were. Also, particularly girls with higher self-concept of math were less likely to attribute their subsequent success to easiness of the task. On the basis of the results it can be concluded that good academic self-concept supports the development of adaptive attributional style whereas low self-concept might put adolescents at risk of maladaptive attributional style. Furthermore, the results cautiously suggest that the effect of causal attributions on subsequent self-concept of ability and the effect of self-concept on subsequent attributions might be different for boys and girls, and that these differences might also depend on the school subject in question. Overall, the results reinforce the importance of supporting adolescents' self-concepts.

Keywords: causal attribution, academic self-concept, adolescence, development

TABLE OF CONTENTS

1. INTRODUCTION.....	1
1.1 Causal attributions	2
1.2 Causal attributions in adolescence.....	4
1.3 Academic self-concept	5
1.4 Academic self-concept in adolescence.....	6
1.5 The developmental dynamics between causal attributions and academic self-concept	7
2. METHODS.....	12
2.1 Sample and procedure	12
2.2 Measurement.....	13
2.3 Statistical analyses.....	14
3. RESULTS.....	15
3.1 The associations between causal attributions and academic self-concepts.....	15
3.2 Attributions as predictors of subsequent self-concept in Finnish language.....	20
3.3 Self-concept as a predictor of subsequent attributions in Finnish language.....	20
3.4 Attributions as predictors of subsequent self-concept in mathematics.....	24
3.5 Self-concept of ability as a predictor of subsequent attributions in mathematics.....	24
4. DISCUSSION.....	27
4.1 Self-concept of ability and attributions in success situations.....	27
4.2 Self-concept of ability and attributions in failure situations.....	32
4.3 Limitations, future challenges and implications	35
4.4 Conclusions.....	38
REFERENCES.....	39

APPENDICES

1. INTRODUCTION

Adolescents are faced with new social roles, cognitive skills and biological changes (Demo 1992), their interest in academic work is often underrated by their friends (Preckel, Niepel, Schneider & Brunner 2013) and their motivation and attitudes towards school become increasingly negative (Anderman & Maehr 1994). These changes may trigger a negative cycle of events that may have long-lasting effects on adolescents' lives. On the other hand, adolescence is an important time for shaping possible selves, the part of self-concept that defines what a person would like to become and would not like to become (Anderman & Maehr 1994), and a time for reshaping their self-theories (Demo 1992) while at the same time one of the main educational objectives is to enhance academic self-concept (Preckel et al., 2013). In this developmental phase the kinds of academic self-concepts and the causes adolescents assign to their failures and successes play a significant role.

Previous research has noted that adolescents' academic self-concepts (perceived competence in a given domain) and causal attributions (interpretations of the perceived causes of failure and success) have an important role in social adjustment and motivation. For example, academic self-concept is related to adolescents' interest in school subjects (Marsh, Trautwein, Lüdtke, Köller & Baumert 2005), persistence behavior (Núñez, González-Pienda, González-Pumariega, Roces, Alvarez, González, Cabanach, Valle & Rodríguez 2005), success in school (Chiu & Klassen 2009; Chiu & Klassen 2010; Ma & Kishor 1997; Marsh & Craven 2006; Marsh et al., 2005; Möller, Retelsdorf, Köller, & Marsh 2011; Valentine, Dubois & Cooper 2004; Wouters, Germeijs, Colpin & Verschueren 2011), subsequent course selection (Durik, Vida & Eccles 2006; Nagy, Trautwein, Baumert, Köller, Garrett 2006), academic adjustment (Wouters et al., 2011), intrinsic satisfaction in school (Briones & Taberner 2012), intentions to study in the future (Ireson & Hallam 2009), educational attainment level (Guay, Larose & Boivin 2004), and career aspirations (Durik et al., 2006).

Similarly, adolescents' causal attributions are related to achievement (Graham 2004; Newman & Stevenson 1990; Shell, Colvin & Bruning 1995; Vispoel & Austin 1995; Watkins & Gutierrez 1989) expectancy of future success (Graham 2004; Platt 1988), task persistence (Martinek & Griffith 1994), affective states (Boman, Smith & Curtis 2003; Ciarrochi, Heaven & Davies 2007), self-efficacy beliefs (Wolters, Fan & Daugherty 2013), intentions to study in future (Bornholt & Möller 2003; Graham 2004), depression (Joiner & Wagner 1995), destructive school behavior (Boman et al., 2003), achievement goals and overall engagement in academic tasks (Wolters et al., 2013), and

life satisfaction (Rigby & Huebner 2005). It has also been shown that academic self-concepts and causal attributions are related with each other higher self-concept being related to more adaptive, self-enhanced attributions and lower self-concepts related to less adaptive attributions (e.g. Marsh 1984). It has been suggested that by supporting adaptive causal attributions it is possible to positively impact on self-concept or self-esteem development (Chodkiewicz & Boyle 2014; Platt 1988; Watkins & Gutierrez 1989). However, previous research on the relationship of academic self-concept and causal attributions has mostly concentrated on children and less is known about these relations among adolescents. Moreover, previous research has grouped attributions into the same class and therefore has been unable to differentiate the effects of different attributions on self-concept, and only a few studies have examined gender differences in the relationship of attributions and self-concept. Also, even though attributions and academic self-concepts have been shown to be domain specific (e.g. Marsh, Cairns, Relich, Barnes & Debus 1984; Marsh & Seaton 2013; Newman & Stevenson 1990), research haven't yet focused on domain specific self-concept and attributions simultaneously. Finally, because previous research has typically used cross-sectional data, little is known about the developmental dynamic between self-concepts and causal attributions.

Given the importance of academic self-concept and causal attributions on adolescents' overall and academic functioning, and taking into account the limitations of the previous studies, the present study investigates the understudied developmental dynamic between adolescents' causal attributions and academic self-concept. More specifically, the aim of the present study is to find out how and to what extent domain-specific causal attributions and domain-specific academic self-concept are related in mathematics and Finnish language, and what kind of developmental dynamics these variables (self-concept/attributions) show during upper comprehensive school education, and are there any gender differences in the relationships.

1.1 Causal attributions

The term “causal attribution” refers to the interpretations of the causes that people make for their failures and successes. According to Weiner (1985; See also Heider 1958) the reason for a search of such interpretations is to gain a better understanding of a person's surroundings and therefore manage themselves effectively. Attribution theorists highlight that these interpretations affect on one's aspirations to achieve more than the outcome itself (Eccles & Wigfield 2002).

According to Banks and Woolfson (2008) there are two significant theories of attributions in the educational setting: Weiner's theory of motivation and the theory of learned helplessness by Abramson, Seligman and Teasdale. According to Weiner's theory, the causes used to explain failures and successes differ from each other according to the following dimensions: locus of causality (internal-external), stability (fixed-variable) and controllability (controllable-uncontrollable) (Weiner 1979, 1985, 1986, 2000, 2010). Abramson, Seligman and Teasdale's (1978) theory of learned helplessness is equivalent with Weiner's theory with respect to content and meaning, except they call locus of causality "locus of control" and instead of the controllability dimension they argue that the third dimension is globality. Locus indicates the location of a cause which can be internal or external to the person. Stability refers to the duration of the cause which can be constant or change over time. Controllability, in turn, refers to the possible volitional alteration of the cause which can vary from relatively controllable to uncontrollable (Weiner 1985, 1986, 2000, 2010.) In the global-specific dimension a global attribution (i.e. lack of intelligence) is expected to apply to multiple situations, whereas a specific attribution (i.e. lack of math ability) apply only to a narrow range of situations (Abramson et al., 1978). According to Weiner (1979), ability, effort, task difficulty and luck are the main causes individuals give for their failures and successes in achievement situations. Ability is considered stable, internal and uncontrollable, effort internal, unstable and controllable, task difficulty external, stable and uncontrollable and luck external, unstable and uncontrollable (Weiner 1985, 2010).

According to the previous research people have a tendency to attribute success to internal causes and failure to external causes, and therefore internalize positive outcome and deny their part in negative outcome (Marsh 1986b; Mezulis, Abramson, Hyde & Hankin 2004; Weiner 1985). This tendency is called as self-serving bias or hedonic bias (Layden 1982; Mezulis et al., 2004; Weiner 1985, 1986). Both genders (Whitley & Frieze 1985; Wigfield 1988) and both children and adolescents tend to use self-serving bias (Mezulis et al., 2004; Normandeau & Gobeill 1998; Vispoel & Austin 1995). Furthermore, the use of self-serving strategies is related to positive mental health (Mezulis et al., 2004) and can be seen as a means of preserving one's self-worth in the face of failure (Covington 1984). On the other hand, according to a meta-analysis of 266 studies, positive bias decreases in adolescence from age 12 on and children and older adults are more prone to making hedonic bias compared to adolescents (Mezulis et al., 2004).

In the literature different attributions have been grouped into attributional styles that can be either harmful or positive to one's self-esteem and future. For example, Higgins and LaPointe (2012) call attributional style dysfunctional when causes of negative outcomes are attributed to

internal, uncontrollable and stable causes (i.e. ability) and functional when causes of negative outcomes are attributed to internal, controllable and unstable (i.e. lack of effort). Dysfunctional style affects negatively on expectancies for future success, generates hopelessness and reduces striving to succeed, whereas functional style leads to higher hope and expectations for future success and striving to succeed in the future (Higgins & LaPointe 2012; Weiner 1985, 2010). In turn, according to Chodkiewicz and Boyle (2014) attributing success to ability and failure to effort can be considered as an adaptive attributional style, and attributing success to external factors and failure to lack of ability maladaptive attributional style. Learned helplessness hypothesis states that attributing a cause of failure to internal, stable and global cause will lower self-esteem and lead to a chronic condition that will apply to multiple occasions (Abramson et al., 1978). Similar to the theory of learned helplessness, pessimistic explanatory style, contains attributing causes of failure to stable and global factors (Boman et al., 2003). Furthermore, there is a lot of support for the linkage between causal attributions one makes for success and failures and one's behavior (Chodkiewicz & Boyle 2014; Weiner 1974). More specifically, a maladaptive attributional style can lead to a negative cycle in which maladaptive attributions lower self-esteem and motivation and this will lead to lack of effort which will further lead to lower achievement (Chodkiewicz & Boyle 2014).

1.2 Causal attributions in adolescence

It has been suggested that cognitive maturity affects the way children understand causal attributions and their meaning (Cole et al., 2008; Folmer et al., 2008; Little & Lopez 1997; Weiner 1974; Weitlauf & Cole 2012; See also Covington 1984). Weiner's attributional theory assumes that people are capable of synthesizing and processing information to form causal attributions. Due to young children's insufficient cognitive and information processing skills young children may not conceive the full repertoire of causes or see the common and differentiating factors between causes (Weiner 1974.) Also, it appears that attributional profiles (i.e. learned helplessness) become more distinct or "crystallized" as children reach upper comprehensive school (Martinek & Griffith 1994).

Young children are shown to have difficulties differentiating between causal attributions (Nicholls & Miller 1985; Wigfield 1988). In particular, according to research young children don't see the difference between ability and effort (Covington 1984; Folmer et al., 2008; Nicholls 1978; Stipek & Mac Iver 1989). Age affects on conceiving effort and ability attributions' reciprocal nature; older children understand that people who have ability don't need to try as much and people who have less ability need to work harder (Folmer et al., 2008; Nicholls & Miller 1984; Rhoads,

Blackwell, Jordan & Walters 1980; See also Covington 1984). This developmental shift occurs approximately from age 10 on but it is only from age 12 on when children can properly distinguish ability from effort (Nicholls 1978; Nicholls & Miller 1984). Children under 6th grade also associate luck with effort and ability; they think that in a luck-related task the hypothetical person's success or failure is not due to luck but the reason for the success or failure outcome is the actor's effort or ability (Nicholls & Miller 1985). Furthermore, when children get older their ability to understand that task difficulty affects on the amount of ability needed increases (Nicholls 1978).

Only few studies have examined adolescents' causal attributions in comparison to younger participants. According to Flammer and Schmid (2003) adolescents use more practice, poor didactic presentation of the teacher, specific abilities, fast understanding and less extrinsic motivation as causes for their successes and failures. It is noted in earlier research that in the face of failure youth may use low interest attribution (Vispoel & Austin 1995) or unstable and internal attributions such as effort (Anderman & Maehr 1994; Folmer et al., 2008; Py & Jouffre 2009; See also Covington 1984) to protect their self-esteem. That is, since they have the ability to differentiate ability and effort they can use lack of effort as an excuse for failure whereas due to cognitive immaturity failure for younger children is an indicator of not having the ability to succeed even though they would have not tried enough to succeed (Folmer et al., 2008). On the other hand, these types of strategies can be used to avoid failures and thus, not trying enough may lead to more failures (Covington 1984).

1.3 Academic self-concept

Shavelson, Hubner and Stanton (1976) define self-concept as a person's perception of himself which is developed with interaction of environment and affects on a person's acts, and acts, in turn, have an impact on how the person sees himself (See also Rosenberg 1979). Harter (1999) takes a more narrow perspective on self-concept and refers to it as self-evaluation of a certain domain. Academic self-concept, in turn, refers to an individual's perceptions about his abilities or competencies in school (Rosen, Glennie, Dalton, Lennon, Bozick 2010; Zhou & Urhahne 2013). Furthermore, expectancy-value theory uses the term self-concept of ability in which ability refers to the beliefs that a person holds about his current competence in a particular domain (Wigfield & Eccles 2000).

Multiple researches have confirmed the multidimensional nature of academic self-concept in children and adolescents and, more importantly, that math and verbal self-concept are separate from

each other (Byrne & Worth Gavin 1996; Marsh 1990; Marsh, Byrne & Shavelson 1988; Marsh & Craven 2006; Marsh & Seaton 2013; Rosen et al., 2010; Valentine et al., 2004; Wigfield & Karpanthian 1991). The differentiation of self-concepts is assumed to develop in middle childhood (Harter 1999; Wigfield & Karpanthian 1991; See also Stipek & Mac Iver 1989). Thus, even young children are shown to be able to differentiate domain-specific self-perceptions (Marsh, Barnes, Cairns & Tidman 1984; Marsh, Craven & Debus 1991; Marsh, Craven & Debus 1998; Wigfield & Eccles 2000). More recently the so called “nested Marsh/Shavelson model” has been developed to describe the structure of the self-concept. It combines features from the previous self-concept models and states that academic self-concepts are clearly distinct from each other and thus, domain specific, and also hierarchically structured with the general self-concept highest in the structure (Brunner et al., 2010; Brunner, Keller, Hornung, Reichert & Martin 2009).

1.4 Academic self-concept in adolescence

Children and adolescents are known to construct their self-concepts by using different information sources such as other persons' perceptions of their ability, school grades, external comparisons with their peers and internal comparisons with their ability areas (Gniewosz, Eccles & Noack 2012; See also Bong & Skaalvik 2003). However, the importance of the sources might vary depending on the developmental status and changes in the environment such as school transitions (Gniewosz et al., 2012).

According to previous research children's self-concepts are highly positive and they seem to decline in middle childhood or in early adolescence (Anderman & Maehr 1994; Jacobs, Lanza, Osgood, Eccles & Wigfield 2002; Spinath & Spinath 2005; Stipek & Mac Iver 1989) but also become more realistic and accurate with increasing age (Kurtz-Costes & Schneider 1994; Nicholls 1978; Wigfield, Eccles, Yoon, Harold, Arbretton, Freedman-Doan & Blumenfeld 1997; Wigfield & Karpanthian 1991). It is also noted that the decline might be domain specific (Cole et al., 2001; Jacobs et al., 2002; Wigfield et al., 1997) and there are individual differences in the extent and timing of the decline of self-concepts (Archambault, Eccles & Vida 2010). The change in children's self-concepts might be related to getting more feedback of their abilities from significant others (Wigfield & Karpanthian 1991) and having more developed skills to compare their achievement to their peers' achievement (Sylva 1994).

Some researchers associate the decline of academic self-concepts particularly to the transition phase of entrance to junior high school (Anderman & Maehr 1994; Cole et al., 2001; Eccles et al.,

1993; Wigfield, Eccles, Mac Iver, Reuman & Midgley 1991) while others argue that the decline of self-concepts continues through middle adolescence (Fraine, Damme & Onghena 2007; Marsh 1989; Nagy, Watt, Eccles, Trautwein, Lüdtke & Baumert 2010; Watt 2004), and others state that after the decline in the school transition phase self-concepts have a tendency to increase (Cole, et al., 2001; Marsh 1989). The decline of self-concepts in the transition phase has been associated with the changes in the school environment (Anderman & Maehr 1994; Eccles et al., 1993; Wigfield et al., 1991). It has also been suggested that the decline is due to the fact that during this period adolescents have better competence than previously to evaluate their skills to their actual performance and abilities (Chiu & Klassen 2009, 2010). Furthermore, self-concepts in various domains become more stable with increasing age (Cole et al., 2001; Guay, Marsh & Boivin 2003; Skaalvik & Valås 1999; Wigfield et al., 1997).

1.5 The developmental dynamics between causal attributions and academic self-concept

According to self-enhancement theory people are prone to perceive events in a way that enhances their self-esteem while self-consistency theory states that people are prone to perceive events in a way that is consistent with their self-esteem (Swann, Griffin, Predmore & Gaines 1987; See also Fitch 1970). Children with higher self-esteem have a tendency to make more internal, stable and more personally controllable attributions in successful outcomes (Weiss, McAuley, Ebbeck & Wiese 1990) and thus, don't seem to have a tendency for learned helplessness. Also, children with lower self-concept have a tendency to externalize success and/or internalize failure (Cooley & Ayres 1988; Möller & Köller 2000; Núñez et al., 2005; Tabassam & Grainger 2002) and thus, show a sign of not using self-serving bias. Overall, individuals with low self-esteem seem to ascribe more personal responsibility over failures than individual with high self-esteem (Bar-Tal 1982; Layden 1982) while individuals with high self-esteem believe that they have more control over outcomes (Weiss et al., 1990).

Previous correlational research on the relationship between attributions and academic self-concept in children and adolescents has found out that attributing success to internal causes such as ability (Kurtz-Costes & Schneider 1994; Marsh 1984; Marsh et al., 1984; Marsh, Relich & Smith 1983; Marsh, Smith & Barnes 1983; Nicholls 1979; Platt 1988; Zhou & Urhahne 2013) and effort (Marsh 1984; Marsh et al., 1984; Marsh, Relich & Smith 1983; Marsh, Smith & Barnes 1983; Platt 1988; Zhou & Urhahne 2013) is positively correlated with academic self-concepts. However, there are also studies suggesting that among 12-year-olds attributing success to effort is negatively related

to self-concept (Kurtz-Costes & Schneider 1994; Nicholls 1979). Furthermore, attributing failure to internal causes such as ability (Kurtz-Costes & Schneider 1994; Marsh 1984; Marsh et al., 1984; Marsh, Relich & Smith 1983; Marsh, Smith & Barnes 1983; Nicholls 1979; Zhou & Urhahne 2013) has been found to be negatively correlated with academic self-concepts.

In turn, the role of effort attribution especially in failure situations has yielded somewhat mixed results. In some studies attributing failure to lack of effort has been shown to be associated with lower self-concept (Marsh 1984; Marsh et al., 1984; Zhou & Urhahne 2013), whereas in some other studies (Marsh, Relich & Smith 1983; Marsh, Smith & Barnes 1983) correlations between effort and self-concept in failure situations have been found to be close to zero. Furthermore, in Kurtz-Costes and Schneider's study (1994) effort in failure situations was slightly positively correlated with self-concept among 10-year-olds. In the study of Bandalos, Yates and Thorndike-Christ (1995) college students who attributed failure to effort compared to students who attributed failure to external factors and students who attributed success to ability compared to students who attributed success to effort did not differ in terms of math self-concept.

Some researchers have offered an explanation that might serve to sort out some of the inconclusive research results derived from previous studies concerning self-concept's relation to effort attribution. Namely, lack of ability attribution in failure situations might be more detrimental to the sense of self-worth compared to effort attribution which might serve to maintain the self-worth (Covington 1984). It has also been suggested that people with high self-concept might blame lack of effort for negative outcomes because working hard might result in a better outcome and that would also be more consistent with their self-concept (Marsh, Relich & Smith 1983; Marsh, Smith & Barnes 1983). Furthermore, the relationship between effort attribution and self-concept in success situations is thought not to be as strong as between ability attribution and self-concept (Marsh et al., 1984) and attributing failure to effort has been suggested to be more positively or less negatively related to self-concept than ability attribution in failure situation (Marsh, Smith & Barnes 1983).

Most of the studies concerning external attributions have classified these attributions into the same group and therefore are unable to distinguish the effects of different external attributions on self-concept. The role of external attributions in relation to self-concept has also been in question. According to previous studies in success and failure situations external attributions have not been significantly related to self-concept (Kurtz-Costes & Schneider 1994; Watkins & Gutierrez 1989) or have been positively related to self-concept (Marsh et al., 1984) or negatively related to self-concept (Marsh 1984). Results of the studies separating different external attributions have shown that in successful outcomes task ease is negatively related to self-concept (Platt 1988) and

attribution to task characteristics is positively related to self-concept (Zhou & Urhahne 2013) whereas luck as attribution is negatively related to self-concept (Briones & Tabanero 2012; Nicholls 1979; Platt 1988; Zhou & Urhahne 2013). In failure situations task characteristics are found to be negatively related to self-concept (Zhou & Urhahne 2013) and luck is positively related to self-concept (Nicholls 1979). Also, studies have not previously investigated the role of guidance attribution in the relationship of attributions and academic self-concept. Although, Zhou and Urhahne (2013) used a similar attribution, i.e. “other persons”, which was found to be negatively related to self-concept in both success and failure situations (Zhou & Urhahne 2013). Furthermore, studies that have separately examined correlations between self-concept of math and language of arts and causal attributions (Marsh 1984; Marsh et al., 1984; Marsh, Relich & Smith 1983; Marsh, Smith & Barnes 1983) haven't reported significant differences in the correlations between attributions and self-concepts.

It has been hypothesized that one of the antecedents of self-esteem is causal attribution. Specifically, the types of attributions people make are believed to affect on the descriptive and affective sides of self-esteem (Bong & Skaalvik 2003). For example, Platt's (1988) study of 17-19 year-olds indicated that ability and effort attributions in success situations contributed positively to academic self-concept and attributing success to task ease contributed negatively to academic self-concept. The effects of the causal attributions can also be seen in a way that causal attributions affect self-esteem via the feelings causal attributions elicits but not the cause itself (Weiner 1985, 1986). For example, attributing success to internal features such as ability creates more pride than external causes and thus affects positively on self-esteem (Weiner 2010) whereas attributing failure to ability will lower self-esteem or self-worth (Weiner 1985). Weiner's theory suggests that people who make dysfunctional attributions will have lowered self-esteem due to these attributions and that causal attributions are causally dominant over self-concept (Watkins & Gutierrez 1989; See also Weiner 1985, 2010). Also, learned helplessness theory assumes that internal, stable and global attributions lead to a decrease in self-esteem (Abramson et al., 1978) and according to expectancy-value theory attributions affect on subsequent self-concept (Eccles & Wigfield 2002; Wigfield 1994).

Furthermore, there is a significant amount of research that has proven that teaching children and adolescents more adaptive attributional styles can lead to emotional and behavioral improvements such as increased achievement, motivation and better self-esteem (Chodkiewicz & Boyle 2014) proposing that change in the attributions will lead to a change in self-esteem. However, there are also studies suggesting that prior self-esteem predicts subsequent attributions (Hirschy & Morris

2002; Tennen & Herzberger 1987). The sparse research on the causal ordering of the academic self-concept and attributions have lead to inconsistent results. Some studies indicate that self-concept affects on causal attributions (Kurtz-Costes & Schneider 1994; Marsh 1984) while other studies propose the opposite (Platt 1988; Watkins & Astilla 1986; Watkins & Gutierrez 1989; Zhou & Urhahne 2013). Marsh (1984) found out in his study of fifth grade students that self-concept has a direct positive effect on attributing success to ability and effort and negative effect on attributing failure to ability and effort. Kurtz-Costes and Schneider's longitudinal study (1994) of 8-10 year-olds also indicated that self-concept at age eight has a direct positive affect on ability attributions in success situations at age 10. On the other hand, Zhou and Urhahne's (2013) study of fourth graders indicated that attributing positive outcome to ability predicted positive general academic self-concept and attributing failure to mood, task characteristics, effort or ability predicted negative self-concept. Watkins and Gutierrez's study (1989) of 11-12 year-olds found a direct positive effect in attributing math success to ability or effort to self-concept whereas only ability attribution in successful reading outcomes had a direct positive effect on self-concept of reading.

The few researches on adolescents have shown that attributions affect subsequent self-concept (Platt 1988; Watkins & Astilla 1986) and that there is some evidence of reciprocal effects (Gonzalez-Pienda, Nunez, Gonzalez-Pumariega, Alvarez, Roces & Garcia 2002). Gonzalez-Pienda et al., (2002) found in their study of 12-18 years-old that self-concept and causal attributions were reciprocally related but only when finding causes for failures. That is, the more adolescent attributed failure to internal factors, the lower the self-concept later on and vice versa, and the better the self-concept the less they attributed failure to internal factors and vice versa.

Most of the research on the relationship of academic self-concept and attributions is conducted with less than 13 year-old children even though the research on the development of understanding causal attributions has shown that many of the changes in understanding causal attributions occurs after age 12 (e.g. Folmer et al., 2008; Nicholls 1978; Nicholls & Miller 1984; See also Covington 1984) and attributions might also carry different meanings for different age groups (Earn & Sobol 1991). Studies that have researched attributions' relation to academic self-concept on upper comprehensive school age adolescents are almost absent. It has been noted in earlier research that self-concepts tend to decline (e.g. Wigfield & Eccles 2000) in the age group of the present study but not many studies have researched how the decline is linked to causal attributions in this developmental phase. However, all this leads to the assumption that adolescents' cognitive ability to comprehend causal attributions is closer to adults' abilities to understand different attributions and can therefore lead to more reliable research results.

Adolescent girls are found less likely to attribute their success to their ability or more likely to their effort or more likely to attribute their failure to lack of ability compared to boys (Bornholt & Möller 2003; Georgiou, Stavriniades, Kalavana 2007; Hui 2000; Mok, Kennedy & Moore 2011; Ryckman & Peckham 1987; Stipek & Gralinski 1991; See also Meece, Glienke & Burg 2006). According to Meece et al. (2006) review gender differences in causal attributions appeared to be domain specific and especially favoring boys in math, and thus may reflect sex role stereotypes. This may also be a sign of older children's self-concepts being more differentiated into different domains (Newman & Stevenson 1990) but attributions have indeed been found to be domain specific (Boekarts, Otten & Voeten 2003; Newman & Stevenson 1990). Gender differences in math and verbal self-concepts are in line with the research of gender differences in attributions and likewise, according to researchers (Willgenbusch & Merrell 1999 for a review) reflect gender stereotypes: girls have been found to have higher verbal self-concept (Brunner et al. 2009; Marsh 1989; Marsh & Yeung 1998; Wigfield et al., 1991; Wilgenbusch & Merrell 1999) and boys higher self-concept in math (Brunner et al., 2009; Marsh 1989; Marsh & Yeung 1998; Nagy et al., 2006; Nagy et al., 2010; Skaalvik & Skaalvik 2004; Watt 2004; Wigfield et al., 1991; Wilgenbusch & Merrell 1999).

Only a few studies have investigated gender differences in the relationship of self-concept and attributions. According to Bandalos et al., (1995) study college women but not men who attribute success to external factors have significantly lower self-concept compared to women who attribute success to effort. Also, in Hirschy and Morris' (2002) study of adults, high self-esteem predicted adaptive attributional style but only for women. Furthermore, Marsh, Smith & Barnes' (1983) study of fifth and sixth graders and Watkins and Gutierrez (1989) study of 11-12 year-olds did not find differences between boys and girls.

The aim of the present study is to investigate the relationship between causal attributions and self-concept in mathematics and Finnish language from developmental point of view. In addition to the above limitations of the previous research on the topic, data used in the previous studies has mostly been cross-sectional. This type of design can't validly test causality of the causal attributions and self-concept (Marsh 1984). A longitudinal study would give information about the possible changes in time in the relationship and thus, would be beneficial to the generalizability of the results (Hirschy & Morris 2002). Also, because both attributions and self-concept are domain specific (e.g. Marsh 1990; Marsh et al., 1984; Marsh 1984), they should be examined from domain specific point of view. However, yet not many of the previous studies have done so. Taken together, previous research has several shortcomings and the studies that have focused on adolescents or children

haven't simultaneously taken into account these limitations. The present study is an attempt to meet the shortcomings of the previous studies by using longitudinal data of adolescents' 7th and 9th grade domain specific attributions and domain specific self-concepts in mathematics and Finnish language.

The research questions were:

1. How and to what extent attributions are related to academic self-concept among adolescents in a) mathematics, b) Finnish language?
2. Does the relationship between these variables change from 7th grade to 9th grade?
3. Does adolescents' attributional style predict their subsequent self-concept of ability? Or is it rather adolescents' self-concept of ability that predicts their subsequent attributional style?
4. Are there any gender differences in the above mentioned relationships?

2. METHODS

2.1 Sample and procedure

The research is part of the Jyväskylä Entrance into Primary school (JEPS) study which was conducted between 1999-2009 (Nurmi & Aunola 1999). The original sample was year 1999 preschool aged children (n= 214) from rural and suburban areas with a close distance to a medium-sized city in Central Finland. Parental permission for the data gathering purposes was obtained at the beginning of the autumn when the children were in kindergarten and again in the fall of the 7th grade. The present study is based on the last two measurement points of the JEPS when the children were in 7th and 9th grade. At the end of the seventh grade there was a total of 231 students (115 girls, 116 boys) and at the end of the ninth grade a total of 237 (117 girls, 120 boys). The number of students participating in the study grew across measurement points because new students were moved to the schools that took part in the study. Two hundred and four (88,3 %) students participated in both the 7th and 9th grade measurement points whereas 27 (11,7 %) students took part in the study only in 7th grade and 33 (14,3 %) students only in 9th grade. The school district that participants were from included demographically similar schools. Achievement level of the classes were heterogeneous and ethnically participants were homogeneous. The questionnaires were filled by the students during school hours (45 minutes to fill in the questionnaires) in 2007 during the 7th grade spring and again in 2009 during the 9th grade spring (Rimkute, Hirvonen, Tolvanen, Aunola

& Nurmi 2012). At the same measurement points, students skills in Finnish language and mathematics were tested in classroom group situations.

2.2 Measurement

Finnish language skills. Students written language skills were assessed with three subtests which were taken from the Test of Word Reading, Spelling and Reading Comprehension (Holopainen, Kairaluoma, Nevala, Ahonen & Aro 2004): (1) the error finding test included 100 words and the student's task was to find the spelling errors and mark them. Students had three and a half minutes to find the errors and the number of errors found was the score of the test. (2) The word-chain test (Holopainen et al., 2004) included 100 words that were chained together with no space between the words. Each chain had four words and the student's task was to find the beginning of the new word and the end of the other word and mark it. Students had three and a half minutes to find the errors and the score of the test was the number of correctly found words. (3) The reading comprehension test (Holopainen et al., 2004) included a four page long "Dogs of the village" story by Veikko Huovinen (1962). The original story by Huovinen has been modified to contain 52 contradictory words relative to the sentence, paragraph or larger text context. Students had to find the contradictory words and mark them. The total score of the test was the number of the correctly found words (Holopainen et al., 2004; Savolainen, Ahonen, Aro, Tolvanen & Holopainen 2008.) The Cronbach's Alpha reliability for the sum score based on the sum of the standardized three subtests for 7th grade was .81. and for 9th grade .80.

Math skills. Students' mathematical performance was assessed by using the group-administered KTLT math test (Räsänen & Leino 2005) designed for 7th to 9th graders. The test has four versions from A to D. In the present study version A was used for both 7th and 9th grade in which different mathematical skills are measured with 40 items. The KTLT test was performed independently by the students during a regular class (40 minutes). A maximum score of 40 points was possible meaning that each item was worth one point. The Cronbach's Alpha reliability for the sum score based on the all items was .86 for the 7th grade and .89 for the 9th grade.

Self-concept. Students' math and Finnish language self-concepts were assessed by using a modified scale of Wigfield et al., (1997). (The scale is presented in Appendix A). The questionnaire included three items for both math and Finnish language (i.e., How good are you at math/Finnish?; How good are you at math/Finnish compared to other students in your class?; How difficult are math/Finnish tasks for you?). The students were asked to rate these items using 5-point Likert scale

(1 = “not good at all / very difficult”; 5 = “very good / very easy”). Sum scores based on the mean values of the three scores for each subject-related self-concept scale were calculated. The Cronbach’s Alpha reliability for the self-concept in math scale was .87 in grade 7 and .89 in grade 9. The Cronbach’s Alpha for Finnish language self-concept scale was .81 in grade 7 and .81 in grade 9.

Causal attributions. Attributions for school related success and failure outcomes were measured by a questionnaire developed by Rytönen, Aunola and Nurmi (2006). (The scale is presented in Appendix B). Attributions of successful school outcomes were tested with two statements for each school subject (“If I succeed well in math tasks (vs. Finnish language), the reason is...”; “When I succeed well in math (vs. Finnish language), the reason is...”). For each item there were four answer options (i.e. “I get good guidance”; “I try hard”; “I have the ability to succeed” and “tasks are easy”). Attributions of failure outcomes were tested as well with two statements per school subject (“If I don’t succeed well in math (vs. Finnish language), the reason is...”; “When I don’t succeed well in math tasks (vs. Finnish language tasks), the reason is...”). For each item there were four answer options (i.e. “I don’t get good enough guidance”; “I don’t try enough”; “I’m not able enough” and “tasks are too difficult”). After each failure and success statement students were asked to rank-order the four answer options according to their importance. Because the ranking options were negatively phrased (1= “high in importance”; 4= “low in importance”), they were reverse scored. Sum scores of the student’s rank-ordered answers based on the mean value of each answer option, i.e. attribution in two questions (i.e. guidance, effort, ability, and task difficulty, for the success and failure situations, and separately for mathematics and Finnish language) were calculated. The Cronbach’s Alphas for the 7th grade math success situations ranged from .70 to .87 and for 9th grade from .80 to .91. The Cronbach’s Alphas for Finnish language success situation for 7th grade ranged from .72 to .76 and for 9th grade from .67 to .79. Failure situations’ Cronbach’s Alphas in math for 7th grade ranged from .70 to .72. and for 9th grade from .63 to .77. Finnish language failure situations’ Cronbach’s Alphas for 7th grade ranged from .63 to .75 whereas for 9th grade the values ranged from .67 to .68.

2.3 Statistical analyses

The statistical analyses were carried out according the following steps. First, to examine how and to what extent different causal attributions are related to mathematics and Finnish language self-concepts at different grade levels Spearman’s correlation analysis was conducted separately for 7th

grade and 9th grade and for the boys and girls. Second, to investigate gender differences in the relationship between self-concepts and attributions, Fisher's z- test was used to determine whether the difference between boys and girls correlations were statistically significant.

Third, to examine whether adolescents' attributions predict their subsequent self-concept or is it rather the self-concept that predicts their subsequent attributions, two sets of hierarchical regression analyses were performed. In the first set of regression analyses the 9th grade self-concept was predicted by the attributions made in 7th grade. Each of the attributions was tested individually as independent variable in their own model. The analyses included five steps. In the first step of each of the analysis, the effects of the 7th grade self-concept of the particular school subject was controlled for. To examine the effects of the gender and to control for its effects gender was inserted as independent variable to the second step of each of the analyses. In the third step, the skill levels of the particular school subject was inserted to control for the effects of the academic skills in question. The fourth step included the 7th grade attribution in which each of them was included in their own models. In order to examine whether there are gender differences in the relation of the self-concept and attributions the fifth step included interaction term Gender X Attribution in question.

In the second set of regression analyses, each of the 9th grade attributions were predicted by the self-concept in 7th grade. Separate analyses were carried out for math and Finnish language related self-concepts as independent variable. At the first step of each analysis, the effects of the 7th grade attribution in question was controlled for. The second step included gender to examine and control for its effects. At the third step, the academic skill level of the particular school subject was controlled for. The fourth step included the self-concept of the particular school subject and the fifth step included the interaction term Gender X Self-concept of the school subject in question. IBM SPSS Statistics 20 software was used to conduct the analyses, except vassarstats.net, a statistical computation website, was used to conduct the Fisher's z-tests.

3. RESULTS

3.1 The associations between causal attributions and academic self-concepts

The first research question was how and to what extent adolescents' causal attributions are related to their self-concepts and the second question was whether these associations are different at 7th grade and 9th grade. The results of the Spearman's correlation analysis between self-concepts and

attribution variables are shown in the Table 1 (math) and 2 (Finnish language). According to the results the pattern of correlations was closely similar in the case of math and Finnish language. First, during 7th and 9th grades there was a strong positive correlation between math self-concept and attributing success to ability and between Finnish language self-concept and attributing success to ability: the better the self-concept of math and Finnish language, the more adolescents tended to attribute successful outcomes in these subjects to ability. These correlations become slightly stronger with time in both school subjects. Second, self-concepts of math and Finnish language both correlated negatively with effort and guidance attributions in success situations in 7th grade indicating that the lower the self-concept, the more likely adolescents tended to attribute successful outcomes to effort and guidance and the higher the self-concept the less likely adolescents tended to attribute success to effort and guidance. These very same correlations became slightly stronger with time indicating stronger relationship between self-concepts and these variables in 9th grade with the exception of effort attribution and Finnish language self-concept. Namely, attributing Finnish language success to effort was no longer statistically significant in the 9th grade. Finally, although self-concept of math and Finnish language were not statistically significantly related to attributing success to task in 7th grade, in 9th grade these two variables had a strong negative correlation: the lower the self-concept, the more likely children tended to attribute successful outcome to task in math and Finnish language and vice versa.

In failure situations both 7th grade math and Finnish language self-concept correlated negatively with ability attribution: the lower the self-concept the more likely adolescents tended to attribute failure outcomes to ability and vice versa. Correlation between math self-concept and ability was slightly stronger in 9th grade whereas in Finnish language the same correlation remained approximately same in 9th grade. There was also a positive correlation between both of the self-concepts in 7th grade and attributing failure to guidance: the higher the self-concept, the more likely adolescents tended to attribute failures to guidance and vice versa. On the other hand, correlation between math self-concept and guidance was no longer significant in the 9th grade whereas correlation between Finnish language self-concept and attributing failure to guidance remained approximately same with time. Correlation between Finnish language self-concept and attributing failure to effort was not statistically significant in either of the measurement times whereas correlation between math self-concept and attributing failure to effort became stronger in 9th grade indicating a significant positive correlation in 9th grade: the higher the self-concept, the more likely adolescents tended to attribute math failures to effort and vice versa. In addition, neither one of the

self-concepts correlated statistically significantly with task attribution in failure situations in either one of the measurement times.

The research was also interested in gender differences in the relationships between self-concepts and attributions. Therefore Fisher's z-test was conducted to each of the boys' and girls' correlation pairs to find out whether the difference between these correlations were statistically significant. The results showed three statistically significant differences between boys and girls: among both boys and girls attributing success to ability was positively associated with self-concept in 7th grade in Finnish language and in mathematics (See Table 1 and 2) but among girls these associations were statistically significantly stronger than among boys ($z=3.14$, $p= .002$ and $z=3.24$, $p= .001$). Furthermore, among girls attributing success to effort in 7th grade was negatively related with Finnish language self-concept (See Table 2) but among boys no statistically significant association was found ($z= -2.13$, $p= .033$).

TABLE 1. The correlations of math self-concept with math-related attributions in success and failure situations, and math skills, and means (M) and standard deviations (SD) in 7th and 9th grade

	Self-concept of math in 7th grade			M	SD	Self-concept of math in 9th grade			M	SD
	Girls	Boys	Total			Girls	Boys	Total		
Attribution in success										
Ability	.64***	.30**	.50***	2.56	1.09	.69***	.62***	.67***	2.51	1.15
Effort	-.12	-.18	-.16*	3.00	0.92	-.13	-.21*	-.17*	2.79	0.95
Task	-.20*	-.07	-.13	2.13	1.00	-.30**	-.23*	-.27***	2.32	0.99
Guidance	-.36***	-.13	-.26***	2.54	0.94	-.34***	-.27**	-.32***	2.56	1.05
Attribution in failure										
Ability	-.23*	-.16	-.20**	2.41	0.92	-.37***	-.21*	-.30***	2.23	0.97
Effort	-.10	.13	.12	3.02	0.95	.18	.13	.17**	3.06	0.92
Task	-.08	.00	-.05	2.71	0.96	.09	-.06	.00	2.65	0.87
Guidance	.27**	.02	.15*	2.11	1.00	.16	.04	.11	2.12	0.99
Math skills	.60***	.62***	.61***	21.52	6.33	.70***	.58***	.65***	24.23	7.08

Note: * p<.05, **p<.01, ***p<.001

TABLE 2. The correlations of Finnish language self-concept with Finnish-related attributions in success and failure situations, and Finnish language skills, and means (M) and standard deviations (SD) in 7th and 9th grade

	Self-concept of Finnish language in 7th grade on					Self-concept of Finnish language in 9th grade				
	Girls	Boys	Total	M	SD	Girls	Boys	Total	M	SD
Attribution in success										
Ability	.59***	.24*	.42***	2.64	1.00	.56***	.49***	.53***	2.57	1.04
Effort	-.34***	-.06	-.21**	3.02	0.92	-.16	-.04	-.11	2.86	0.91
Task	.00	-.03	-.02	2.31	0.98	-.16	-.34***	-.28***	2.39	0.98
Guidance	-.21*	-.16	-.19**	2.25	0.99	-.26**	-.21*	-.23**	2.27	0.97
Attribution in failure										
Ability	-.30**	-.26**	-.29***	2.34	0.85	-.22*	-.28**	-.27***	2.19	0.92
Effort	.05	.11	.11	3.21	0.89	.05	.12	.09	3.25	0.85
Task	-.08	-.02	-.06	2.57	0.95	-.05	-.19*	-.12	2.49	0.87
Guidance	.28**	.11	.20**	2.12	1.01	.16	.26**	.21**	2.13	0.94
Finnish language skills	.38***	.30**	.38***	-0.01	0.86	.36***	.45***	.46***	0.00	0.84

Note: * p<.05, **p<.01, ***p<.001

3.2 Attributions as predictors of subsequent self-concept in Finnish language

In order to answer to the third and fourth research questions several hierarchical regression analyses were next performed. Results of the regression analyses of whether 7th grade attributions in failure and success situations predicted 9th grade Finnish language self-concept after controlling for the effects of former self-concept, gender and Finnish language skills, revealed that none of the attributions predicted statistically significantly 9th grade self-concept in Finnish language.

The results showed further that two of the interaction terms, i.e. Gender X Guidance in success situations ($\Delta R^2 = .03$, $p < .01$; $\beta = .51$, $p < .01$) and Gender X Ability in failure situations ($\Delta R^2 = .03$, $p < .01$; $\beta = .55$, $p < .01$) were statistically significant suggesting that the relationship between these attributions and 9th grade self-concept was different depending on the gender. Consequently, statistical analyses related to these attributions were next conducted separately for boys and girls. The results showed, however, that none of the tested attributions yielded statistical significance either among boys or girls.

3.3 Self-concept of ability as a predictor of subsequent attributions in Finnish language

The results of the regression analyses of whether 7th grade self-concept predicted 9th grade attributions in failure and success situations in Finnish language after controlling for the effects of former attributions, gender and Finnish language skills are presented in Tables 3 (success situations) and 4 (failure situations). The results showed that 7th grade self-concept contributed statistically significantly to the model when accounting for the ability and the task attribution of a success situation suggesting that the better the self-concept in 7th grade, the more success situations were attributed to ability in 9th grade and the higher the 7th grade self-concept, the less likely subsequent success outcomes were attributed to task. 7th grade self-concept did not statistically significantly predict 9th grade effort and guidance attributions in success situations. Also, 7th grade self-concept contributed to the model statistically significantly when accounting for the ability and guidance attributions in failure situations in 9th grade indicating that the higher the self-concept in 7th grade, the less likely failures were attributed to ability in 9th grade and the better the self-concept, the more likely failure was attributed to guidance in 9th grade. 7th grade self-concept did not statistically significantly predict 9th grade effort and task attributions in failure situations. Overall, the results

indicated that the 7th grade self-concept had some predictive power beyond the effect of former attributions, gender and skills in predicting some of the 9th grade attributions.

The results showed further that Gender X Self-concept interaction was statistically significant when attributing failure to effort ($\Delta R^2 = .06$, $p < .05$; $\beta = -.85$, $p < .05$) in 9th grade indicating that the relationship between effort attribution and 7th grade self-concept was different depending on the gender. To examine this interaction effect further statistical analysis were next conducted separately for boys and girls. The results showed, however, that effort attributions yielded no statistical significance among boys nor among girls.

TABLE 3. Summary of hierarchical regression analyses for predicting 9th grade Finnish language attributions with 7th grade Finnish language self-concept in success situations

Variables	Ability			Effort			Task			Guidance		
	r	β	R ²	r	β	R ²	r	β	R ²	r	β	R ²
Step 1: Attribution in 7 th grade	.33***	.33***	.11***	.26***	.26***	.07***	.13	.12	.01	.10	.08	.01
Step 2: Gender	-.10	-.10	.12***	.03	.01	.07**	.10	.10	.02	.05	.04	.01
Step 3: Finnish language skills in 7 th grade	.35***	.32***	.21***	-.22**	-.22**	.11***	-.07	-.05	.03	-.20**	-.18*	.04
Step 4: Finnish language self-concept in 7 th grade	.38***	.18*	.23***	-.16*	-.04	.11***	-.20**	-.17*	.05	-.18*	-.08	.04

Note: * p<.05, **p<.01, ***p<.001

TABLE 4. Summary of hierarchical regression analyses for predicting 9th grade Finnish language attributions with 7th grade Finnish language self-concept in failure situations

Variables	Ability			Effort			Task			Guidance		
	r	β	R ²	r	β	R ²	r	β	R ²	r	β	R ²
Step 1: Attribution in 7 th grade	.19*	.18*	.03*	.17*	.16*	.03*	.30***	.29***	.09***	.15	.16*	.03*
Step 2: Gender	.10	.09	.04*	-.03	-.02	.03	.00	-.01	.09***	-.02	-.01	.03
Step 3: Finnish language skills in 7 th grade	-.20**	-.17*	.06**	.03	.04	.03	-.01	-.04	.09**	.10	.08	.03
Step 4: Finnish language self-concept in 7 th grade	-.27***	-.20*	.10**	.03	-.01	.03	-.07	-.04	.09**	.22**	.19*	.06*

Note: * p<.05, **p<.01, ***p<.001

3.4 Attributions as predictors of subsequent self-concept in mathematics

Results of the regression analyses of whether 7th grade attributions in failure and success situations predicted 9th grade self-concept in math were similar to the case of Finnish language. Namely, like in Finnish language, after controlling for the effects of former self-concept, gender and math skills results showed that none of the attributions statistically significantly predicted 9th grade self-concept in math.

The results showed further that two of the interaction terms were statistically significant, i.e. Gender X Effort in success situations ($\Delta R^2 = .01$, $p < .05$; $\beta = .41$, $p < .05$), and Gender X Guidance in failure situations ($\Delta R^2 = .01$, $p < .05$; $\beta = .29$, $p < .05$) suggesting that the relationships between these attributions and 9th grade self-concept were different depending on the gender. Therefore statistical analyses were next conducted separately for boys and girls. According to the results guidance attribution in failure situation was statistically significantly and positively related to the boys' 9th grade self-concept ($\Delta R^2 = .02$, $p < .05$; $\beta = .15$, $p < .05$): the more boys attributed failure in 7th grade to guidance, the better the subsequent self-concept was. The same result was not found in girls. Furthermore, effort attributions in success situations did not yield statistical significance among boys or girls.

3.5 Self-concept of ability as a predictor of subsequent attributions in mathematics

Results of the regression analyses of whether 7th grade self-concept predicted 9th grade attributions in failure and success situations in math after controlling for the effects of former attribution, gender and math skills are presented in tables 5 (success situations) and 6 (failure situations). The results were similar to those found in Finnish language. Specifically, like in Finnish language, the results showed that 7th grade self-concept contributed statistically significantly and positively to the model when accounting for the ability attribution in success situation and statistically significantly and negatively when accounting for the task attribution in success situation: the higher the self-concept of math-ability, the more subsequent successes were attributed to ability and the less to task. Also, similar to the results found in Finnish language, 7th grade self-concept did not statistically significantly predict 9th grade effort and guidance attributions in success situations. In failure situations the results were also similar to those found in Finnish language. Namely, self-concept contributed to the models statistically significantly and negatively when accounting for ability attribution in failure situations and self-concept contributed statistically significantly and positively

to the model when accounting for guidance attribution: the higher the self-concept of math the less likely subsequent failures were attributed to ability and more likely to guidance. Overall, these results indicate that the 7th grade self-concept has some predictive power beyond the effect of former attributions, gender and skills in predicting most of the 9th grade attributions.

The results showed further that two of the interaction terms were statistically significant, i.e. Gender X Task in success situations ($\Delta R^2 = .04$, $p < .01$; $\beta = -.90$, $p < .01$) and Gender X Ability in success situations ($\Delta R^2 = .02$, $p < .05$; $\beta = .64$, $p < .05$) indicating that the relationship between these attributions and 7th grade self-concept were different depending on the gender. To examine the interaction effects in the mentioned relations statistical analyses were conducted separately for boys and girls. According to the results 7th grade self-concept was significantly and negatively related to the girls' 9th grade task attribution in success situations ($\Delta R^2 = .08$, $p < .01$; $\beta = -.36$, $p < .01$): the higher the self-concept in 7th grade, the less likely girls attributed success to task in 9th grade. The same result was not found in boys. Furthermore, in success situations 7th grade self-concept was significantly and positively related to the girls' ($\Delta R^2 = .06$, $p < .01$; $\beta = .34$, $p < .01$) and boys' ($\Delta R^2 = .08$, $p < .01$; $\beta = .37$, $p < .01$) 9th grade ability attribution: the better the self-concept in 7th grade, the more likely both girls and boys attributed success to ability in 9th grade.

TABLE 5. Summary of hierarchical regression analyses for predicting 9th grade math attributions with 7th grade math self-concept in success situations

Variables	Ability			Effort			Task			Guidance		
	r	β	R ²	r	β	R ²	r	β	R ²	r	β	R ²
Step 1: Attribution in 7 th grade	.47***	.46***	.21***	.27***	.29***	.08***	.21**	.22**	.05**	.40***	.41***	.17***
Step 2: Gender	.20**	.11	.23***	-.03	-.04	.08***	-.09	-.08	.06**	-.03	.00	.17***
Step 3: Math skills in 7 th grade	.33***	.21**	.27***	-.14	-.10	.09***	-.09	-.07	.06*	-.25**	-.18**	.20***
Step 4: Math self-concept in 7 th grade	.53***	.34***	.33***	-.18*	-.10	.10**	-.19*	-.20*	.08**	-.25***	-.04	.20***

Note: * p<.05, **p<.01, ***p<.001

TABLE 6. Summary of hierarchical regression analyses for predicting 9th grade math attributions with 7th grade math self-concept in failure situations

Variables	Ability			Effort			Task			Guidance		
	r	β	R ²	r	β	R ²	r	β	R ²	r	β	R ²
Step 1: Attribution in 7 th grade	.24**	.24**	.06**	.29***	.26***	.07***	.15	.18*	.03*	.17*	.15	.02
Step 2: Gender	-.09	-.08	.07**	.17*	.14*	.09***	-.07	-.06	.04*	.08	.06	.03
Step 3: Math skills in 7 th grade	-.21**	-.17*	.10**	.05	.06	.09***	.06	.06	.04	.04	.01	.03
Step 4: Math self-concept in 7 th grade	-.28***	-.22*	.13***	.151	.13	.11***	-.09	-.17	.06*	.19**	.25*	.06*

Note: * p<.05, **p<.01, ***p<.001

4. DISCUSSION

The purpose of the present study was to find out how and to what extent adolescents' causal attributions in mathematics and in Finnish language are related to their self-concepts in the corresponding school subjects in upper comprehensive school, and what kind of developmental dynamics causal attributions and self-concept of abilities show, i.e. whether self-concepts in given fields predict subsequent attributions in corresponding school subjects or is it rather attributions that predict subsequent self-concepts. Also, the role of gender in the above mentioned relationships was examined. Overall, the results showed that high self-concept was related to adaptive attributional style whereas low self-concept was related to less adaptive attributional style. The associations were also found to be very similar across grades and gender, with few exceptions. Furthermore, the results showed that it was previous self-concept that predicted subsequent attributions rather than vice versa.

4.1 Self-concept of ability and attributions in success situations

The relationships between self-concepts and attributions in 7th grade and in 9th grade were fairly similar in both success and failure situations in mathematics and in Finnish language supporting earlier findings (Marsh 1984; Marsh et al., 1984; Marsh, Relich & Smith 1983; Marsh, Smith & Barnes 1983). In both school subjects adolescents with high self-concept internalized successes by attributing it to ability. Self-serving bias effect assumes that people with high self-concept attribute successes to internal and stable factors and failures to external factors (e.g. Marsh 1986b). According to the results of the present study the correlations between both math and Finnish language self-concepts and attributing success to ability were positive and thus, consistent with the previous correlational studies (Kurtz-Costes & Schneider 1994; Marsh 1984; Marsh et al., 1984; Marsh, Relich & Smith 1983; Marsh, Smith & Barnes 1983; Nicholls 1979; Platt 1988; Zhou & Urhahne 2013) and the self-serving bias assumption, indicating that adolescents with high self-concept in given domains have a tendency to attribute successes to their abilities.

The results of the present study showed further that it was self-concept that had an impact on some of the subsequent attributions rather than vice versa. The impact was similar in both school subjects. The main finding of the current study showing that self-concept of abilities affect subsequent attributions rather than vice versa is inconsistent with Weiner's theory (1985, 2010), expectancy-value theory (Eccles & Wigfield 2002; Wigfield 1994), and theory of learned

helplessness (Abramson et al., 1978) as well as with the research done on adolescents (Platt 1988; Watkins & Astilla 1986) and children (Watkins & Gutierrez 1989; Zhou & Urhahne 2013) which all assume that attributions have an impact on self-concepts or self-esteem. However, the current results are in line with studies indicating that self-esteem affects on attributions (Hirchy & Morris 2002; Tennen & Hertenberg 1987) and that academic self-concept has an effect on attributions (Kurtz-Costes & Schneider 1994; Marsh 1984). The inconsistency of the results in the field may be due to different methodology used in the studies. For instance, previous studies have mostly used general self-concept and/or attribution measures instead of domain specific measures and mainly also used cross-sectional rather than longitudinal data. Since it has been noted in earlier research that self-concepts are domain specific (e.g. Marsh 1990; Valentine et al., 2004) and that attributions might also be domain specific (e.g. Boekarts et al., 2003), it is possible that the causal relationship between these variables is different depending on the measures used. Furthermore, cross-sectional data can't validly test causal relations (Marsh 1984).

The results concerning the developmental dynamics between the self-concepts and attributions showed that adolescents' self-concept of math and Finnish language were positively related to attributing their subsequent success to their abilities but ability attribution did not have an impact on subsequent self-concepts. The higher the self-concept in 7th grade, the more success outcomes in math and Finnish language were attributed to abilities in 9th grade. This result found among adolescents supports previous studies (Kurtz-Costes & Schneider 1994; Marsh 1984) that indicated a direct positive effect from self-concept to ability attributions in success situations among 8-10 year-olds and fifth graders. This result is also consistent with the self-consistency theory (Fitch 1970; Swann et al., 1987) and self-serving bias effect (e.g. Marsh 1986b): attributing success to ability is consistent with good self-concept and it would not only be illogical for high self-concept people not to give credit to themselves for their own success but also is not consistent with their good self-concept. What is important in this finding is that self-concept of abilities had a long-term impact on attributing success to ability in future success situations while attributing success to ability did not have an effect on subsequent self-concept. These results suggests that promoting good self-concept during adolescence promotes adaptive attributional style and this might in turn protect against adverse effects attributions can have.

The results of previous studies investigating the role the external attributions in success situations have been mixed (e.g. Marsh et al., 1984; Marsh 1984) and some earlier studies have indicated that neither success nor failure outcomes are related to external attributions (Kurtz-Costes & Schneider 1994; Watkins & Gutierrez 1989). In the current study, adolescents' low self-concept

was associated with externalizing success by attributing it to task and guidance. This result was found in both school subject. Specifically, attributing success to external factors such as to guidance and task were negatively related to both of the self-concepts but the relationship between task attribution and both self-concepts become statistically significant in 9th grade. These results indicate that the lower the self-concept, the more adolescents attributed their successes to external factors. Supporting the present findings low self-concept has also previously been related to externalizing successes (Cooley & Ayres 1988; Núñez, et al., 2005; Möller & Köller 2000). The current finding of guidance attribution in success situations being negatively related to self-concept is similar to Zhou and Urhahne's (2013) results which indicated negative relations between self-concept and attributing success to others. Also, task attribution's negative relations with self-concept is consistent with Platt's study (1988) of adolescents which indicated a negative relationship between task attribution and academic self-concept but contradictory to the findings of Zhou and Urhahne's (2013) study of fourth graders in which attributing success to task characteristics was positively related to self-concept. One explanation for the low self-concept adolescents blaming their success on external factors is that by doing this they attempt to preserve their self-views. This argument is in line with the self-consistency theory (Fitch 1970; Swann et al., 1987). Furthermore, attributing success to external factors is a sign of a maladaptive attributional style (Chodkiewicz & Boyle 2014), which has been related to low self-concept (Cooley & Ayres 1988; Möller & Köller 2000; Núñez et al., 2005; Tabassam & Grainger 2002).

The results concerning the developmental dynamics between the external attributions in success situations and self-concepts showed further that it was self-concept that predicts success attributions rather than vice versa in both mathematics and in Finnish language. However, this long-term impact was found only concerning task attribution. The higher the self-concept was in 7th grade, the less likely subsequent successes in math and Finnish language were attributed to task easiness. These results suggests that the correlations between self-concepts and guidance attribution in success situations did not impact on each other with time but self-concept had a long-term effect on avoiding task attribution in success situations. It seems like a good self-concept protects against the development of maladaptive attributional style. One possible explanation for why self-concept lessened the amount of subsequent task attribution but not guidance attribution in success situations could be that attributing success to task easiness might be less consistent with good self-concept by implying that everyone could have completed the task successfully because it was easy, and therefore did not require ability whereas attributing success to getting enough guidance might imply

that the task itself was difficult enough because it needed assistance to get completed, and thus also requires ability.

In the current study attributing success to effort was negatively related with self-concept of math in both of the measurement points and also showed statistically significantly negative relation with self-concept of Finnish language but only in 7th grade among girls. This result suggests that the lower self-concept was, the more likely adolescents attributed success to effort and the higher the self-concept was, the less likely they attributed their success to effort. These results are consistent with Kurtz-Costes and Shneider's (1994) and Nicholls' (1979) studies but inconsistent with some other studies (Marsh 1984; Marsh et al., 1984; Marsh, Relich & Smith 1983; Marsh, Smith & Barnes 1983; Platt 1988; Zhou & Urhahne 2013). These results can be interpreted in the frame of self-enhancement theory which posits that attributing success to internal reasons enhances self-esteem (Fitch 1970). That is, for low self-concept adolescents attributing success to effort might be an attempt to enhance self-esteem. Also, high self-concept adolescents had a tendency to attribute success to ability which is more consistent with their self-concept than effort which would imply that they are not smart enough if they thought they would need to try hard to succeed. Older children are found to understand the compensatory nature of effort and ability; people who have the ability don't need to try hard and people who have less ability need to try harder (e.g. Folmer et al., 2008). In addition, most of the previous studies have examined children under 12 years-old who might not yet see the difference between effort and ability (e.g. Covington 1984; Folmer et al., 2008; Nicholls 1978). Therefore, low self-concept adolescents who attribute success to effort are most likely capable of disentangling effort and ability and their lower self-concept implies that they perceive themselves as not good in the school subjects in question. Thus, it is natural for these adolescents to attribute their success increasingly to effort; they perceive themselves as not so capable in these school subjects and thus, they need to try hard to succeed. This type of pattern indicates that despite having a low self-concept they seem not to show a sign of learned helplessness which is characterized as not having control over outcomes (Abramson et al., 1978). Therefore, it can be concluded that these adolescents have somewhat adaptive attributional style.

However, 7th grade self-concepts did not statistically significantly predict 9th grade effort attributions and effort attributions did not have an effect on subsequent self-concept in success situations in either one of the school subjects. This finding is inconsistent with Marsh's (1984) findings which indicated a positive effect from self-concept on attributing success to effort. The inconsistency between the present study and Marsh's (1984) study could be due to the fact that Marsh used cross-sectional data and the participants of his study were fifth graders, and thus might

not completely understand that effort is different from ability. Taken together, these findings suggest that the correlations between effort attributions and self-concepts in success situations don't actually have any long-term effects.

Previous studies have not found gender differences in the relations of self-concept and attributions (Marsh, Smith & Barnes 1983; Watkins & Gutierrez 1989) or have indicated that only women's self-esteem predicts adaptive attributional style (Hirchy & Morris 2002), and only women who attribute success to effort have higher self-concept compared to women who attribute success to external factors (Bandalos et al., 1995) suggesting that attributional processes might affect differently on women. Somewhat in line with the previous findings the current study showed that high self-concept girls were more prone to attributing their success to their abilities than boys with high self-concepts in both school subjects in 7th grade, and also in line with the studies that have shown that girls tend to attribute their success to effort (Mok et al., 2011; Ryckman & Peckham 1987; See also Meece et al., 2006), in the present study girls with low self-concept had a tendency to attribute their success in Finnish language to effort in 7th grade.

The results of the developmental dynamics between the self-concepts and attributions showed that in particular girls' self-concept of math was negatively related to subsequent success attributions to task: the higher the girls' self-concept of math was, the less likely subsequent successes were attributed to task easiness. This result is in line with Hirchy and Morris' (2002) study. Thus, it was more evident for girls' self-concept to have positive effects on attributions in math; positive self-concept of math promoted adaptive attributional style but also made it less likely to become maladaptive in the future. Mathematics have stereotypically been thought of as a discipline which males are better at than girls (Georgiou et al., 2007) and girls are also found to have worse self-concept in math compared to boys (e.g. Willgenbusch & Merrell 1999). It has also been noted that significant others affect on the development of self-concept (Bong & Skaalvik 2003; Gniewosz et al., 2012) and students are found to construct their self-concept based on comparison processes (Marsh 1986a). In fact, children are known to evaluate their academic self-concepts higher with less able peers (i.e. Big-Fish-Little-Pond effect) (Marsh & Parker 1984). Thus, one could assume that girls with high self-concept in math don't have many peers with high self-concept in math. It could also be assumed that girls who have high self-concept in math are likely to compare their self-concept to other girls and because they don't know many girls who also feel competent in math, these girls might have higher self-concept in math than for instance, in a math talented class. Girls who are good at math might also be given more ability feedback than boys because boys are thought to be more able at math so they don't need as much praise. Furthermore,

attributing success to ability logically excludes attributing success to task. One possible explanation for girls self-concept lessening the amount of subsequent task attribution in success situations might be that due to the above mentioned reasons, girls with higher self-concept of math might praise themselves with more ability feedback than boys, and therefore self-concepts have more profound effects on the attributions in question. Overall, high self-concept of math seems to affect on girls' tendency to avoid attributing success to task easiness.

4.2 Self-concept of ability and attributions in failure situations

According to the results of the current study adolescents' low self-concept in math and Finnish language was associated with attributing failures to lack of abilities. Attributing failure to internal, stable and global factors is considered to lower self-esteem and to cause learned helplessness (Abramson et al., 1978) and attributing failure to lack of ability is also considered as maladaptive attributional style (Chodkiewicz & Boyle 2014). The results of the present study support the previous studies which have shown that attributing failure to ability (Kurtz-Costes & Schneider 1994; Marsh 1984; Marsh et al., 1984; Marsh, Relich & Smith 1983; Marsh, Smith & Barnes 1983; Nicholls 1979; Zhou & Urhahne 2013) is negatively related to academic self-concept. The results are also in line with the research indicating that children with lower self-concept have a tendency to internalize failures (Cooley & Ayres 1988; Möller & Köller 2000; Núñez et al., 2005; Tabassam & Grainger 2002), and that people with low-self-esteem are prone to ascribing more responsibility for failures than high self-esteem persons (Bar-Tal 1982).

The results concerning the developmental dynamic between self-concepts and attributions showed that, as in the case of success situations, it was rather self-concept that influenced on subsequent attributions rather than vice versa. According to the results, in both school subjects self-concept of abilities had a negative effect on attributing subsequent failure to ability; the higher the self-concept in 7th grade, the less likely failures were attributed to ability in 9th grade. The results are in line with Marsh's (1984) cross-sectional study which showed that self-concept had a direct negative effect on attributing failure to ability. The results can be interpreted again by using self-consistency theory (Fitch 1970): for low-self-concept adolescents attributing their failure to lack of ability and high self-concept adolescents avoiding the same attribution can be considered as consistent with their self-concepts. The role of self-concept explaining ability attributions in failure and success situations might be due to the fact that children learn to distinguish their different abilities fairly young (e.g. Wigfield & Karpanthian 1991), and thus logically assign their successes

and failures to their abilities or lack of abilities in accordance with their self-concepts. Furthermore, the measurement of self-concept (i.e. “I am good at”) and ability attributions (i.e. “I have the ability”) are fairly similar, and therefore these constructs might be related to each other. However, high self-concept seems to protect against blaming failures in the future on lack of ability, which in turn, might protect from maladaptive attributional style and promote adaptive attributional style.

The results of the present study showed that in addition to internalizing successes, adolescents with high self-concept externalized failures in both school subjects. In the present study both self-concepts were positively related to guidance attribution in failure situations indicating that high self-concept adolescents were prone to attributing their failures in math and Finnish language to the external factor, i.e. lack of guidance. Previous research hasn't examined the role of guidance and its relations to self-concept. However, the present findings are not in line with Zhou and Urhahne's study (2013) that showed a negative relation between general academic self-concept and attribution to others in failure situations among fourth grade children. This inconsistency might be due to the different age group and measures used in Zhou and Urhahne's study.

The results concerning the developmental dynamic between failure attributions and self-concepts showed that self-concept had a positive effect on attributing subsequent failure to lack of guidance later on; the better the self-concept in Finnish language and in math in 7th grade, the more likely failures were attributed to the lack of guidance in 9th grade. The result that adolescents who have good self-concept are more likely to attribute their subsequent failure to the lack of guidance is consistent with self-serving bias effect according to which people have a tendency to externalize failure and thereby protect their self-esteem (e.g. Marsh 1986b; See also Covington 1984). The results are also consistent with self-enhancement theory which posits that attributing failure to external causes might work as self-enhancement (Fitch 1970) and support notions from previous literature indicating that people who use self-serving bias often have high self-esteem (Layden 1982). Overall, it seems that, during adolescence, positive self-concept had a role in promoting self-protective attributional tendencies in both school subjects.

In the previous literature, attributions are hypothesized to impact on self-esteem (Bong & Skaalvik 2003). In the present study only one this kind of effect was found: the more boys attributed their failure in math to lack of guidance in 7th grade, the better their subsequent self-concept of math ability in 9th grade was. This result supports the assumptions of Weiner's theory (1985, 2010), expectancy value theory (Eccles & Wigfield 2002; Wigfield 1994) and the theory of learned helplessness (Abramson et al., 1978), which all assume that attributions affect on subsequent self-esteem or self-concept. Earlier research hasn't investigated the role of guidance

attribution in the relationship of attributions and self-concept. The fact that attributing failure to guidance affected positively on subsequent self-concept in math indicates a need to examine effects of different attributions on self-concept separately in girls and boys. Also, the fact that the same effect was not found in Finnish language suggests that attributions might have a different effect on different self-concepts. Thus, perhaps the effects of attributions are domain and gender specific just like it is indicated that self-concept and attributions are domain specific.

In the present study, the positive relationship between guidance attribution and math self-concept in failure situations was no longer statistically significant in 9th grade. Instead there was a positive relationship between 9th grade math self-concept and attributing failure to lack of effort. Thus, adolescents with high self-concept in math preferred lack of effort over guidance attribution after failure in 9th grade. This indicates that they had some sense of control over failure outcomes. Also, unlike the studies associating effort attribution in failure situations to lower self-concept (Marsh 1984; Marsh et al., 1984; Zhou & Urhahne 2013), in the present study attributing failure to effort was positively related to self-concept (See also Kurtz-Costes & Schneider 1994). One possible explanation for the positive relationship is that people with high self-concept might attribute failure to lack of effort possibly because they think that they have better outcome with more effort which view is more consistent with their self-concept (Marsh, Relich & Smith 1983; Marsh, Smith & Barnes 1983). Attributing failure to effort can also be considered as self-protective strategy (Anderman & Maehr 1994; Folmer et al., 2008; Py & Jouffre 2009; See also Covington 1984). High self-concept adolescent attributing failure to not trying enough in math implies that the task was so difficult that even a person perceiving himself good at it couldn't do it, and at the same time lack of effort implies that they had the ability if they would have tried harder. Thus, attributing failure to not trying might actually be self-enhancing to the high self-concept adolescents. A possible explanation for why high math self-concept adolescents had a tendency to blame lack of effort for their failures in 9th grade instead of lack of guidance, which they did blame in Finnish language 9th grade failure situations, might be due to effort attribution being a more culturally acceptable attribution in failure of math compared to Finnish language among adolescents with high self-concept than attributing the failure to the lack of help. It is possible that for adolescents to do well in mathematics requires more effort than to do well in Finnish language tasks, and therefore attributing failure in math to effort might be more culturally acceptable or valued among adolescents with high self-concept than in Finnish language. However, the results of the developmental dynamics between self-concept and attributions showed that self-concept did not have an impact on subsequent attribution of failure to effort and attributing failure to effort did not

have an influence on subsequent self-concept in either one of the school subjects. That is, although attributing failure to effort is associated with high self-concept, they do not have any long-term effects on each other.

In the present study task attribution in failure situations, in turn, was not related to either one of the self-concepts supporting the previous findings that have grouped external attributions into one class (Kurtz-Costes & Schneider 1994; Watkins & Gutierrez 1989) but again contradictory to the Zhou and Urhahne (2013) study in which attributing failure to task characteristics was negatively related to self-concept. Thus, it seems like attributing failure to task doesn't play a significant role in the development of self-concept in adolescence but self-concept does not affect on attributing subsequent failures to task either. In the present study self-concept affected positively on attributing subsequent failures to lack of guidance. A possible explanation for this is that high self-concept people are more likely choose (if they have an option) to attribute their failure to lack of guidance because that might imply that to succeed you would have needed help, which in turn, suggests that the task had been difficult enough (requires also ability to succeed), whereas attributing failure to task difficulty might imply that you are not able enough after all. Therefore, it might be more self-protective/enhancing to attribute failure to lack of guidance than to task difficulty.

4.3 Limitations, future challenges and implications

As in all studies, there are several limitations to the generalizability of the findings of the present study that should be taken into account when interpreting the results. First, the sample size was relatively small and the data also consisted of a specific age range of students. Even though the current study provided a valuable contribution to the information about the dynamics of the self-concept of abilities and attributions in specific school domains during adolescence, it would be more informative to replicate the findings with a bigger sample but also include students with different ages in the study for comparative reasons. Since the present study posited some gender differences in the relations between causal attributions and self-concept of abilities, and these differences were further dependent on school subject, it would be useful in future studies to examine gender differences and other school subjects simultaneously. Also, it seems that self-concept has a different effect on external attributions depending on the given cause. Namely, self-concept didn't have a significant effect on attributing subsequent failure to task but it did have a positive effect on attributing failure to lack of guidance. Similarly, while self-concept affected negatively on subsequent attribution to task easiness in success situations, self-concept did not have

an effect on attributing success to getting enough guidance. These results highlight the need to investigate not only academic self-concepts and causal attributions from a domain specific perspective but also to investigate the relationship of causal attributions and self-concepts without grouping external attributions into one group.

Second, many researchers have raised a concern about measuring attributions with hypothetical situations as they might not accurately measure students' attributional tendencies in real-life situations (Hirchy & Morris 2002; Wolters et al., 2013). Therefore, as Hirchy and Morris (2002) noted, real-life measurement would provide information about the current study's generalizability to the actual life-events. Taken all this into consideration, the validity of the current study's attribution measurement could be questioned and it is a challenge for future research to develop tools that would have more ecological validity (Wolters et al., 2013). Furthermore, the present study used only a few questions to assess the causal attributions. Researchers recommend assessing constructs with multiple tools to get a better understanding about the constructs but also to avoid errors concerning measurement (Hirchy & Morris 2002).

Third, previous studies have found cultural differences in the use of causal attributions (Mezulis et al., 2004). Since the sample in the present study was culturally homogenous the results should be carefully interpreted to represent other cultures. Also, since attributions are thought to have different consequences depending on the location of the attribution on causal dimensions (Weiner 2010) and because attributions might be located to different dimensions depending on the person (Weiner 1979; 2010) and age of the person (Earn & Sobol 1991), it would be good to assess subjective locations of the attributions simultaneously when researching attributions. This would give a more accurate picture of the relationship between self-concepts and attributions.

Fourth, in the present study measurements were conducted twice in two years which is one of the strengths of the study given the limitations of the previous research but longer follow-up time with more intensive measurement would be beneficial for the generalizability of the results. To differentiate the reciprocal or causal relations is a challenge that demands a careful research design (Wolters et al., 2013). The explanatory power of some the examined variables was fairly small indicating that other factors are involved in the process, and also there seemed to be a relatively large amount of constancy in both attributions and self-concepts. It might very well be that more intensive measurement and sophisticated research tools would reveal that these constructs affect on each other in a reciprocal manner. Attributions might also have a short-term impact on self-concept whereas the current research mainly suggests that self-concept has a long-term effect on some of the measured attributions. Thus, although attributions in most of the cases did not predict self-concepts

the possibility of the reciprocal connections can't be excluded given the restrictions of the methodology and measurement used. Also, to grasp a more complex picture it would be necessary to examine the role of other related constructs.

Finally, this study used data gathered solely from adolescents themselves. Data that would have included information about self-concepts and attributions from others such as parents or teachers might have provided a different picture about the relationship of these variables or at least would have given a broader picture of the phenomena.

Despite the shortcomings of the study, the results suggest that adolescents with high self-concepts have more adaptive attributional styles than adolescents with low self-concept. Although research on attributional retraining suggests that teaching more adaptive attributions has a positive impact on self-esteem (Chodkiewicz & Boyle 2014) and attributional feedback is effective for the purpose of self-concept enhancement (O'Mara, Marsh, Crave & Debus 2006), the present study suggests that by promoting high self-concept of abilities it might be possible to promote adolescents adaptive attributions. Thus, the present study suggests that during adolescence self-concept training might lead to a greater change in attributions than attribution retraining. Furthermore, since the present study suggests that the effect of self-concept on subsequent attributions might be different depending on gender and school subject, perhaps girls would benefit from different intervention structures supporting self-concept in different school subjects compared to boys and vice versa.

Low self-concept is usually related to low-achievement (e.g. Möller et al., 2011) and it is suspected whether long-term effects of self-concept enhancement interventions can occur if these programs do not include enhancing the actual skills (O'Mara et al., 2006). On the other hand, it is nowadays known that self-concept is a flexible and changing construct (Gniewosz et al., 2012) and self-confidence accounts more for achievement than actual skills (Gonzalez-Pumariiega et al., 2002). Therefore, school should promote students' self-perception so that instead of feeling incompetent students would see themselves as capable of succeeding despite the problems they encounter (Gonzalez-Pumariiega et al., 2002). It has also been suggested that metacognitive skills might countervail poor abilities (Schraw 1998). Thus, promoting metacognitive skills might also enhance students' self-concept of abilities. Metacognitive abilities are known to improve in adolescence and, although it is not fully established knowledge, the improvement might be connected to the development of sense of self and self-awareness (Weill et al., 2013). Teachers, psychologists and other significant people in adolescents' lives have a big role in promoting these skills and it is the role of the future research to investigate more carefully the links between metacognitive skills and emerging selves and to develop practical applications.

However, teachers, parents and other significant people in adolescents' lives should investigate and promote healthier self-concept of abilities together with adolescents but keep in mind that these, as well as causal attributions, are domain specific and therefore changing self-concept or attributions in one area doesn't mean that the change will occur in another area. Also, as Vispoel and Austin (1995) noted, teachers should teach that ability is something that can be changed instead of something unchangeable in nature and therefore promote an incremental view of intelligence. This raises the question of the kind of feedback students get in upper school. More qualitative feedback or qualitative feedback with numerical grades could provide opportunities for discussion and training of better self-concepts and attributions adolescents have. Given the importance that both self-concept of abilities and attributions have in adolescents' lives, it is vital not only to perceive and intervene in possible negative cycles self-concept and attribution can create but also to correct the development of negative cycles that might already exist in low-self-concept adolescents' lives.

4.4 Conclusions

The purpose of the current study was to contribute to the body of knowledge regarding the effects of self-concept of abilities on causal decisions adolescents make in academic contexts, on one hand, and what is the effect of causal attributions on self-concepts, on the other hand. The results confirmed the previous findings according to which self-concepts and attributions are related with each other. However, the results of the current study also added to the previous literature by showing that during adolescence self-concepts predict some but not all of the attributions rather than vice versa. The results also showed that there are some gender differences in the dynamics of self-concepts and attributions: attributing failure in mathematics to guidance had a positive effect on boys' subsequent self-concept. Also, particularly girls who had high self-concept of math were less likely to attribute their subsequent success to easiness of the task. Consequently, the results of the current study extended the previous knowledge about the gender differences found in attributions and self-concept of abilities and proposes that the effect of causal attributions on subsequent self-concept of abilities and the effect of self-concept on subsequent attributions might be different for boys and girls and that these differences might also depend on the school subject in question.

REFERENCES

- Abramson, L. Y., Seligman, E. P. & Teasdale, J. D. (1978). Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Psychology, 87(1)*, 49-74.
- Anderman, E. M. & Maehr, M. L. (1994). Motivation and schooling in the middle grades. *Review of Educational Research, 64(2)*, 287-309.
- Archambault, I., Eccless, J. S. & Vida, M. N. (2010). Ability self-concepts and subjective value in literacy: joint trajectories from grades 1 through 12. *Journal of Educational Psychology, 102(4)*, 804-816.
- Bandalos, D. L., Yates, K. & Thorndike-Christ, T. (1995). Effects of math self-concept, perceived self-efficacy, and attributions for failure and success on test anxiety. *Journal of Educational Psychology, 87(4)*, 611-623.
- Banks, M. & Woolfson, L. (2008) Why do students think they fail? The relationship between attributions and academic self-perceptions. *British Journal of Special Education, 35(1)*, 49-56.
- Bar-Tal, D. (1982). The effects of teacher's behavior on pupils' attributions: a review. In C. Antaki & C. Brewin (eds.), *Attributions and psychological change. Applications of attributional theories to clinical and educational practice*, (177-194). London: Academic Press.
- Boekarts, M., Otten, R. & Voeten, R. (2003). Examination performance: are students causal attributions school-subject specific? *Anxiety, Stress and Coping, 16(3)*, 331-343.
- Boman, P., Smith, D. & Curtis, D. (2003). Effects of pessimism and explanatory style on development of anger in children. *Social Psychology International, 24(1)*, 80-94.
- Bong, M. & Skaalvik, E. M. (2003). Academic self-concept and self-efficacy: how different are they really? *Educational Psychology Review, 15(1)*, 1-40.
- Bornholt, L. & Möller, J. (2003). Attributions about achievement and intentions about further study in social contexts. *Social Psychology of Education, 6(3)*, 217-231.
- Briones, E. & Taberero, C. (2012). Social cognitive and demographic factors related to adolescents' intrinsic satisfaction with school. *Social Psychology of Education, 15(2)*, 219-232.
- Brunner, M., Keller, U., Dierendonck, C., Reichert, M., Ugen, S., Fischbach, A. & Martin, R. (2010). The structure of academic self-concepts revisited: the nested Marsh/Shavelson Model. *Journal of Educational Psychology, 102(4)*, 964-981.

- Brunner, M., Keller, U., Hornung, C., Reichert, M. & Martin, R. (2009). The cross-cultural generalizability of a new structural model of academic self-concepts. *Learning and Individual Differences, 19*(4), 387-403.
- Byrne, B. M. & Worth Gavin, D. A. (1996). The Shavelson model revisited: testing for the structure of academic self-concept across pre-, early, and late adolescents. *Journal of Educational Psychology, 88*(2), 215-228.
- Chiu, M. M. & Klassen, R. M. (2009). Calibration of reading self-concept and reading achievement among 15-year-olds: cultural differences in 34 countries. *Learning and Individual Differences, 19*(3), 372-386.
- Chiu, M. M. & Klassen, R. M. (2010). Relations of mathematics self-concept and its calibration with mathematics achievement: cultural differences among fifteen-year-olds in 34 countries. *Learning and Instruction, 20*(1), 2-17.
- Chodkiewicz, A. R. & Boyle, C. (2014). Exploring the contribution of attribution retraining to student perceptions and learning process. *Educational Psychology in Practice, 30*(1), 78-87.
- Ciarrochi, J., Heaven, P. C. L. & Davies, F. (2007). The impact of hope, self-esteem, and attributional style on adolescents' school grades and emotional well-being. *Journal of Research in Personality, 41*(6), 1161-1178.
- Cole, D. A., Ciesla, J. A., Dallaire, D. H., Jacquez, F. M., Pineda, A. Q., LaGrange, B., Truss, A. E., Folmer, A. S., Tilghman-Osborne, C. & Felton, J. W. (2008). Emergence of attributional style and its relation to depressive symptoms. *Journal of Abnormal Psychology, 117*(1), 16-31.
- Cole, D. A., Maxwell, S. E., Martin, J. M., Peeke, L. G., Seroczynski, A. D., Tram, J. M., Hoffman, K. B., Ruiz, M. D., Jacquez, F. & Maschman, T. (2001). The development of multiple domains of child and adolescent self-concept: a cohort sequential longitudinal design. *Child Development, 72*(6), 1723-1746.
- Cooley, E. J. & Ayres, R. (1988). Self-concept and success-failure attributions of nonhandicapped students and students with learning disabilities. *Journal of Learning Disabilities, 21*(3), 174-178.
- Covington, M. V. (1984). The self-worth theory of achievement motivation: Findings and implications. *The elementary School Journal, 85*(1), 4-20.
- Demo, D. H. (1992). The self-concept over time: Research issues and directions. *Annual Review of Sociology, 18*(1), 303-326.

- Durik, A. M., Vida, M., Eccles, J. S. (2006). Task values and ability beliefs as predictors of high school literacy choices: a developmental analysis. *Journal of Educational Psychology, 98*(2), 382-393.
- Earn, B. M. & Sobol, M. P. (1991). Developmental differences in the interpretation of social causes. *Canadian Journal of Behavioral Science, 23*(1), 114-119.
- Eccles, J. S., Midgley, C., Wigfield, A., Buchanan, C., Reuman, D., Flanagan, C. & Mac Iver, D. (1993). Development during adolescence. The impact of stage-environment fit on young adolescents' experiences in schools and in families. *The American Psychologist, 48*(2), 90-101.
- Eccles, J. & Wigfield, A. (2002). Motivational beliefs, values and goals. *Annual Review of Psychology, 53*(1), 109-132.
- Fitch, G. (1970). Effects of self-esteem, perceived performance and choice on causal attributions. *Journal of Personality and Social Psychology, 16*(2), 311-315.
- Flammer, A. & Schmid, D. (2003). Attribution of conditions for school performance. *European Journal of Psychology of education, 18*(4), 337-355.
- Folmer, A. S., Cole, D. A., Sigal, A. B., Benbow, L. D., Satterwhite, L. F., Swygert, K. E. & Ciesla, J. A. (2008). Age-related changes in children understanding of effort and ability: Implications for attribution theory and motivation. *Journal of Experimental Child Psychology, 99*(2), 114-134.
- Fraine, D. B., Damme, J. V. & Onghena, P. (2007). A longitudinal analysis of gender differences in academic self-concept and language achievement: a multivariate multilevel latent growth approach. *Contemporary Educational Psychology, 32*(1), 132-150.
- Georgiou, S. N., Stavriniades, P. & Kalavana, T. (2007). Is Victor better than Victoria in math? *Educational Psychology, 23*(4), 329-342.
- Gnievosz, B., Eccles, J.S. & Noack, P. (2012). Secondary school transition and the use of different sources of information for the construction of the academic self-concept. *Social Development, 21*(3), 537-557.
- Gonzalez-Pienda, J. A., Nunez, J. C., Gonzalez-Pumariega, S., Alvarez, L., Roces, C. & Garcia, M. (2002). A structural equation model of parental involvement, motivational and aptitudinal characteristics, and academic achievement. *The Journal Of Experimental Education, 70*(3), 257-287.
- Graham. S. (2004). Giving up on modern foreign languages? Students' perceptions on learning French. *The Modern Language Journal, 88*(2), 171-191.

- Guay, F., Larose, S. & Boivin, M. (2004). Academic self-concept and educational attainment level: a ten-year longitudinal study. *Self and Identity*, 3(1), 53-68.
- Guay, F., Marsh, H. W. & Boivin, M. (2003). Academic self-concept and academic achievement: developmental perspectives on their causal ordering. *Journal of Educational Psychology*, 95(1), 124-136.
- Harter, S. (1999). *The construction of the self. A developmental perspective*. New York: The Guilford Press.
- Heider, F. (1958). *The psychology of interpersonal relations*. New York: John Wiley & Sons Inc.
- Higgins, N. C. & LaPointe, M. R. P. (2012). An individual differences measure of attributions that affect achievement behavior: Factor structure and predictive validity of the academic attributional style questionnaire. *SAGE Open*, 2(4), 1-15.
- Hirchy, A. J. & Morris, J. R. (2002). Individual differences in attributional style: the relational influence of self-efficacy, self-esteem, and sex role identity. *Personality and Individual Differences*, 32(2), 183-196.
- Holopainen, L., Kairaluoma, L., Nevala, J., Ahonen, T. & Aro, M. (2004). Lukivaikkeuksien seulontatesti nuorille ja aikuisille. (Dyslexia screening test for youth and adults). Jyväskylä: Jyväskylän yliopistopaino.
- Hui, E. K. P. (2000). Personal concerns and their causes: perceptions of Hong Kong Chinese adolescent students. *Journal of Adolescence*, 23(2), 189-203.
- Ireson, J. & Hallam, S. (2009). Academic self-concepts in adolescence: relations with achievement and ability grouping in schools. *Learning and Instruction*, 19(3), 201-213.
- Jacobs, J. E., Lanza, S., Osgood, D. W., Eccles, J. S. & Wigfield, A. (2002). Changes in children's self-competence and values: gender and domain differences across grades one through twelve. *Child development*, 73(2), 509-527.
- Joiner, T. E. & Wagner, K. D. (1995). Attributional style and depression in children and adolescents: a meta-analytic review. *Clinical Psychology Review*, 15(8), 777-798.
- Kurtz-Costes, B. E. & Schneider, W. (1994). Self-concept, attributional beliefs, and school achievement: a longitudinal analysis. *Contemporary Educational Psychology*, 19(2), 199-216.
- Layden, M. A. (1982). Attributions and the maintenance of behavior change. In C. Antaki & C. Brewin (eds.), *Attributions and psychological change. Applications of attributional theories to clinical and educational practice*, (63-82). London: Academic Press.

- Little, T. D. & Lopez, D. F. (1997). Regularities in the development of children's causality beliefs about school performance across six sociocultural contexts. *Developmental psychology*, 33(1), 165-175.
- Ma, X. & Kishor, N. (1997). Attitude toward self, social factors, and achievement in mathematics: a meta-analytic review. *Educational Psychology*, 9(2), 89-120.
- Marsh, H. W. (1984). Relations among dimensions of self-attribution, dimensions of self-concept, and academic achievement. *Journal of Educational Psychology*, 76(6), 1291-1308.
- Marsh, H. W. (1986a). Verbal and math self-concepts: an internal/external frame of reference model. *American Educational Research Journal*, 23(1), 129-149.
- Marsh, H. W. (1986b). Self-serving effect (bias?) in academic attributions: its relation to academic achievement and self-concept. *Journal of Educational Psychology*, 78(3), 190-200.
- Marsh, H. W. (1989). Age and sex effects in multiple dimensions of self-concept: preadolescence to early adulthood. *Journal of Educational Psychology*, 81(3), 417-430.
- Marsh, H. W. (1990). The structure of academic self-concept: the Marsh/Shavelson model. *Journal of educational Psychology*, 82(4), 623-636.
- Marsh, H. W., Barnes, J., Cairns, L. & Tidman, M. (1984). Self-description questionnaire: age and sex effects in the structure and level of self-concept for preadolescent children. *Journal of Educational Psychology*, 76(5), 940-956.
- Marsh, H. W., Byrne, B. M. & Shavelson, R. J. (1988). Multifaceted academic self-concept: its hierarchical structure and its relations to academic achievement. *Journal of Educational Psychology*, 80(3), 366-380.
- Marsh, H. W., Cairns, L., Relich, J., Barnes, J. & Debus, R. L. (1984). The relationship between dimensions of self-attribution and dimensions of self-concept. *Journal of Educational Psychology*, 76(1), 3-32.
- Marsh, H. W. & Craven, R. G. (2006). Reciprocal effects of self-concept and performance from a multidimensional perspective. Beyond seductive pleasure and unidimensional perspectives. *Perspectives on Psychological Science*, 1(2), 133-163.
- Marsh, H. W., Craven, R. G. & Debus, R. (1991). Self-concepts of young children 5 to 8 years of age: measurement and multidimensional structure. *Journal of Educational Psychology*, 83(3), 377-392.
- Marsh, H. W., Craven, R. & Debus, R. (1998). Structure, stability and development of young children's self-concepts: a multicohort-multioccasion study. *Child Development*, 69(4), 1030-1053.

- Marsh, H. W. & Parker, J. W. (1984). Determinants of student self-concept: is it better to be relatively large fish in a small pond even if you don't learn to swim as well? *Journal of Personality and Social Psychology*, *47*(1), 213-231.
- Marsh, H. W., Relich, J. D. & Smith, I. D. (1983). Self-concept: the construct validity of interpretations based upon the SDQ. *Journal of Personality and Social Psychology*, *45*(1), 173-187.
- Marsh, H. W. & Seaton, M. (2013). Academic self-concept. In J. Hattie & E. M. Anderman (eds.) *International guide to student achievement*, (62-63). New York: Routledge.
- Marsh, H. W., Smith, I. D. & Barnes, J. (1983). Multitrait-multimethod analyses of the self-description questionnaire: student-teacher agreement on multidimensional ratings of student self-concept. *American Educational Journal*, *20*(3), 333-357.
- Marsh, H. W., Trautwein, U., Lüdtke, O., Köller, O. & Baumert, J. (2005). Academic self-concept, interest, grades, and standardized test scores: reciprocal effects models of causal ordering. *Child Development*, *76*(2), 397-416.
- Marsh, H. W. & Yeung, A. S. (1998). Longitudinal structural equation models of academic self-concept and achievement: gender differences in the development of math and English constructs. *American Educational Research Journal*, *35*(4), 705-738.
- Martinek, T. J. & Griffith III, J. B. (1994). Learned helplessness in physical education: a developmental study of causal attributions and task persistence. *Journal of Teaching in Physical Education*, *13*(2), 108-122.
- Meece, J. L., Glienke, B. B. & Burg, S. (2006). Gender and motivation. *Journal of School Psychology*, *44*(5), 351-373.
- Mezulis, A. H., Abramson, L. Y., Hyde, J. S. & Hankin, B. L. (2004). Is there a universal positivity bias in attributions? A meta-analytic review of individual, developmental, and cultural differences in the self-serving attributional bias. *Psychological Bulletin*, *130*(5), 711-747.
- Mok, M. M. C., Kennedy, K. J. & Moore, P. J. (2011). Academic attribution of secondary students: gender, year level and achievement level. *Educational Psychology* *31*(1), 87-104.
- Möller, J. & Köller, O. (2000). Spontaneous and reactive attributions following academic achievement. *Social Psychology of Education*, *4*(1), 67-86.
- Möller, J., Retelsdorf, J., Köller, O. & Marsh, H. W. (2011). The reciprocal internal/external frame of reference model: an integration of models of relations between academic achievement and self-concept. *American Educational Research Journal*, *48*(6), 1315-1346.

- Nagy, G., Trautwein, U., Baumert, J., Köller, O. & Garrett, J. (2006). Gender and course selection in upper secondary education: effects of academic self-concept and intrinsic value. *Educational Research and Evaluation, 12*(4), 323-345.
- Nagy, G., Watt, H. M., Eccles, J. S., Trautwein, U., Lüdtke, O. & Baumert, J. (2010). The development of students' mathematics self-concept in relation to gender: different countries, different trajectories? *Journal of Research on Adolescence, 20*(2), 482-506.
- Newman, R. S. & Stevenson, H. W. (1990). Children's achievement and causal attributions in mathematics and reading. *Journal of Experimental Education, 58*(3), 197-212.
- Nicholls, J. G. (1978). The development of the concepts of effort and ability, perception of academic attainment, and the understanding that difficult task require more ability. *Child Development, 49*(3), 800-814.
- Nicholls, J. G. (1979). Development of perception of own attainment and causal attributions for success and failure in reading. *Journal of Educational Psychology, 71*(1), 94-99.
- Nicholls, J. G. & Miller, T. (1984). Reasoning about the ability of self and others: a developmental study. *Child Development, 55*(6), 1990-1999.
- Nicholls, J. G. & Miller, A. T. (1985). Differentiation of the concepts of luck and skill. *Developmental psychology, 21*(1), 76-82.
- Normandeau, S. & Gobeil, A. (1998). A developmental perspective on children's understanding of causal attributions in achievement-related situations. *International Journal of Behavioral Development, 22*(3), 611-632.
- Núñez, J.C., González-Pienda, J. A., González-Pumariiega, S., Roces, C., Alvarez, L., González, P., Cabanach, R. G., Valle, A. & Rodríguez, S. (2005). Subgroups of attributional profiles in students with learning difficulties and their relation to self-concept and academic goals. *Learning Disabilities Research & Practice, 20*(2), 86-97.
- Nurmi, J. E. & Aunola, K. (1999). Jyväskylä Entrance into Primary school study (JEPS). Jyväskylä, Finland: University of Jyväskylä.
- O'Mara, A. J., Marsh, H. W., Craven, R. G. & Debus, R. L. (2006). Do self-concept interventions make a difference? A synergistic blend of construct validation and meta-analysis. *Educational Psychologist, 41*(3), 181-206.
- Platt, C. (1988). Effects of causal attributions for success on first-term college performance: a covariance structure model. *Journal of Educational Psychology, 80*(4), 569-578.

- Preckel, F., Niepel, C., Schneider, M. & Brunner, M. (2013). Self-concept in adolescence: a longitudinal study on reciprocal effects of self-perceptions in academic and social domains. *Journal of Adolescence*, 36(6), 1165-1175.
- Py, J. & Jouffre, S. (2009). The explanatory production among fourth-graders to ninth-graders: impact of institutional and social demands on development of unstable internal causality. *European Journal of Psychology of Education*, 24(3), 307-323.
- Rholes, W. J., Blackwell, J., Jordan, C. & Walters, C. (1980). A developmental study of learned helplessness. *Developmental Psychology*, 16(6), 616-624.
- Rigby, B. T & Huebner, E. S. (2005). Do causal attributions mediate the relationship between personality characteristics and life satisfaction in adolescence? *Psychology in the Schools*, 42(1), 91-99.
- Rimkute, L., Hirvonen, R., Tolvanen, A., Aunola, K. & Nurmi, J-E. (2012). Parents' role in adolescents' educational expectations. *Scandinavian Journal of Educational Research*, 56(6), 571-590.
- Rosen, J. A., Glennie, E. J., Dalton, B. W., Lennon, J. M. & Bozick, R. N. (2010). Noncognitive skills in the classroom: new perspectives on educational research. RTI Press publications No. BK-0004-1009. Research Triangle Park, NC. RTI International retrieved (19.10.2013) from <http://www.rti.org/rtipress>.
- Rosenberg, M. (1979). *Conceiving the self*. New York: Basic Books Inc.
- Ryckman, D. B. & Peckham, P. (1987). Gender differences in attributions for success and failure situations across subject areas. *Journal of Educational Research*, 81(2), 120-125.
- Rytkönen, K., Aunola, K., & Nurmi, J.-E. (2006). Parents' causal attributions of their children's academic performance –Scale. Unpublished test material. University of Jyväskylä.
- Räsänen, P. & Leino, L. (2005). KTLT-Laskutaidon testi luokka-asteille 7-9. (KTLT- a test for basic mathematical skills for grades 7-9). Jyväskylä: Niilo Mäki Instituutti.
- Savolainen, H., Ahonen, T., Aro, M., Tolvanen, A. & Holopainen, L. (2008). Reading comprehension, word reading and spelling as predictors of school achievement and choice of secondary education. *Learning and Instruction*, 18(2), 201-210.
- Schraw, G. (1998). Promoting general metacognitive awareness. *Instructional Science*, 26(1-2), 113-125.

- Shavelson, R. J., Hubner, J.J. & Stanton, G. C. (1976). Self-concept: validation of construct interpretations. *Review of Educational Research*, 46(3), 407-441.
- Shell, D. F., Colvin, C. & Bruning, R. H. (1995). Self-efficacy, attribution, and outcome expectancy mechanism in reading and writing achievement: grade-level and achievement-level differences. *Journal of Educational Psychology*, 87(3), 386-398.
- Skaalvik, S. & Skaalvik, E. M. (2004). Gender differences in math and verbal self-concept, performance expectations, and motivation. *Sex Roles*, 50(3/4), 241-252.
- Skaalvik, E. M. & Vålas, H. (1999). Relations among achievement, self-concept, and motivation in mathematics and language arts: a longitudinal study. *The Journal of Experimental Education*, 67(2), 135-149.
- Spinath, B. & Spinath, F. M. (2005). Longitudinal analysis of the link between learning motivation and competence beliefs among elementary school children. *Learning and Instruction*, 15(2), 87-102.
- Stipek, D. J. & Gralinski, H. (1991). Gender differences in children's achievement-related beliefs and emotional responses to success and failure in mathematics. *Journal of Educational Psychology*, 83(3), 361-371.
- Stipek, D. & Mac Iver, D. (1989). Developmental change in children's assessment of intellectual competence. *Child Development*, 60(3), 521-538.
- Swann, W. B., Griffin, J. J. & Predmore, S. C. (1987). The cognitive-affective crossfire: when self-consistency confronts self-enhancement. *Journal of Personality and Social Psychology*, 52(5), 881-889.
- Sylva, K. (1994). School influences on children's development. *Journal of Child Psychology and Psychiatry*, 35(1), 135-170.
- Tabassam, W. & Grainger, J. (2002). Self-concept, attributional style and self-efficacy beliefs of students with learning disabilities with and without attention deficit disorder. *Learning Disability Quarters*, 28(2), 141-131.
- Tennen, H. & Herzberger, S. (1987). Depression, self-esteem, and the absence of self-protective attributional biases. *Journal of Personality and Social Psychology*, 52(1), 72-80.
- Valentine, J. C. , DuBois, D. L., Cooper, H. (2004). The relation between self-beliefs and academic achievement: a meta-analytic review. *Educational Psychologist*, 39(2), 111-133.
- Vispoel, W. P. & Austin, J. R. (1995). Success and failure in junior high school: A critical incident approach to understanding students' attributional beliefs. *American Educational Research Journal*, 32(2), 377-412.

- Watkins, D. & Astilla, E. (1986). Causal dominance among self-concept, locus of causality, and academic achievement. *The Journal of Psychology, 120(6)*, 627-633.
- Watkins, D. & Gutierrez, M. (1989). Causal relationship among self-concept, attributions, and achievement in Filipino students. *The Journal of Social Psychology, 130(5)*, 625-631.
- Watt, H. M. (2004). Development of adolescents' self-perceptions, values, and task perceptions according to gender and domain in 7th through 11th-grade Australian students. *Child development, 75(5)*, 1556-1574.
- Weill, L. G., Fleming, S. M., Dumontheil, I., Kilford, E. J., Weill, R. S., Rees, G., Dolan, R. J. & Blakemoore, S-J. (2013). The development of metacognitive ability in adolescence. *Consciousness and Cognition, 22(1)*, 264-271.
- Weiner, B. (1974). *Achievement motivation and attribution theory*. New Jersey: General Learning Press.
- Weiner, B. (1979). A theory of motivation for some classroom experiences. *Journal of Educational Psychology, 71(1)*, 3-25.
- Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychological review, 92(4)*, 548-573.
- Weiner, B. (1986). Attribution, emotion, and action. In Sorrentino, R. M. & Higgins, E. T. (eds.) *Handbook of motivation and cognition: foundations of social behavior, (281-312)*. New York: The Guilford Press.
- Weiner, B. (2000). Intrapersonal and interpersonal theories of motivation from an attributional perspective. *Educational Psychology Review, 12(1)*, 1-14.
- Weiner, B. (2010). The development of attribution-based theory of motivation: a history of ideas. *Educational Psychologist, 45(1)*, 28-36.
- Weiss, M. R., McAuley, E., Ebbeck, V. & Wiese, D. M. (1990). Self-esteem and causal attributions for children's physical and social competence in sport. *Journal of Sport and Exercise Psychology, 12(1)*, 21-36.
- Weitlauf, A. S. & Cole, D. A. (2012). Cognitive development masks support for attributional style models of depression in children and adolescents. *Journal of Abnormal Child Psychology, 40(6)*, 849-862.
- Whitley, B. E. & Frieze, I. H. (1985). Children's causal attributions for success and failure in achievement settings: a meta-analysis. *Journal of Educational Psychology, 77(5)*, 608-616.
- Wigfield, A. (1988). Children's attributions for success and failure: Effects of age and attentional focus. *Journal of Educational Psychology, 80(1)*, 76-81.

- Wigfield, A. (1994). Expectancy-value theory of achievement motivation: a developmental perspective. *Educational Psychology Review*, *6(1)*, 49-78.
- Wigfield, A. & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology*, *25(1)*, 68-81.
- Wigfield, A., Eccles, J.S., Mac Iver, D., Reuman, D. A. & Midgley, C. (1991). Transitions during early adolescence: changes in children's domain-specific self-perceptions and general self-esteem across the transition to junior high school. *Developmental Psychology*, *27(4)*, 552-565.
- Wigfield, A., Eccles, J. S., Yoon, K. S., Harold, R. D., Arbretton, A. J. A., Freedman-Doan, C. & Blumenfeld, P. C. (1997). Change in children's competence beliefs and subjective task values across the elementary school years: a 3-year study. *Journal of Educational Psychology*, *89(3)*, 451-469.
- Wigfield, A. & Karpanthian, M. (1991). Who am I and what can I do? Children's self-concepts and motivation in achievement situations. *Educational Psychologist*, *26(3&4)*, 233-261.
- Wilgenbusch, T. & Merrell, K. W. (1999). Gender differences in self-concept among children and adolescents: a meta-analysis of multidimensional studies. *School Psychology Quarterly*, *14(2)*, 101-120.
- Wolters, C. A., Fan, W. & Daugherty, S. G. (2013). Examining achievement goals and causal attributions together as predictors of academic functioning. *The Journal of Experimental Education*, *81(3)*, 295-321.
- Wouters, S., Germeijs, V., Colpin, H. & Verschueren, K. (2011). Academic self-concept in high school: predictors and effects on adjustment in higher education. *Scandinavian Journal of Psychology*, *52(6)*, 586-594.
- Zhou, J. & Urhahne, D. (2013). Teacher judgment, student motivation, and the mediating effect of attributions. *European Journal of Psychology of Education*, *28(2)*, 275-295.

APPENDICES

Appendix A. Self-concept of ability scale

Alla on joitakin kysymyksiä liittyen koulunkäyntiisi.					
	huono/en kovin hyvä		keskiverto		erittäin hyvä
1.	Kuinka hyvä olet matematiikassa?		1	2	3 4 5
2.	Kuinka hyvä olet äidinkielessä?		1	2	3 4 5
3.	Kuinka hyvä olet lukuaineissa (esim. historia, biologia, maantieto)?		1	2	3 4 5
4.	Kuinka hyvä olet liikunnassa?		1	2	3 4 5
5.	Kuinka hyvä olet taito- ja taideaineissa? (esim. musiikki, kuvaamataito, käsityöt)		1	2	3 4 5
6.	Kuinka hyvä olet matematiikassa verrattuna matematiikan ryhmäsi muihin oppilaisiin?		1	2	3 4 5
7.	Kuinka hyvä olet äidinkielessä (lukemisessa ja kirjoittamisessa) verrattuna äidinkielen ryhmäsi muihin oppilaisiin?		1	2	3 4 5
8.	Kuinka hyvä olet lukuaineissa (esim. historia, biologia, maantieto) verrattuna luokkasi muihin oppilaisiin?		1	2	3 4 5
9.	Kuinka hyvä olet liikunnassa verrattuna luokkasi muihin oppilaisiin?		1	2	3 4 5
10.	Kuinka hyvä olet kielissä verrattuna luokkasi muihin oppilaisiin?		1	2	3 4 5
11.	Kuinka hyvä olet taito- ja taideaineissa verrattuna luokkasi muihin oppilaisiin?		1	2	3 4 5
	helppoja		siltä väliltä		vaikeita
12.	Kuinka vaikeita matematiikan tehtävät ovat sinusta?		1	2	3 4 5
13.	Kuinka vaikeita äidinkielen tehtävät ovat sinusta?		1	2	3 4 5
14.	Kuinka vaikeita englannin kielen tehtävät ovat sinusta?		1	2	3 4 5
15.	Kuinka vaikeita taito- ja taideaineet (esim. musiikki, kuvaamataito, käsityöt) ovat sinusta?		1	2	3 4 5

Appendix B. Causal attribution scale

Alla on esitetty erilaisia kouluun liittyviä tapahtumia ja mahdollisia syitä niihin. Aseta eri syyt järjestykseen 1- 4 kunkin kysymyksen kohdalla niin, että ajatteluasi **ensisijaisesti** kuvaavin vaihtoehto saa arvon **1**, ajatteluasi toissijaisesti kuvaava vaihtoehto arvon **2**, seuraava arvon **3** ja ajatteluasi vähiten kuvaava vaihtoehto arvon **4**.

	Saan hyvää ohjausta	Yritän kovasti	Olen kyvykäs	Tehtävät ovat helppoja
1. Jos onnistun hyvin äidinkielen tehtävissä, johtuu se siitä, että	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Jos onnistun hyvin matematiikan tehtävissä, johtuu se siitä, että	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Kun menestyn hyvin äidinkielessä, johtuu se siitä, että	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Kun menestyn hyvin matematiikassa, johtuu se siitä, että	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	En saa riittävän hyvää ohjausta	En yritä tarpeeksi	En ole tarpeeksi kyvykäs	Tehtävät ovat liian vaikeita
5. Jos menestyn heikosti äidinkielessä, johtuu se siitä, että	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Jos menestyn heikosti matematiikassa, johtuu se siitä, että	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Kun en osaa jotain äidinkielen tehtävää, johtuu se siitä, että	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Kun en osaa jotain matematiikan tehtävää, johtuu se siitä, että	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>