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**Academic and General Stress among Students: The Role of
Implicit Theory of Intelligence and Gender**

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Abstract. Implicit theory of intelligence concerns the belief whether one's intelligence is fixed (entity theory) or changeable (incremental theory). The aim of this study was to examine the relationship between implicit theory of intelligence and stress, both academic and general, as well the role of gender. A questionnaire was distributed to 697 Swedish upper secondary students (M age = 17.3, SD = 1.0) enrolled to preparatory programmes. Entity theory was found to significantly predict higher levels of both academic and general stress. While female students had the same level of entity thinking as male students did, female students experienced more academic stress as well as general stress. Results are discussed in relation to general theoretical implications, and to the educational context.

In Sweden, the situation in school has been frequently debated lately, due to current reports on students' decreasing mental health (The Public Health Agency of Sweden, 2014) and declining school results (Swedish National Agency for Education, 2013). These two major problems experienced in Swedish schools seem to be interdependent, achievement influences mental health and vice versa. Moreover, students' perception of themselves and their abilities, their *self-theories*, seem to be in play (Gustavsson et al., 2010). According to yearly surveys initiated by Swedish authorities, the experience of stress related to schoolwork is found to be one of the contributing factors when it comes to the escalating problems of mental illness among adolescents (Statistics Sweden, 2012; The Public Health Agency of Sweden, 2014). Research based on these and earlier surveys, reveal that students' experience of academic stress has drastically increased over the last few decades, and that girls seem to be the most affected (The Public Health Agency of Sweden, 2016). Other Nordic studies on stress has displayed similar results; adolescents have problems handling the pressures connected to school (Moksnes, Løhre, Lillefjell, Byrne, & Haugan, 2014; Wiklund, Malmgren-Olsson, Öhman, Bergström, & Fjellman-Wiklund, 2012), and when it comes to stress in general, girls are more affected, and have lower self-esteem (Moksnes, Moljord, Espnes, & Byrne, 2010; Schraml, Perski, Grossi, & Simonsson-Sarnecki, 2011). Since stress is such a strong contributing factor when it comes to adolescents' psychological problems, it is important that we understand the causes of this stress and, by extension, find ways to lower these stress levels. This study aims to understand how levels of general stress, and academic stress in particular, may be predicted by students' implicit theory of intelligence, that is whether or not they believe that their intelligence is malleable and possible to change (Dweck, 2000).

In the late 80s and the 90s, Carol S. Dweck and her associates developed a model to establish the interactions between different theories connected to learning, motivation and achievement (Dweck, 2000). Implicit theory of intelligence was the key concept in this model (Dweck & Leggett, 1988; Dweck, Chiu & Hong, 1995), and consists of two bipolar theories; either people hold an *entity theory*, that is, they consider intelligence to be a fixed trait, or they hold an *incremental theory*, that is, they believe that intelligence can change. According to Dweck (2000), entity theorists strive to perform well, and they tend to attribute failure to their own lack of ability instead of their effort (I am not smart enough, hence I performed poorly). Thus, they do not seem to handle setbacks well. Incremental theorists, on the other hand, are

more mastery-oriented in their approach. They strive to learn, that is their main focus is to increase their abilities rather than to perform well (I'm learning, hence I become more intelligent). Consequently, people holding an incremental theory have an advantage; they are more prone to work hard on a challenging task, since they attribute failure to lack of effort, not lack of intelligence (Dweck, 2000; Hong, Chiu, Lin, Wan, & Dweck, 1999).

The concept enclosing implicit theory of intelligence was described by Dweck (2000) as a framework for understanding intelligence, achievement goals, motivation, attribution, effort and self-esteem. The model has been tested and applied to an array of domains, most of them linked to an academic context. Note that the main part of recent research by Dweck and colleagues has been connected to children and schoolwork. More to say, the findings in this area has played an important role in education in recent years. Among other things, theory of intelligence has been related to self-efficacy (Davis, Burnette, Allison & Stone, 2010) and self-esteem among students, with entity theory corresponding with lower self-beliefs (Diseth, Meland, & Breidablik, 2014). Students holding an incremental theory have been demonstrated to achieve higher grades (Romero, Paunesku, Dweck & Gross, 2014). Yeager and Dweck (2012) concluded that, in an academic context, different beliefs about the malleability of intelligence made students either more resilient, or more vulnerable to academic challenges. When handling setbacks in school, entity theorists seemed to be more exposed, more likely to develop a pattern of helpless responses involving negative emotions, self-doubt, lowered expectations, decreasing expectations and under-achievement (Dweck, 2000). A contribution of great relevance when it comes to the practical applications of these findings was provided by Blackwell, Trzesniewski and Dweck (2007), who demonstrated that incremental theory can very well be educated in school. In their study, an intervention was conducted to change junior high students' mindset regarding intelligence. This intervention involved eight "workshops" of 25 minutes each, where students were educated in study skills, brain functions, and how to change their way of thinking. The outcome showed that students who were taught incremental theory became significantly more motivated in the classroom, and their trajectory in grades was more optimistic, compared to the students who did not take part in the intervention.

It needs to be mentioned, that a few concerns have been raised about implicit theory of intelligence. For instance Harackiewicz and Elliot (1995) criticised the bipolarity of the theory, meaning that it presumes that a person cannot hold both theories of intelligence (entity and incremental) at the same time. In their response, Dweck et al. (1995) did not reject the fact that one theory necessarily excluded the other, however they did not consider it to be a crucial matter. In later research, the critique was partly supported by Tempelaar, Rienties, Giesbers & Gijsselaers (2015), who claimed that a construct of two direct opposites may inhibit the applicability of Dweck's (2000) framework of theories.

As we have seen, a large amount of research has shown that implicit theories of intelligence do affect student's ways of dealing with challenges in school, their apprehensions of themselves, and, in the long run, their academic success. Entity theorists appear to be the ones with a disadvantage; they are more exposed to school pressure due to inefficient strategies when facing setbacks. The question arises, whether these students are not also more vulnerable when it comes to stress. Can theory of intelligence also predict academic stress?

The term *stress* has been defined in various ways in research, this, of course, depending on academic context and focus; whether the discipline being biological or psychological science (or other areas), and whether attention is paid to the physical, social, emotional or cognitive aspects of stress (Aldwin, 2007). However, Lazarus and Folkman (1984) suggested that stress is to be seen as an overall concept to organise and understand a variety of phenomena and processes, all dealing with human adaptation. In their view, the transaction between person and environment is the common denominator. In this study, the term stress is used in a very broad sense, referring to the subjective appraisal of the

environment, causing a negative outcome of any form (such as strain, distress or anxiety). The term *general stress* here includes any circumstance inducing stress, be it stressful life events, loss of control, conflicts or expectations not met, while *academic stress* is narrowed down to stress connected to pressure induced in school, examples being expectations to perform, time restraints, workload and academic self-perception.

While students' perception of themselves and their abilities seem to be connected to stress, this link has not been thoroughly investigated. To my knowledge, only one study has been conducted directly focusing on theory of intelligence and stress, namely the one by Ollfors and Andersson (2007). In an extensive survey of 918 participants, students aged 16-19 in a Swedish upper secondary school, were asked to assess their experience of stress and their beliefs about intelligence. Three other self-theories were also examined: Academic self-efficacy, internal attribution of failure and confidence in intelligence (the latter referring to the positive beliefs in one's intellectual abilities). In this study, implicit theory of intelligence was not found to predict stress, however it had significant relationships with the each of the three other self-theories. Additionally, the result revealed that female students were significantly more stressed than their male peers, and that the experience of stress was mostly connected to schoolwork. Students on preparatory programmes were more affected by stress than students on vocational programmes.

When it comes to stress, an extensive amount of research has been done, and during the last decades the number of studies has increased drastically (Aldwin, 2007), Stress has been connected to various negative outcomes, including mental illness (Shraml, 2013). However, the way individuals appraise and cope with stress differs a great deal; some people seem to thrive in a stressful environment and others seem to succumb (Aldwin, 2007). When it comes to the work of Dweck and colleagues, a large amount of variables connected to implicit theory have been covered, but stress specifically has not yet been one of them. A few studies have, however, been made in nearby fields. For instance, research on implicit theories of personality, that is the beliefs about whether people's attributes are fixed or malleable, has shown that incremental beliefs resulted in lower general stress (Yeager, Johnson, Spitzer, Trzesniewski, Powers & Dweck, 2014). Additionally, mastery avoidance goals, that is goals that entails focus on one's incompetence and preventing failure (in contrast to for instance learning goals), has been demonstrated to evoke both stress and anxiety (Sideridis, 2007). The adjacent areas of motivation and problem solving are also, to a certain extent, covering beliefs about intelligence and ability to cope with challenges. This, in its turn, has been linked to stress appraisal and coping strategies. Research has revealed a correlation between the self-perceived ability to solve problems and psychological distress (Baker, 2003; Baker & Williams, 2001). Moreover, the nearby concept of locus of control, referring to whether a person makes internal or external attributions for experienced events, has been related to stress (Lefcourt, Martin, & Saleh, 1984; Rashid & Talib, 2013). Nevertheless, the direct relationship between theory of intelligence and stress has not yet been thoroughly examined.

As shown earlier, gender seems to be an issue when it comes to the perception of stress in relation to academic work. Generally, adolescent girls are shown to be significantly more affected by stress than boys (Baker, 2003; The Public Health Agency of Sweden, 2016; Moksnes et al., 2010; Ollfors & Andersson, 2007; Schraml et al., 2011; Wiklund et al., 2012). Girls tend to respond more emotionally to stress, they are more prone to experiencing anxiety and depression (Moksnes et al., 2010) and their high stress levels are related to low self-esteem (McKay, Dempster & Byrne, 2014; Moksnes et al., 2010). Undoubtedly, there seem to be a connection between these variables regarding girls' experience of stress. According to Rudolph (2002) adolescent girls are more emotionally engaged with interpersonal relationships than boys, which make them more vulnerable to social failure and negative feedback. This might serve as one explanation to why girls are more affected by stress than boys, and also give a clue to why they seem to have lower self-esteem. Furthermore, it

indicates that girls might also have a more emotional investment in their academic performances than boys, due to a sensitivity to praise and critique from others. Hence one might assume that girls are more affected by stress than boys also in an academic context.

Few studies have examined gender differences in implicit theory of intelligence, and the results found are slightly inconsistent. Dweck (2000) suggested that girls hold an entity theory to a larger extent than boys, which was also demonstrated in a study by Diseth et al. (2014). However, in other research no such gender differences have been found (Renaud-Dubé, Guay, Talbot, Taylor & Koestner, 2015). Results pointing in the direction of Dweck's hypothesis are that girls, more than boys, exhibit some of the beliefs associated with entity theory. For instance, girls have been demonstrated to be more "self-derogating" when attributing failure (Burgner & Hewstone, 1993). Additionally, high-achieving girls have been found to be more vulnerable to expectations and pressure in school than other students, and excessive praise for intelligence and achievement have been shown to create patterns of helpless responses in bright girls (Dweck, 2000).

In the light of previous research, theory of intelligence might be a factor influencing the perception of academic stress, considering the demonstrated effects on for instance students' self-theories (Ollfors & Andersson, 2007), attribution when facing setbacks (Hong et al., 1999), and resilience (Yeager & Dweck, 2012). Clearly, further research is needed, especially regarding stress specific to the academic context. In the study by Ollfors and Andersson (2007), students on preparatory programmes were more affected by stress than students on vocational programmes. This suggests that students aiming for higher education focus more on academic achievement and thereby become more vulnerable to academic stress. Hence, there is a distinct need to investigate the relationship between theory of intelligence and academic stress among students on preparatory programmes. There is also a need to more thoroughly examine the role of programme when it comes to stress, both academic and general. As Blackwell et al. (2007) has shown that teaching incremental theory can successfully improve motivation and achievement, studies of these matters might implicate a way to reduce the experience of stress among students. Moreover, the examination of gender differences regarding both theory of intelligence and stress might help to illuminate the uncertainties concerning girls' alleged entity beliefs, and also to reveal any congruity between female adolescents' high levels of perceived stress and the vulnerability as suggested by Dweck (2000).

The aim of this study was to examine the relationship between implicit theory of intelligence and stress, both academic stress and stress in general, and to examine whether there are any gender differences in these variables and their relationships. Participants were all enrolled to preparatory programmes. The following hypotheses were tested:

1. High scores on implicit theory of intelligence (i. e. entity theory) predict higher academic stress and general stress (in line with e. g. Baker, 2003; Baker & Williams, 2001; Sideridis, 2007; Yeager et al., 2014).
2. Female students score higher on implicit theory of intelligence (i. e. they endorse an entity theory to a greater extent) than male students (in line with Diseth et al., 2014; Dweck, 2000).
3. Female students experience more stress, academic and general, than males (in line with Baker, 2003; Moksnes et al., 2010; Ollfors & Andersson, 2007; Schraml et al., 2011; Wiklund et al., 2012).

No hypothesis concerning gender differences in the relationship between entity theory and stress was established, nor was a hypothesis regarding the relationship between programme and stress. This was due to the fact that these specific areas have not been investigated in prior research.

Method

Participants

This study involved 697 students (478 females, 204 males, 12 other and 3 did not report their sex) in a public upper secondary school in a city in the south of Sweden. The participants, ranging from 15 to 21 years of age ($M = 17.3$, $SD = 1.0$), were first-, second- and third-year students in 32 different classes, enrolled in five different school programmes preparing for higher education: The Arts Programme ($N = 259$; 198 females, 58 males, 3 other), the Humanistic Programme ($N = 20$; 11 females, 8 males, 1 did not report sex), the International Baccalaureate ($N = 86$; 57 females, 27 males, 2 other), The Natural Science Programme ($N = 78$, 49 females, 26 males, 2 other, 1 did not report sex) and the Social Science Programme ($N = 254$, 163 females, 85 males, 5 other, 1 did not report sex). All programmes but one, falling into the category of vocational education, on the particular school were included in the survey. Four questionnaires were handed in blank, and were hence discarded. The majority of the participants were native and/or fluent Swedish speakers, with the exception of a few students on the International Baccalaureate ($N = 16$), who chose an English translation of the questionnaire. The students were recruited initially by an oral or written inquiry to their class teachers, followed by an oral inquiry in the classroom.

Instrument

The Implicit Theory of Intelligence Scale (ITI; Dweck, 2000) was used to assess students' implicit theory of intelligence. The scale consists of 8 items, involving statements such as "you have a certain amount of intelligence, and you can't really do much to change it" and "you can always substantially change how intelligent you are" are rated on a 6-point Likert scale: 1 = *strongly agree* to 6 = *strongly disagree*. Four scale items were then reverse-coded, meaning that a high score signified an endorsement of an entity theory regarding intelligence and a low score signified an incremental theory of intelligence. The ITI scale has globally been used when measuring implicit theory of intelligence. In this study the adult version of the whole 8-item ITI scale was used. It was translated into Swedish; the primary aim being to make the translation as precise as possible, without losing fluency and academic context. Two upper secondary school English/Swedish teachers were asked to comment on the translation of the scale, which resulted in a few minor changes. A Chronbach's Alpha value of .91 was obtained in this study.

The Perception of Academic Stress Scale (PAS; Bedewy & Gabriel, 2015) was used to measure the students' perception of academic stress. The students were asked to rate 18 statements of the types "Teachers have unrealistic expectations of me, I believe that the amount of work assignment is too much" and "I fear failing courses this year" on a 5-point Likert-scale (1 = *strongly disagree* to 5 = *strongly agree*). Again, some of the items (6-18) were reversed-coded, thus meaning that higher values corresponded to a stronger perception of academic stress. The scale consists of four different subscales measuring *pressures to perform*, *perceptions of work-load*, *academic self-perception* and *time restraints*. Given that the original PAS scale was constructed to target undergraduate university students, six of the items were slightly modified to better suit the participants in this study. As for the measures of entity theory of intelligence, the scale was translated into Swedish and proofread by two English/Swedish teachers. The Chronbach's Alpha for the full PAS scale for this study was .84. However, reliabilities for the separate subscales were low (Chronbach's Alpha between .60 and .64), and therefore only the full PAS-scale was used.

To assess the general perception of stress among students, the respondents were asked to complete the Swedish version of the 10-item Perceived Stress Scale (PSS-10; Eskin & Parr, 1996). The PSS scale is a widely used psychometric scale, measuring the respondents' appraisal of stressors and perceived lack of control during the last month ("In the last month, how often have you found that you could not cope with all the things that you had to do?"). They rated their level of stress experienced on a 5-point Likert scale ranging from 1 = *Never* to 5 = *Very often*. The scores of items 4, 5, 7 and 8 were then reversed, and consequently a higher score indicated a higher level of perceived stress. Both construct validity and internal reliability has been proven satisfactory (Nordin & Nordin, 2013). The Cronbach's Alpha obtained in this study was .83.

Procedure

The implementation of the study was initiated by an inquiry to the school director of the upper secondary school, followed by oral or e-mailed requests directed to the class teachers. The survey then took place either on a class council or a regular lesson, depending on the teachers' wishes. In the classroom the students were informed, both written and orally, about the purpose of the questionnaire, that participation was voluntary, and that the result would be reported in a way so that none of the respondents could be identified. The anonymous questionnaires were then handed out, along with spare pencils, and as the task was completed they were recollected. The approximate time needed for the survey was 20 minutes. The questionnaires were distributed during five weeks at the end of the spring term. Apparently, the few classes that participated at the very end of the period, two weeks before the summer holiday, had a greater loss in number of participants than the rest. One third-grade class at the International Baccalaureate had already taken their mock exams and did no longer attend to regular classes, hence they were not part of this study.

Pilot study. A pilot study was conducted in order to discover any ambiguities in the questionnaire. Eleven voluntary second grade students were recruited at the same school as the participants of the main study. They were then asked to complete the questionnaire, and to write comments about both contents and form in the margin. The pilot study resulted in a slight alteration of two items in the PAS-scale, and also to an inversion of the same scale, meaning that a low score represented disagreement and a high score represented agreement. This was done to make the questionnaire more cohesive and to avoid confusion for the respondents.

Results

The purpose of this study was to investigate the relationship between implicit theory of intelligence and stress, both academic and general, and to examine whether there are any gender differences in these variables and their relationships. Prior to analysis, data was examined through various SPSS procedures for accuracy of data entry, missing values, and fit between their distributions and the assumptions of multivariate analysis. Due to the small amount of participants defining themselves as other than female or male, gender was analysed as a dichotomous variable in the multivariate analysis of variance, involving only students categorised as female or male. The group "other" was then counted as missing data. No extreme skewness or kurtosis was detected, and the assumptions were met for both multiple analysis of variance and regression.

Initially, a 2x2 between-subjects multivariate analysis of variance (IBM SPSS MANOVA) was performed to examine Hypothesis 2 and 3 and to determine which factors should be entered into a subsequent regression model testing the relationship between implicit theory of intelligence and stress. Dependent variables in the MANOVA were academic stress, general stress and implicit theory of intelligence. Gender and programme were tested as independent variables. For means and standard deviations of implicit theory of intelligence, academic stress and general stress over gender and programme, see Table 1. Hypothesis 2, suggesting that female students hold an entity theory to a greater extent than males, was not supported in this study. No significant gender difference was found linked to implicit theory of intelligence, $F(1, 664) = 0.04, p = .84, ns$, partial $\eta^2 = .00$. Regarding Hypothesis 3, that female students experience more stress than males, the findings were not as straightforward. Results showed that females, in fact, experienced a significantly higher level of general stress than males, $F(1, 664) = 10.08, p < .01$, partial $\eta^2 = .01$. However, no significant difference was found between genders on academic stress, $F(1, 664) = 0.95, p = .33, ns$, partial $\eta^2 = .00$. To conclude, female students were found to experience more general stress, but the same level of academic stress as male students.

Additionally, the results of the MANOVA indicated that programme had a significant main effect on implicit theory of intelligence $F(4, 664) = 3.70, p < .01$, partial $\eta^2 = .02$. and academic stress $F(4, 664) = 3.84, p < .01$, partial $\eta^2 = .02$. According to the post hoc test (Bonferroni), students on the Social Science Programme were demonstrated to hold entity beliefs to a higher degree than the others, especially compared to the International Baccalaureate ($MD = -3.4, p < .01$). The students on the Social Science Programme also experienced more academic stress than the students on all the other programmes ($M = 33.4, SD = 10.6$), however the post hoc test showed only tendencies towards significance compared to three other programmes: The Arts Programme ($MD = 2.6, p = .08, ns$), the Humanistic Programme ($MD = 6.9, p = .08, ns$) and the Natural Science programme ($MD = 4.0, p = .06, ns$). The results showed no significant interaction effect between gender and programme in the MANOVA.

Table 1

Means and (standard deviations) of implicit theory of intelligence, academic stress and general stress over gender and programme

Sample categories	Dependent variables		
	Implicit theory of intelligence	Academic stress	General stress
Gender			
Female	17.1 (7.5)	32.1 (10.5)	23.3 (6.3)*
Male	16.5 (8.1)	29.6 (12.0)	19.7 (6.9)
Programme			
Arts Programme	16.4 (7.3)	30.8 (11.2)	22.7 (6.7)
Humanistic Programme	17.1 (7.2)	26.5 (9.5)	20.9 (7.0)
International Baccalaureate	14.8 (8.4)	30.4 (10.2)	21.8 (6.7)
Natural Science Programme	16.9 (8.0)	29.4 (12.0)	20.7 (7.7)
Social Science Programme	18.1 (7.5)*	33.4 (10.5)*	22.5 (6.1)
Total	16.9 (7.7)	31.4 (11.0)	22.2 (6.6)

* $p < .01$ according to MANOVA and post hoc-test (Bonferroni)

Secondly, a Pearson Product-Moment Correlation test was conducted. The results displayed positive correlations between implicit theory of intelligence and both academic stress, $r = .26, p < .001$, and stress in general, $r = .18, p < .001$. Thus a connection between an endorsement of entity theory and a high level of stress was found. As might be expected, the correlation between academic stress and stress in general was also significant, $r = .59, p < .001$. When examining the correlations for girls and boys separately, no considerable differences were found. See Table 2. All correlations were significant for both girls and boys. Only one small dissimilarity emerged; the relationship between implicit theory of intelligence and general stress was slightly stronger for girls, $r = .19, p < .001$, than for boys, $r = .16, p < .05$.

Table 2

Intercorrelations between implicit theory of intelligence, academic stress and general stress over gender

	Female gender			Male gender		
	Implicit theory of intelligence	Academic stress	General stress	Implicit theory of intelligence	Academic stress	General stress
Implicit theory of intelligence	-	.26***	.19***	-	.24**	.17*
Academic stress	-	-	.56***	-	-	.63***
General stress	-	-	-	-	-	-

* $p < .05$; ** $p < .01$; *** $p < .001$ according to correlation test (Pearson Product-Moment Correlation)

As the last step of the analysis two sequential multiple regressions (IBM SPSS REGRESSION) were performed to examine the predictors of perceived academic stress and general stress. The result is shown in Table 3. Dummy variables were created to represent the categorical variables gender (0 = male and "other", 1 = female) and school programme (0 = other than the Social Science Programme, 1 = the Social Science Programme). The choice of using the Social Science Programme as a reference group was due to earlier indications of high levels of perceived stress in this group. In model 1 implicit theory of intelligence was tested, in model 2 both implicit theory and gender were included, and in model 3 the variable programme was also added as a predictor.

In line with Hypothesis 1, high scores regarding implicit theory of intelligence, that is an entity theory, predicted higher levels of perceived academic stress, $B = 0.37, 95\% \text{ CI } [0.27, 0.48], \beta = 0.26, t = 6.96, p < .001$. When gender and programme were controlled for (model 3), the prediction was not as salient, but still significant, $B = 0.34, 95\% \text{ CI } [0.24, 0.45], \beta = 0.24, t = 6.46, p < .001$. A similar result was also found regarding stress in general; an entity theory significantly predicted higher general stress, $B = 0.16, 95\% \text{ CI } [0.09, 0.22], \beta = 0.18, t = 4.81, p < .001$. The numbers were slightly reduced when gender and programme were controlled for, $B = 0.15, 95\% \text{ CI } [0.08, 0.21], \beta = 0.17, t = 4.55, p < .001$.

When gender was added as a predictor (model 2), there was a significant increment in R^2 regarding both academic stress, $\Delta R^2 = 0.01$, $F = 27.29$, $p < .001$, and general stress, $\Delta R^2 = 0.05$, $F = 30.06$, $p < .001$. Thus the outcome of the multiple regressions also gave support to Hypothesis 3; female gender significantly predicted both a higher degree of academic stress, $B = 2.10$, 95% CI [0.38, 3.81], $\beta = 0.09$, $t = 2.40$, $p < .05$, and stress in general, $B = 3.16$, 95% CI [2.12, 4.20], $\beta = 0.22$, $t = 5.98$, $p < .001$, when controlling for implicit theory of intelligence.

Finally, programme was also added in model 3. When academic stress was tested, programme significantly improved the prediction, $\Delta R^2 = 0.02$, $F = 22.36$, $p < .001$. Being enrolled to the Social Science Programme predicted significantly higher levels of academic stress, $B = 2.89$, 95% CI [1.22, 4.55], $\beta = 0.13$, $t = 3.42$, $p < .01$, when gender and implicit theory was controlled for. Programme did not, however, have a similar impact on general stress, $B = 0.45$, 95% CI [-0.56, 1.46], $\beta = 0.03$, $t = 0.87$, *ns*, $p = 0.38$. In sum, implicit theory of intelligence, gender and program were all predictors of academic stress, although it must be noted that the explained variances were not very high (see Table 3). Effect sizes were also generally small.

Table 3

Predictors of perceived academic stress and stress in general

Variable	Academic stress		Model 3	
	Model 1 <i>B</i>	Model 2 <i>B</i>	<i>B</i>	95 % CI
Implicit theory of intelligence	0.37***	0.37***	0.34***	[0.24, 0.45]
Gender (female)		2.10*	2.31**	[0.61, 4.02]
Programme (the Social Science Programme)			2.89**	[1.23, 4.55]
R^2	0.07	0.07		0.09
F	48.46***	27.29***		22.36***
ΔR^2		0.01		0.02
ΔF		5.77*		11.67**

Variable	General stress		Model 3	
	Model 1 <i>B</i>	Model 2 <i>B</i>	<i>B</i>	95 % CI
Implicit theory of intelligence	0.16***	0.15***	0.15***	[0.08, 0.21]
Gender (female)		3.16***	3.20***	[2.15, 4.24]
Programme (the Social Science Programme)			0.45	[-0.56, 1.46]
R^2	0.03	0.08		0.08
F	23.18***	30.06***		20.29***
ΔR^2		0.05		0.00
ΔF		35.76***		0.76

$N = 689$. *CI = Confidence interval.* * $p < .05$; ** $p < .01$; *** $p < .001$.

Discussion

The aim of this study was to examine the relationship between implicit theory of intelligence and stress, academic and general. Furthermore, the intention was to determine whether any gender differences could be distinguished regarding these aspects.

When it comes to the first hypothesis, results revealed that an entity theory of intelligence in fact was a predictor of both higher academic stress, as well as higher general stress among upper secondary school students. Hereby, the hypothesis was clearly supported in that students who think that intelligence cannot be changed are more stressed. According to the result, the relationship between implicit theory and stress seems to be equally strong for girls as for boys. In the study by Ollfors and Andersson (2007), a significant result was not found when the impact of implicit theory of intelligence on stress was investigated. A possible reason for this is that their participants were enrolled to both preparatory and vocational upper secondary school programmes, which was not the case in this study. It might be suggested that performance and grades are perceived as more important for students aiming for higher education, which might induce higher levels of academic stress. This assumption was supported by Ollfors and Andersson (2007), whose findings showed that students on preparatory programmes experienced higher levels of stress than their peers.

As mentioned, little research has been done involving implicit theory of intelligence and stress, exception being the study by Ollfors and Andersson (2007). Research in similar areas, however, has indicated that there might be a relationship between the two variables. For instance, connections have been found between an entity theory and helpless responses when facing setbacks (Dweck, 2000), and a low self-efficacy and less effective coping strategies when it comes to academic challenges (Davis et al., 2011). Moreover, research on stress in adjacent areas, such as studies of self-beliefs about personality and attribution (Yeager et al., 2014), and problem solving (Baker, 2003; Baker & Williams, 2001) as well as goal-theory (Sideridis, 2007) are in line with the outcome of this study. According to this research, the beliefs about the capacity to improve one's abilities, whether one is convinced to succeed or fail when solving problems, and the type of goals set (to learn or to avoid failure), has all been connected to the perception of stress. The more negative you are about yourself and your abilities, the more stress you experience. In fact, the supposition that students holding an entity theory might be more vulnerable than their peers does not seem farfetched. The way students apprehend their own abilities, and also their use of strategies when facing setbacks, is bound to, in some way or another, influence their experience of the many potential stressors in school. The question is perhaps rather which specific factors are at work, and how they intertwine. Ollfors and Andersson (2007) did not find that theory of intelligence predicted stress, but one of the other self-theories examined, confidence in intelligence, did. Furthermore, in their study, theory of intelligence had a significant effect on the three other theories tested (confidence in intelligence, internal attribution of failure and academic self-efficacy). Thus, to fully understand the relationship between beliefs of intelligence and stress, this theory must be seen in the context of other self-theories.

In the second hypothesis it was stipulated that female students hold an entity theory to a greater extent than male students. In this study, no such differences were found. Thus the hypothesis was not supported, and neither were the claims of Dweck et al. (2000) or the study by Diseth et al. (2014). However, it must be said that this result does not fully rule out the possibility that female students believe intelligence to be a fixed trait to a greater extent than males. There might be variables not accounted for in this study. Neither does this result imply that female students do not suffer from the same problems as entity theorists do. As we have seen, girls have been shown to be more derogatory and self-critical in their attributions (Burgner & Hewstone, 1993), and to have lower self-esteem and self-efficacy (Diseth et al.,

2014). Moreover, it has to be considered that the behaviour and characteristics of an entity theorist might differ due to gender. For instance, girls have been shown to emphasise the role of effort when it comes to performance (Siegle, DaVia Rubenstein, Pollard & Romey, 2010) while the entity theorist attribute failure to their lack of ability, *not* their effort (Dweck, 2000). This indicates that female entity theorists might find effort more important than male entity theorists do. As the framework of theories involving beliefs of intelligence is complex, one factor might very well play off another. Nevertheless, evidence of gender differences regarding entity theory of intelligence is not sustained by this study.

In the final hypothesis, female students were expected to experience higher levels of both academic and general stress than males, which is a proposition verified in this study. In the MANOVA, the effect of gender was not significant, but the regression model showed that female gender did, *de facto*, significantly predict higher levels of academic stress. The prediction was even stronger when it came to stress in general. Accordingly, female students seem to experience more academic and general stress than males, though general stress plays a more central role. Students encounter many sorts of events and problems that may be perceived as stressful in everyday life, academic stressors being only a few of many. When it comes to adolescent girls, for instance social pressures, negative body image and low self-esteem (Gaines & Burnett, 2014) are demonstrated to be important stressors. As Rudolph (2002) has shown, adolescent girls tend to make emotional investment in interpersonal relationships to a greater extent than boys, which can explain both the fact that they perceive more stress than boys, and the fact that they experience more general than academic stress. In sum, the results of this study showed that gender does matter when it comes to stress, a result in line with the previous research by Baker (2003), Ollfors and Andersson (2007) and Wiklund et al. (2012).

The role of programme was found to be important in this study; a relationship was demonstrated between programme and both implicit theory of intelligence and stress. Programme had a significant main effect on implicit theory, and students on the Social Science Programme were entity theorists to a greater extent than the other students. Being enrolled to the Social Science Programme also predicted higher levels of academic stress. Ollfors and Andersson (2007) found that students on preparatory programmes experienced more stress than their peers on vocational programmes. The outcome of the current study supports their findings that being enrolled to a preparatory programme entails a larger dose of stress, but also highlights the fact that the stress experienced is mainly connected to an academic context. What is more, it shows that entity beliefs and academic stress appear to be more salient on certain programmes, indicating structural patterns that can be dealt with more generally in school.

As we have seen, implicit theory of intelligence has been proven to influence a great deal of things, such as motivation, attribution, achievement, effort and self-esteem (Dweck, 2000; Hong et al., 1999). Entity theorists are shown to have a disadvantage, due to their ways of dealing with failure, involving a pattern of helpless responses (Dweck, 2000). To conclude, entity beliefs might increase the risk of negative emotions, self-derogatory attribution and a self-destructive behaviour. In a school context, this makes the entity theorist more vulnerable when it comes to the many pressures met. Heavy work-loads, narrow time restraints and expectations to perform are clearly to be perceived stressful in the eyes and mind of a student holding an entity theory. Thereby, it must be said that the outcome of this study is relevant, and a sharp indication that further investigation in this area is needed. To locate educational problems, a focus on academic stress and preparatory programmes is central. To overcome the issues of stress connected to school, one has to concentrate on the factors in control, that is the causes of stress that lies within the scope of the educational system. Moreover, the aspect of gender must not be forgotten due to the uncertainties regarding the relationship to theory of intelligence. As demonstrated in this and other studies, gender has a significant impact on

stress, meaning that girls do tend to be more exposed to difficulties in school. An entity theory of intelligence might not be the pure reason for this, but somewhere in the entangled framework of self-theories there might be a key to find.

The last three decades, extensive research on implicit theory of intelligence has been conducted, and Dweck has become a well-known name in the educational field. The notion that a "growth mindset", that is the more recent, popular label of incremental beliefs, can change students' opportunities to succeed in school, is starting to breach the educational systems in many countries, not at least in Sweden. Implicit theory of intelligence has been shown to affect resilience and achievement (Dweck, 2000) on the one hand, and, as we have seen in this study, stress on the other. This might help to shed some light on the Swedish educational issues with students' increasing experience of stress (The Public Health Agency of Sweden, 2016; Moksnes et al., 2014; Wiklund et al., 2012) and declining school results (Swedish National Agency for Education, 2013). To better understand the situation in school, the relationship between theory of intelligence, the perception of stress and achievement has to be considered. Furthermore, the proven gender differences regarding stress ought to be emphasised; even though female students might not hold entity theory to a larger extent than males, there are other factors making them more exposed. However, to really gain a foothold, theory has to be practiced. To change the "fixed mindset" of students, incremental theory actively has to be educated. As proven in the study by Blackwell et al. (2007), teaching incremental theory on a few occasions can make a difference, yet the most efficient way to integrate these beliefs must be in every day classes, emphasising the importance that everyone can improve, making learning the main goal (as opposed to performing). Yet, an obvious problem here is that focus on performance is somewhat difficult to avoid in an academic context, where tests and assessment of students' achievements are, perhaps, inevitable parts of the school system. Nevertheless, as previous research has shown, educating students towards a growth mindset would be beneficial for many reasons, reducing stress being one of them.

Some potential limitations concerning this study should be noted. To begin with, the measures used to assess academic stress was developed quite recently (Bedewy & Gabriel, 2015) and the scale has not been evaluated to the same extent as the other scales measuring implicit theory and stress. A fact to be considered is also that the explained variances in the multiple regressions were not very high. The results were indeed significant, but it has to be taken into account that effect sizes for the regressions were small. Thus, there is obviously a vast number of other factors affecting students' perception of stress, apart from the ones examined in this study. Another possible limitation is the risk of social desirability bias among respondents, especially since the questionnaires were handed out in class, where students might be used to answer as expected. Furthermore, the fact that the questionnaires were distributed during the last five weeks at the end of the spring term may possibly have affected the outcome of this study. The period of data collection began before the grades were set, and ended after, which might have influenced the experience of stress in both directions. Another aspect to consider is to which extent students relate to themselves when self-theories are measured. This might seem a small question, but findings by De Castella and Byrne (2014) revealed that modifying the original scale measuring implicit theory of intelligence, by replacing *you* with *I*, resulted in a greater outcome variance in the prediction of achievement goals, helplessness attribution as well as performance; this in comparison with data from the original scale. Hence, the "degree of self" in self-theories might be a key to the comprehension of students' behaviour, but clearly further research is needed. Finally, only female and male gender was examined, since the number of participants in the group "other" were too few.

Future research is clearly needed when it comes to both the impact of implicit theory of intelligence on stress, and the specific role of gender. As mentioned, the mediating effects of other self-theories on stress need to be illuminated, and ways to implement the teaching of

incremental theory in education has to be developed. Moreover, other sources of academic stress need to be thoroughly examined, in order to find ways to reduce stress in school. At last, the role of programme when it comes to the relationship between entity theory and stress needs to be further investigated, this to understand the causes and effects of the problems with stress connected to education.

References

- Aldwin, C. M. (2007). *Stress, coping, and development: An integrative perspective* (2nd ed.). New York: The Guilford Press.
- Baker, S. R. (2003). A prospective longitudinal investigation of social problem-solving appraisals on adjustment to university, stress, health, and academic motivation and performance. *Personality and Individual Differences, 35*, 569-591. doi: 10.1016/S0191-8869(02)00220-9
- Baker, S. R., & Williams, K. (2001). Short communication: relation between social problem-solving, appraisals, work stress and psychological distress in male firefighters. *Stress and Health, 17*, 219-229. doi: 10.1002/smi.901
- Bedewy, D., & Gabriel, A. (2015). Examining perceptions of academic stress and its sources among university students: The perception of academic stress scale. *Health Psychology Open, July-December*, 1-9. doi: 10.1177/2055102915596714
- Blackwell, L. A., Trzesniewski, K. H., & Dweck, C. S. (2007). Theories of intelligence and achievement across the junior high school transition: A longitudinal study and an intervention. *Child Development, 78*, 246-263. doi:0009-3920/2007/7801-0014
- Burgner, D., & Hewstone, M. (1993). Young children's causal attributions for success and failure: "Self-enhancing" boys and "self-derogating" girls. *British Journal of Developmental Psychology, 11*, 125-129. doi: 10.1111/j.2044-835X.1993.tb00592.x
- Davis, J. L., Burnette, J. L., Allison, S. T., & Stone, H. (2011). Against the odds: academic underdogs benefit from incremental theories. *Social Psychology Education, 14*, 331-346. doi: 10.1007/s11218-010-9147-6
- De Castella, K., & Byrne, D. (2014). My intelligence may be more malleable than yours: the revised implicit theories of intelligence (self-theory) scale is a better predictor of achievement, motivation, and student disengagement. *European Journal of Psychology of Education, 30*, 245-267. doi: 10.1007/s10212-015-0244-y
- Dieseth, Å., Meland, E., & Breidablik, H. J. (2014). Self-beliefs among students: Grade level and gender differences in self-esteem, self-efficacy and implicit theories of intelligence. *Learning and Individual Differences, 35*, 1-8. doi: 10.1016/j.lindif.2014.06.003
- Dweck, C. S. (2000). *Self-Theories: Their role in motivation, personality and development*. New York: Psychology Press.
- Dweck, C. S., Chiu, C., & Hong, Y. (1995). Implicit theories: Elaboration and extension of the model. *Psychological Inquiry, 6*, 322-333. doi: 10.1207/s15327965pli0604_12
- Eskin, M., & Parr, D. (1996). *Introducing a Swedish version of an instrument measuring mental stress*. Reports from the Department of Psychology, no 813. Stockholm: Stockholm University, Department of Psychology.
- Gaines, S. A., & Burnett, T. B. S. (2014). Perceptions of eating behaviors, body image, and social pressures in female division II college athletes and non-athletes. *Journal of Sport Behavior, 37*, 351-369. Retrieved from <http://web.b.ebscohost.com>.

- ezproxy.ub.gu.se/ehost/pdfviewer/pdfviewer?sid=d750d3e8-e1dd-4c98-af13-2cc9ca156508%40sessionmgr104&vid=1&hid=129
- Gustavsson, J. -E., Allodi M. Westling, Alin Åkerman, B., Eriksson, C., Eriksson, L., Fischbein, S., Granlund, M., Gustavsson, P., Ljungdahl, S., Ogden, T., Persson, R. S. (2010). *School, learning and mental health: a systematic review*. Stockholm: The Royal Swedish Academy of Sciences, The Health Committee. Retrieved from https://www.kva.se/globalassets/vetenskap_samhallet/halsa/utskottet/kunskapsoversikt2_halsa_eng_2010.pdf
- Harackiewicz, J. M., & Elliot, A. J. Life is a roller coaster when you view through entity glasses. *Psychological Inquiry*, 6, 298-301. doi: 10.1207/s15327965pli0604_5
- Hong, Y., Chiu, C., Lin, D. M., Wan, W., & Dweck, C. S. (1999). Implicit theories, attributions, and coping: A meaning system approach. *Journal of Personality and Social Psychology*, 77, 588-599. doi: 10.1037//0022-3514.77.3.588
- Lazarus, R. S. & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer Publishing Company, Inc.
- Lefcourt, H. M., Martin, R. A., & Saleh, W. E. (1984). Locus of Control and Social Support: Interactive Moderators of Stress. *Journal of Personality and Social Psychology*, 47, 378-389. doi: 10.1037/0022-3514.47.2.378
- McKay, M. T., Dempster, M., & Byrne, D. G. (2014). An examination of the relationship between self-efficacy and stress in adolescents: the role of gender and self-esteem. *Journal of Youth Studies*, 17, 1131-1151. doi: 10.1080/13676261.2014.901494
- Moksnes, U. K., Løhre, A., Lillefjell, M., Byrne, D. G., & Haugan, G. (2014). The Association Between School Stress, Life Satisfaction and Depressive Symptoms in Adolescents: Life Satisfaction as a Potential Mediator. *Social Indicators Research*, 125, 339-357. doi: 10.1007/s11205-014-0842-0
- Moksnes, U. K., Moljord, I. E. O., Espnes, G. A., & Byrne, D. G. (2010). The association between stress and emotional states in adolescents: The role of gender and self-esteem. *Personality and Individual Differences*, 49, 430-435. doi: 10.1016/j.paid.2010.04.012
- Nordin, M., & Nordin, S. (2013). Psychometric evaluation and normative data of the Swedish version of the 10-item perceived stress scale. *Scandinavian Journal of Psychology*, 54, 502-507. doi: 10.1111/sjop.12071
- Ollfors, M., & Andersson, S. I. (2007). Ability of stress, sense of control, and self-theories to predict Swedish high school students' final grades. *Educational Research and Evaluation*, 13, 143-169. doi: 10.1080/13803610701434241
- The Public Health Agency of Sweden [Folkhälsomyndigheten]. (2014). *Skolbarns hälsövanor i Sverige 2013/14. Grundrapport*. Östersund: Folkhälsomyndigheten. Retrieved from <https://www.folkhalsomyndigheten.se/pagefiles/18915/skolbarns-halsovanor-sverige-2013-14.pdf>
- The Public Health Agency of Sweden [Folkhälsomyndigheten]. (2016). *Skolprestationer, skolstress och psykisk ohälsa bland tonåringar*. Östersund: Folkhälsomyndigheten. Retrieved from <https://www.folkhalsomyndigheten.se/pagefiles/23029/skolprestationer-skolstress-psykisk-ohalsa-tonaringar-16003-webb.pdf>
- Rashid, I., & Talib, P. (2013). Modelling a Relationship between Role Stress & Locus of Control. *The Indian Journal of Industrial Relations*, 48, 726-738. Retrieved from <http://web.a.ebscohost.com.ezproxy.ub.gu.se/ehost/pdfviewer/pdfviewer?sid=480440d9-fcf8-4e00-a982-82de6008f564%40sessionmgr4007&vid=1&hid=4201>
- Renaud-Dubé, A., Guay, F., Talbot, D., Taylor, G., & Koestner, R. (2015). The relations between implicit intelligence beliefs, autonomous academic motivation, and school persistence intentions: a mediation model. *Social Psychology Education*, 18, 255-272. doi: 10.1007/s11218-014-9288-0

- Romero, C., Paunesku, D., Dweck, C. S., & Gross, J. J. (2014). Academic and emotional functioning in middle school: The role of implicit theories. *Emotion, 14*, 227-234. doi: 10.1037/a0035490
- Rudolph, K. D. (2002). Gender Differences in Emotional Responses to Interpersonal Stress During Adolescence. *Journal of Adolescent Health, 30*, 3-13. doi: 10.1016/S1054-139X(01)00383-4
- Schraml, K. (2013). *Chronic stress among adolescents: Contributing factors and associations with academic achievement* (Doctoral thesis in Psychology), Stockholm: Department of Psychology, Stockholm University. Retrieved from <http://su.diva-portal.org/smash/get/diva2:614880/FULLTEXT01.pdf>
- Schraml, K., Perski, A., Grossi, G., & Simonsson-Sarnecki, M. (2011). Stress symptoms among adolescents: The role of subjective psychosocial conditions, lifestyles, and self-esteem. *Journal of adolescents, 34*, 987-996. doi: 10.1016/j.adolescence.2010.11.010
- Sideridis, G. D. (2007). The regulation of affect, anxiety, and stressful arousal from adopting mastery-avoidance goal orientations. *Stress and Health, 24*, 55-69. doi: 10.1002/smi.1160
- Siegle, D., DaVia Rubenstein, L., Pollard, E., & Romey, E. (2010). Exploring the relationship of college freshmen honors students' effort and ability attribution, interest, and implicit theory of intelligence with perceived ability. *Gifted Child Quarterly, 54*, 92 – 101. doi: 10.1177/0016986209355975
- Statistics Sweden [Statistiska Centralbyrån]. (2012). *Levnadsförhållanden, rapport 125: Barns upplevelser av skolan [Living Conditions Report 12: Children's experiences from school]*. Stockholm: Statistiska Centralbyrån. Retrieved from http://www.scb.se/statistik/_publikationer/LE0106_2011A01_BI_LE125BR1201.pdf
- Swedish National Agency for Education [Skolverket] (2013). *PISA 2012. 15-åringars kunskaper i matematik, läsförståelse och naturvetenskap: Resultaten i koncentrat*. Stockholm: Skolverket. Retrieved from http://www.skolverket.se/om-skolverket/publikationer/visa-enskild-publikation?_xurl_=http%3A%2F%2Fwww5.skolverket.se%2Fwtpub%2Fws%2Fskolbok%2Fwpubext%2Ftrycksak%2Fblob%2Fpdf3126.pdf%3Fk%3D3126
- Tempelaar, D. T., Rienties, B., Giesbers, B., & Gijsselaers, W. H. (2015). The pivotal role of effort beliefs in mediating implicit theories and achievement goals and academic motivations. *Social Psychology Education, 18*, 101-120. doi: 10.1007/s11218-014-9281-7
- Wiklund, M., Malmgren-Olsson, E-B., Öhman, A., Bergström, E., & Fjellman-Wiklund, A. (2012). Subjective health complaints in older adolescents are related to perceived stress, anxiety and gender - a cross-sectional school study in Northern Sweden, *BMC Public Health, 12*(993). doi:10.1186/1471-2458-12-993
- Yeager, D. S., Johnson, R., Spitzer, B. J., Trzesniewski, K. H., Powers, J., & Dweck, C. S. (2014). The far-reaching effects of believing people can change: implicit theories of personality shape stress, health, and achievement during adolescent, *Journal of Personality and Social Psychology, 106*, 867-884. doi: 10.1037/a0036335
- Yeager, D. S., & Dweck, C. S. (2012). Mindset that promote resilience: When students believe that personal characteristics can be developed. *Educational Psychologist, 47*, 302-314. doi: 10.1080/00461520.2012.722805