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**School-Related Stress among Sixth-Grade Students – Associations with Academic
Buoyancy and Temperament**

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Abstract

The present study examined to what extent sixth-grade students' academic buoyancy and temperament contributed to their school-related stress. A total of 845 students rated their school-related stress at the beginning and end of the school year and their academic buoyancy at the beginning of the year. Parents rated students' effortful control and negative affectivity. The results showed that high academic buoyancy, high effortful control, and low negative affectivity at the beginning of the school year were related to lower school-related stress at the end of the school year, after controlling for gender, GPA, and previous level of stress. Effortful control and negative affectivity had no significant interaction effect with academic buoyancy on students' school-related stress. The findings of the study suggest that interventions aiming at supporting students' academic buoyancy may also decrease their feelings of school stress. In particular, students with high negative affectivity or low effortful control may need training in stress management skills.

Keywords: academic buoyancy; early adolescence; effortful control; negative affectivity; school-related stress

School-Related Stress among Sixth-Grade Students - Associations with Academic Buoyancy and Temperament

1. Introduction

Research on adolescents' experience of stress has grown during the past decades (e.g., Bowker, Bukowski, Hymel, & Sippola, 2000; Murberg & Bru, 2004; Nieder & Seiffge-Krenke, 2001; Rudolph & Hammen, 1999). In early adolescence, typical stressors are, for example, conflicts with parents (Seiffge-Krenke, Aunola, & Nurmi, 2009), relationships with friends and peers (Bowker et al., 2000; Seiffge-Krenke et al., 2009), romantic relationships (Nieder & Seiffge-Krenke, 2001), and school performance (Murberg & Bru, 2004; Seiffge-Krenke et al., 2012). School is a central context in early adolescents' lives and can be perceived as being analogous to students' work (Salmela-Aro, Savolainen, & Holopainen, 2009). Despite this, school-related stress among early adolescents has been less examined than has work-related stress among adults (for a review on work stress, see Ganster & Rosen, 2013).

Previous studies on school-related or academic stress have also mostly focused on college or university students (e.g., Akgun & Ciarrochi, 2003; Hystad, Eid, Laberg, Johnsen, & Bartone, 2009; Struthers, Perry, & Menec, 2000) and less is known about individual experiences of school stress among younger students, such as early adolescents (for exceptions, see Ang & Huan, 2006; Hjern et al., 2008). Moreover, the role of individual factors such as self-beliefs (Lazarus, 1999) and temperament (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001; Rueda & Rothbart, 2009) in experiences of school stress has not been widely studied. With knowledge of the factors that contribute to students' experience of stress and to their ability to manage stress, it is possible to identify students who are at risk of excessive stress, burnout, or poor wellbeing. The present study aims to examine to what extent academic buoyancy, temperamental effortful control, and

temperamental negative affectivity uniquely and jointly contribute to early adolescents' experiences of school-related stress.

1.1. Transactional stress theory

Transactional stress theory by Lazarus and Folkman (1984) proposes that psychological stress arises in a person–environment transaction when the person feels that environmental demands exceed his or her resources and threaten his or her wellbeing. The evaluation of stressors and threatening events has two stages (Lazarus & Folkman, 1984). In primary appraisal, the person evaluates whether the event is threatening or challenging to his or her goals, commitments, values, and beliefs (Lazarus & Folkman, 1984; Lazarus, 1999). If no threat is perceived, experience of stress does not arise. In contrast, the person experiences stress if he or she feels that something valuable to him or her has been lost or that it is being threatened or challenged. Once the stressor has been identified and evaluated, the person makes a secondary appraisal of his or her chances of coping with the situation (Lazarus & Folkman, 1984). This involves judgment of the controllability of the stressor, the options and resources the person has at his or her disposal, and the probability of succeeding in his or her efforts.

Stress appraisals are affected by the personal goals, commitments, resources, and beliefs that the person has about him- or herself and about the world (Lazarus & Folkman, 1984). For example, strong commitment to certain goals or values may expose the person to experience stress in relation to that specific life domain. In addition, stress appraisals are influenced by context- and situation-specific factors such as novelty of the situation, duration of the event, and timing in the person's life course (Lazarus & Folkman, 1984). In early adolescence, individuals experience many social, psychological, and physiological changes (Roeser, Eccles, & Sameroff, 2000; Steinberg & Morris, 2001) that may affect their self-esteem, social relationships, and school outcomes. Conflicts with parents tend to increase and

closeness with parents tends to decrease as early adolescents spend more time with their peer groups and come to value friendships more highly. Adolescents also face the challenges of exploring and building their identities, going through puberty, and starting romantic relationships (Steinberg & Morris, 2001). Furthermore, many adolescents experience stress in relation to school (e.g., Crystal et al., 1994; Murberg & Bru, 2004; Seiffge-Krenke et al., 2012), because school accounts for a significant proportion of students' daytime.

1.2. School-related stress in early adolescence

Previous research has shown that psychosocial stress in adolescence, either as sporadic incidences or as a prolonged exposure to stress, is later related to psychosocial problems such as depression, aggression, or substance abuse (for reviews, see Grant, Compas, Thurm, McMahon, & Gipson, 2004; McMahon, Grant, Compas, Thurm, & Ey, 2003). However, many previous studies have focused on severe stress and risk factors, such as violence, poverty, or parental divorce, and their contribution to children's and adolescents' wellbeing (e.g., Lengua, Sandler, West, Wolchik, & Curran, 1999; Masten et al., 1999; McMahon et al., 2003). Less is known about stressors that are more typical in early adolescents' everyday lives, such as factors related to school. School-related stress can arise from the demands and pressure of schoolwork, high expectations for success, fear of failure, low performance, conflicts with schoolmates and teachers, or conflicts with parents concerning students' motivation and performance at school (Ang & Huan, 2006; Martin & Marsh, 2008a, 2009; Murberg & Bru, 2004). School-related stress is relatively common among early adolescents in Finland, where the present study was conducted. In the 2013/2014 survey of the international Health Behavior in School-aged Children study (Inchley et al., 2016), 26% of 11-year-old girls and 30% of 11-year-old boys and 48% of 13-year-old girls and 44% of 13-year-old boys in Finland reported feeling pressured to some extent or a lot by their schoolwork.

Previous research has shown that school-related stress is associated with several psychosomatic and somatic symptoms (Hjern et al., 2008; Murberg & Bru, 2004; Natvig et al., 1999; Torsheim & Wold, 2001). In 13- to 16-year-old adolescents, worries about school achievement and feeling that schoolwork was too demanding were associated with psychosomatic symptoms such as headache, abdominal pain, or feeling tense (Murberg & Bru, 2004). Similarly, factors such as schoolwork pressure, harassment by peers, and being treated poorly by teachers were related to increased psychosomatic symptoms among 10- to 18-year-old children and adolescents (Hjern et al., 2008). In other studies, high levels of school-related stress have been found to be associated with increased risk for psychosomatic and somatic symptoms (Natvig et al., 1999; Torsheim & Wold, 2001), or depressive symptoms and even suicide idealization (Ang & Huan, 2006; Low et al., 2012). Prolonged school stress symptoms can also lead to school burnout (Salmela-Aro, Muotka, Alho, Hakkarainen, & Lonka, 2016; Salmela-Aro et al., 2009). In addition, stress related to school and studying at age 12 has been found to predict lower performance even three years later (Kaplan et al., 2005).

Previous research on adolescents' school-related stress is mostly limited to cross-sectional designs (e.g., Ang & Huan, 2006; Hjern et al., 2008; Murberg & Bru, 2004; Natvig et al., 1999), which makes it difficult to draw conclusions about the direction of causality or the development of school-related stress across time. Some of the studies have also focused on older adolescents or young adults (Akgun & Ciarrochi, 2003; Struthers et al., 2000) or have used a wide age range without a specific focus on early adolescence (Ang & Huan, 2006; Hjern et al., 2008). The present study applies a longitudinal study design to examine early adolescents' school-related stress and individual factors that affect this stress.

1.3. Academic buoyancy and school-related stress

Stress appraisals are influenced by a person's self-beliefs and judgment of the individual resources he or she possesses (Lazarus, 1999; Lazarus & Folkman, 1984). One pivotal factor for experiences of stress in the school context could be academic buoyancy. This refers to students' beliefs that they can respond adaptively to the everyday pressure, challenges, and setbacks they face in school, such as poor grades, occasional fluctuation in motivation, negative feedback from teachers, or difficult schoolwork (Martin & Marsh, 2008a, 2009). Conceptually, academic buoyancy is distinct from but related to the concept of academic resilience (Martin, 2013; Martin & Marsh, 2009), which refers to a person's capacity for successful adaptation despite substantially challenging circumstances that are a major threat to their academic development (Martin & Marsh, 2009). Typically studies on resilience focus on students facing acute or chronic adversities, such as chronic underachievement, learning difficulties, truancy and disaffection from school, or opposition to teachers (Martin & Marsh, 2008a). These intense and extreme adversities are experienced by a minority of students. The concept of academic buoyancy was developed out of interest to study the ability that many students need when experiencing the everyday pressure and challenge of schoolwork.

According to previous studies, academic buoyancy is related to achievement motivation and wellbeing in adolescence. Among high school students, academic buoyancy has been found to predict high engagement (Martin, 2014), school enjoyment, class participation, and general self-esteem (Martin & Marsh, 2006) as well as low psychological risk factors, such as failure avoidance and emotional instability (Martin, Ginns, Brackett, Malmberg, & Hall, 2013) and grade and exam anxiety (Putwain, Connors, Symes, & Douglas-Osborn, 2012; Putwain, Daly, Chamberlain, & Sadreddini, 2016). Although being related to a number of motivational and behavioral factors, buoyancy is separate from

constructs such as self-efficacy, mastery orientation, disengagement, persistence, and self-handicapping (see Martin & Marsh, 2008b).

Academic buoyancy has not been previously investigated in relation to students' experiences of school-related stress. However, when considered as a secondary appraisal that students make in stressful situations of their capacity to manage school-related pressure, academic buoyancy can be expected to be associated with high control beliefs and self-confidence in stress management which, consequently, results in lower stress. Previous research also suggests that students with low academic buoyancy appraise academic pressure, such as teachers' use of pressured communications regarding upcoming exams, as being more threatening than do students with high buoyancy (Symes, Putwain, & Remedios, 2015). Academic buoyancy may thus also contribute to students' primary appraisal of whether the situation is perceived as a threat and, consequently, whether it is likely to evoke feelings of stress. Consequently, high academic buoyancy can be expected to be related to a low level of school stress.

1.4. Temperamental differences in school-related stress

In addition to academic buoyancy, temperament can also play a role in students' stress appraisals and coping efforts (Compas et al., 2001; Rueda & Rothbart, 2009). Temperament is defined as innate or early-appearing individual differences in emotional, behavioral, and attentional responses, manifested in the threshold, intensity, and duration of individuals' reactions as well as in the self-regulation of these reactions (Rothbart & Derryberry, 1981; Rothbart, Ahadi, & Evans, 2000). Temperamental differences influence the kinds of contexts that individuals are drawn to, the kinds of stimuli that they focus their attention on, the kinds of feedback that they receive from others, and the ways in which they interpret the information they perceive from the environment and from their own affective reactions (Derryberry & Rothbart, 1997).

The present study focuses on the role of temperamental negative affectivity and effortful control in students' school-related stress. Negative affectivity and effortful control are two of the broader temperament dimensions in the developmental model of temperament constructed by Rothbart and colleagues (Derryberry & Rothbart, 1997; Rothbart, Ahadi, Hershey, & Fisher, 2001). Negative affectivity refers to individual differences in the threshold, intensity, and recovery of negative emotions such as frustration, sadness, and discomfort (Rothbart et al., 2001) when, for example, confronted with disappointments or interruptions. Students with high negative affectivity are sensitive to negative and potentially threatening cues in their environment and are liable to express intense negative feelings (Derryberry & Rothbart, 1997). Effortful control is the self-regulative aspect of temperament, characterized by attentional, activation, and inhibitory control (Rothbart et al., 2001). High effortful control enables individuals to direct and maintain attention, plan and control their behavioral and affective responses, and inhibit inappropriate ones (Rothbart et al., 2001).

The role of temperament in stress and stress management has been studied to some extent among children and adolescents (e.g., Lengua et al., 1999; Lengua & Long, 2002; Thompson, Zalewski, & Lengua, 2014). However, this research has not focused specifically on school-related stress. Studies on 8- to 12-year-old children and early adolescents have shown that temperamental negative affectivity is related to threat appraisals and avoidance coping skills (Lengua et al., 1999; Lengua & Long, 2002; Thompson et al., 2014). Children with high negative affectivity tend to have negative thoughts about life events, observe more threats in their environment, and try to deal with stressors by avoiding them. This negative style of appraisal and coping aggravates the effect of negative life events and may lead to adjustment problems (Lengua & Long, 2002). Effortful control or self-regulation, on the other hand, has been found to be associated with a decrease in threat appraisals, more active coping, and lower adjustment problems (Lengua & Long, 2002; Thompson et al., 2014). The

significance of effortful control in the regulation of affect, behavior, and attention is highlighted by findings showing that effortful control can moderate the relation between negative affectivity and threat appraisals: In a study on children and adolescents, using a dot probe detection task (Lonigan & Vasey, 2009), high negative affectivity was found to be related to attentional bias to threat stimuli, but only when accompanied by low effortful control. In the school context, high effortful control can help students to dismiss distraction and to focus on how they can overcome the challenge they are facing (see Derryberry & Rothbart, 1997). Students' ability to monitor and shift their attention away from potential threats and stress-evoking factors can reduce their anxiety and improve their functioning, especially if, without this ability, they would be inclined to have intense, negative reactions when distracted or frustrated. Following this, it can be assumed that temperamental negative affectivity and effortful control may both uniquely and jointly contribute to students' experiences of stress at school.

The relationship between temperament and academic buoyancy is yet unclear but it is possible that buoyancy is at least to some extent influenced by individual differences in temperament. To support this, research on resilience suggests that both emotionality and self-regulation contribute to children's resilience and adjustment in adverse situations (e.g., Lengua, 2002; Smith & Prior, 1995; Wang & Deater-Deckard, 2013). Children with high negative affectivity are more likely to show adjustment problems when faced with multiple risk factors, whereas high effortful control is associated with high resilience to adversity. Consequently, it is also important to examine whether the effect of academic buoyancy on school-related stress is moderated by students' negative affectivity and effortful control.

1.5. The present study

The present study aimed to investigate the relationship of academic buoyancy and temperament with sixth-grade students' school-related stress. The research questions were as follows:

(1) To what extent is sixth-grade students' academic buoyancy related to their school-related stress at the end of the school year, after controlling for gender, grade point average (GPA), school class, and previous level of school stress?

When setting the hypothesis, there were no previous studies on the relationship between academic buoyancy and school-related stress on which to rely. However, based on a theoretical assumption of the protective role of buoyancy against academic setbacks and on findings from previous studies with various measures of student wellbeing (e.g., Martin & Marsh, 2006; Martin et al., 2013; Putwain et al., 2012), it was hypothesized that higher academic buoyancy is related to lower school-related stress.

(2) To what extent are students' academic buoyancy, temperamental negative affectivity, and effortful control uniquely and jointly related to their school-related stress, after controlling for gender, GPA, school class, and previous level of school stress?

Based on previous research (Lengua et al., 1999; Lengua & Long, 2002; Thompson et al., 2014), it was hypothesized that higher negative affectivity and lower effortful control are related to higher stress. Moreover, based on research on the role of temperamental characteristics in resilience to adversity (e.g., Lengua, 2002; Wang & Deater-Deckard, 2013), we also examined the possibility that temperament could moderate the effect of academic buoyancy on experiences of school-related stress, but no specific hypotheses for the interactions were set.

Gender and GPA were controlled for in the analyses, because previous research has shown that girls and boys may differ in school-related stress (e.g., Rudolph & Hammen,

1999) and in academic buoyancy (Martin & Marsh, 2008a; Martin, Colmar, Davey, & Marsh, 2010) and that GPA is related to experiences of school stress (Crystal et al., 1994).

2. Material and methods

2.1. Participants

The participants of the study were part of a larger longitudinal study (authors removed for blind review) focusing on individual and environment-related factors that promote students' learning, motivation, and school well-being during the transition from primary school to lower secondary school. The sample consisted of 845 primary school students (457, or 54% girls) from 56 school classes. Five of the classes were combined classes, with fifth-graders studying together with sixth-graders. Thirty fifth-graders from these classes were excluded from the present sample. The students' parents were also asked to participate in the study.

The age of the students at the beginning of the study ranged from 11.6 to 13.8 years ($M = 12.3$, $SD = 0.4$). A vast majority (96%) of the students were Finnish-speaking, 2% had some other language as their mother tongue, and 2% were bilingual (Finnish and some other language). Mother tongue was not known for two students (0.2%). A total of 75% of the students reported living in a nuclear family, 5% in blended families, 8% with a single parent, 12% alternately with mother and father, and 0.4% in another type of family (such as foster home). Compared to Finnish families with underage children (see Official Statistics of Finland, 2016b), nuclear families were slightly overrepresented in the study sample, and single-parent households were underrepresented.

The majority of parent responses (98%) were received from mothers. The parents were somewhat more educated than 30- to 54-year-old adults on average in Finland (Official Statistics of Finland, 2016a). A total of 3% of parents were not educated beyond comprehensive school (i.e., nine years of basic education), 29% had completed upper

secondary education, 40% had a bachelor's degree or vocational college degree, and 29% had a master's degree or higher.

The amount of missing data in the main study variables ranged from 1.3% to 22.0%. The proportion of missing data was highest for the parent-rated temperament variables and for GPA that was obtained from the school registers. Little's MCAR test indicated that the data was not missing completely at random: $\chi^2(464) = 564.9, p = .001$. Further analyses showed that students for whom parent ratings of temperament were available, had higher GPA ($t(692) = 4.89, p < .001$; Cohen's $d = .49$) and lower school-related stress at Time 1 ($t(833) = 2.55, p = .01$; Cohen's $d = .22$) and Time 2 ($t(832) = 2.18, p = .03$; Cohen's $d = .18$) than students whose parents did not provide temperament ratings (all measures are described in more detail in Section 2.3). In the following analyses, full-information maximum likelihood method was used for model estimation to handle the missing data.

2.2. Procedure

Parents' written consent was requested for their adolescents' and their own participation in the study. The parents were advised to discuss the study with their offspring to ensure the students' own willingness to participate. Of all families contacted, 73.9% consented to the adolescent's participation. Teachers of the participating classes gave their written consent for the data collections to be conducted during school days. The study has been evaluated and approved by the ethics committee of the local university.

Students' data were collected in the classrooms on normal school days by two trained testers. The data collections included an extensive set of measures, including tests of academic skills as well as questionnaires concerning, for example, children's school motivation, social relationships, and well-being. Time 1 (T1) data were collected in the autumn term (late September to early November) and Time 2 (T2) data was collected in the

spring term (March or April) of Grade 6. Parents' data were collected by questionnaires at T1. Parents had an option to fill either an electronic or a postal version of the questionnaire.

2.3. Measures

2.3.1. School-related stress

Students reported their school-related stress at T1 and T2 using questions adapted from the Health Behavior in School-Aged Children (HBSC) study (Currie et al., 2012; see also Käämpä et al., 2012). The questions are based on findings showing that school demands and work overload are related to students' compromised health and health behavior (e.g., Samdal, Dür, & Freeman, 2004; Sonmark & Modin, 2017). The four items of the scale (see items and their factor loadings on a latent school stress factor in Table 2) were assessed on a five-point Likert scale (1 = *completely disagree*; 5 = *completely agree*). Cronbach's alpha reliabilities were .79 at T1 and .77 at T2.

2.3.2. Academic buoyancy

Students rated their academic buoyancy at T1 using a scale developed by Martin and Marsh (2008a). The scale consists of four items (see items and their factor loadings on a latent academic buoyancy factor in Table 2) answered on a five-point Likert scale (1 = *completely disagree*; 5 = *completely agree*). Previous research has demonstrated the reliability and validity of the measure across different age groups (Martin, 2013; Martin & Marsh, 2008a, 2008b; Putwain et al., 2012). Cronbach's alpha reliability in the present sample was .83.

2.3.3. Temperament

Parents rated students' temperament at T1 using a Finnish version of the Early Adolescent Temperament Questionnaire – Revised (EATQ-R, Ellis & Rothbart, 2001, Finnish translation by K. Räikkönen-Talvitie; see also Ellis, 2002; Snyder et al., 2015). The EATQ-R and other temperament questionnaires developed by Rothbart and colleagues are

widely used in research because different versions of the same instrument for several age groups enable the investigation of temperamental differences and development from infancy to adulthood. Validation information of the EATQ-R in the present study sample can be found in Authors (2018a). The EATQ-R consists of 55 statements assessed on a five-point Likert scale (1 = *almost never true*; 5 = *almost always true*). The statements measure nine temperamental dimensions (activation control, affiliation, attention, fear, frustration, inhibitory control, sadness, shyness, and surgency) that further constitute four broader factors: effortful control, negative affectivity, surgency, and affiliativeness. In the present study, only the factors of effortful control and negative affectivity were used. Mean scores for the dimensions of activation control, attention, and inhibitory control were calculated and used as indicators of effortful control, and mean scores for the dimensions of fear, frustration, and sadness as indicators of negative affectivity (see Authors, 2018a, for more information about the factor structure of the scale in the present sample). Cronbach's alpha reliabilities were .83 for effortful control and .70 for negative affectivity.

2.3.4. GPA

To control for students' academic competence in the analyses, GPA in their last school report (end of Grade 5) was used. GPA ranged from 5.7 to 9.6 on a scale from 5 (adequate) to 10 (excellent).

2.4. Statistical analyses

The research questions were examined using structural equation modeling (SEM). First, a measurement model with latent factors for T1 and T2 school-related stress, T1 academic buoyancy, negative affectivity, and effortful control was estimated. Second, to examine the role of academic buoyancy in students' school-related stress, a SEM model was estimated with T2 stress as the dependent variable and T1 academic buoyancy as an independent variable. The effects of gender, GPA, and T1 stress on T2 stress were controlled

for. Third, to examine the main and interactive effects of effortful control and negative affectivity on students' T2 school-related stress, SEM models were conducted with T2 stress as the dependent variable and the independent variables (T1 academic buoyancy, T1 temperamental negative affectivity, and T1 effortful control) and control variables (gender, GPA, and T1 stress) added as predictors. Interaction effects between T1 academic buoyancy, T1 negative affectivity, and T1 effortful control were tested using the XWITH command in *Mplus* (Muthén & Muthén, 1998-2017; see also Klein & Moosbrugger, 2000).

The analyses were conducted using the *Mplus* statistical package (version 8; Muthén & Muthén, 1998-2017). All models were estimated with MLR estimation, which provides full-information maximum likelihood estimation with test statistics and standard errors that are robust to non-normality. To evaluate model fit, the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR) were used. Values higher than .90 for CFI and lower than .06 for RMSEA and .08 SRMR were considered acceptable (see Hu & Bentler, 1999).

Intra-class correlation coefficients (ICC) and design effects were calculated to assess the effect of students' clustering in the school classes. The ICCs ranged from .004 for T1 effortful control (design effect = 1.05) to .07 for GPA (design effect = 1.84). The ICCs and design effects could be considered small, but the effect of clustering of students within school classes was nevertheless controlled at each stage of the analyses using the COMPLEX option in *Mplus*.

3. Results

3.1. Preliminary analyses

Table 1 shows descriptive statistics for the measures used in the study. Preliminary analyses showed that there was a statistically significant decrease in students' school-related stress from T1 to T2 ($t(824) = 2.78, p = .01$; dependent samples $d = .08$). Regarding gender

differences, boys reported significantly more school-related stress than girls at both T1 ($t(833) = -4.78, p < .001$; Cohen's $d = -.33$) and T2 ($t(832) = -4.34, p < .001$; Cohen's $d = -.30$), but boys also reported higher T1 buoyancy than girls ($t(832) = -4.27, p < .001$; Cohen's $d = -.30$). Girls were rated higher than boys in T1 effortful control ($t(657) = 4.28, p < .001$; Cohen's $d = .34$), whereas no gender differences were found in T1 negative affectivity ($t(657) = -0.21, p = .84$; Cohen's $d = -.02$). Girls had higher GPA than boys ($t(636) = 6.78, p < .001$; Cohen's $d = .52$).

--- INSERT TABLE 1 AROUND HERE ---

3.2. Measurement model

A measurement model with five latent factors (T1 and T2 school-related stress, T1 academic buoyancy, T1 effortful control, and T1 negative affectivity) was first tested. For school-related stress, factor loadings of the same items were constrained to be equal between T1 and T2 to test invariance of the measurement across time (metric invariance). Autocovariances of the residuals of the same items were also estimated. The fit of the measurement model was satisfactory: $\chi^2(124) = 397.35, p < .001$; CFI = .94; RMSEA = .05; SRMR = .05. Factor loadings of the latent variables are presented in Table 2. The standardized estimates of all factor loadings were higher than .40 and significant at $p < .001$ level.

The intercorrelations between the latent variables and control variables are presented in Table 3. Expected negative correlations were found for school-related stress with academic buoyancy and effortful control, and a positive correlation was found between school-related stress and negative affectivity. Academic buoyancy also showed significant correlations with negative affectivity and effortful control. Negative affectivity and effortful control were highly correlated.

--- INSERT TABLES 2 AND 3 AROUND HERE ---

3.3. Academic buoyancy as a predictor of school-related stress

A structural model was next created to test the contribution of T1 academic buoyancy to students' T2 school-related stress. The effects of T1 stress, gender, and GPA were controlled for. The results of the final model ($\chi^2(68) = 320.36, p < .001$; CFI = .92; RMSEA = .07; SRMR = .06) are presented in Figure 1. The results showed that after accounting for the control variables, T1 academic buoyancy was a significant predictor of students' T2 school-related stress: The higher the student's academic buoyancy, the lower was his or her stress. Of the control variables, T1 stress and gender significantly contributed to students' T2 school-related stress, whereas GPA was not a significant predictor.

--- INSERT FIGURE 1 AROUND HERE ---

3.4. The effect of negative affectivity and effortful control on school-related stress

The role of T1 negative affectivity and effortful control in students' T2 school-related stress was next analyzed by adding them as predictors in the structural model presented above. Because negative affectivity and effortful control were highly correlated ($r = -.78$, see Table 3), their effects were estimated in separate models. In both models, an interaction effect between the latent factors of academic buoyancy and negative affectivity or effortful control was also estimated. However, the interaction effects were found to be statistically non-significant ($\beta = -.03, p = .63$ for academic buoyancy \times negative affectivity; $\beta = -.03, p = .48$ for academic buoyancy \times effortful control) indicating that the relation between T1 academic buoyancy and T2 school-related stress was not moderated by T1 negative affectivity or effortful control. Consequently, the final models are reported without the interactions. The results of the final models are presented in Figures 2a and 2b.

--- INSERT FIGURE 2 AROUND HERE ---

The results of the model for negative affectivity ($\chi^2(105) = 398.60, p < .001$; CFI = .92; RMSEA = .06; SRMR = .05) showed that negative affectivity had a small but significant

effect on students' school-related stress after accounting for the effects of previous level of school stress, academic buoyancy, gender, and GPA: The higher the students' T1 negative affectivity, the higher was their T2 stress level (see Figure 2a). Similarly, the model for effortful control ($\chi^2(105) = 391.93, p < .001$; CFI = .93; RMSEA = .06; SRMR = .05) showed that effortful control had a significant relation with T2 school-related stress: The higher the students' T1 effortful control, the lower was their T2 stress (see Figure 2b). The results of both models further showed that academic buoyancy remained a significant predictor of students' school-related stress after the effects of negative affectivity and effortful control were taken into account: The more T1 buoyancy the students reported, the lower was their T2 school stress.

4. Discussion

The aim of this study was to examine the role of academic buoyancy and temperamental negative affectivity and effortful control in sixth-grade students' experiences of school-related stress, after controlling for their previous level of school stress, gender, and GPA. The findings showed that academic buoyancy, or the ability to successfully respond to the everyday pressure, challenges, and setbacks that students face in school, predicted a lower level of school-related stress. Moreover, low negative affectivity and high effortful control were found to predict lower stress levels. No interaction effects were found for academic buoyancy, negative affectivity, and effortful control, suggesting that the contribution of academic buoyancy to students' school-related stress was not moderated by their temperament.

The results of the present study showed, first, that students' academic buoyancy at the beginning of the school year predicted a lower level of school-related stress at the end of the school year, after controlling for previous stress level, gender, and GPA. This was in line with our hypothesis and with findings from previous studies showing that students' ability to

respond to everyday academic challenges and pressure is related to their wellbeing, such as higher school enjoyment and self-esteem and lower test anxiety and emotional instability (e.g., Martin & Marsh, 2006; Martin et al., 2013; Putwain et al., 2012). It is possible that students with high academic buoyancy are less prone to threat appraisals than are students with low buoyancy (see Symes et al., 2015). If students have a high belief in their ability to bounce back from academic setbacks and challenges, they may see school-related stressors, such as a poor grade or high workload, as less threatening. It has also been suggested that students with high buoyancy are more likely to appraise stress factors as challenging and less likely to appraise them as threatening (Symes et al., 2015), but there is no empirical evidence to support this yet. Students' belief in their capacity to respond adaptively to school-related pressure can also be seen as a resource that, in itself, affects students' experiences of situations as less stressful (Lazarus & Folkman, 1984).

The results further showed that the effect of academic buoyancy on school-related stress remained significant after controlling for the effect of temperamental negative affectivity and effortful control. Moreover, no interaction effects were found between academic buoyancy, negative affectivity, and effortful control. This indicates that the unique effect of buoyancy was independent of students' temperamental characteristics of negative affectivity and effortful control and that buoyancy is not just an artifact of temperament. Following this, it can be suggested that academic buoyancy is a malleable ability that can be developed (see Martin et al., 2010) independently of students' inborn characteristics. However, the relationship between academic buoyancy and temperament needs to be further investigated in future studies before we can, for example, draw conclusions about the role of self-regulation in the development of academic buoyancy.

In addition to the effect of academic buoyancy, students' negative affectivity was also found to have a small unique effect on their school-related stress. This was in line with our

hypothesis (cf. Lengua et al., 1999; Lengua & Long, 2002; Thompson et al., 2014). Students with high negative affectivity may be prone to picking up negative or potentially threatening cues from the environment (Derryberry & Rothbart, 1997), such as things that make them feel irritated, worried, or anxious in learning situations, and thus they may be more inclined to threat appraisals and stress experiences (Lengua et al., 1999; Thompson et al., 2014). High negative affectivity can also be related to maladaptive coping skills, such as avoidance, when students try to deal with situations that they see as threatening or stressful (Lengua & Long, 2002; Thompson et al., 2014). Proneness to dwell on the negative sides and potential threats in learning situations can predispose students with high negative affectivity to a risk for prolonged school stress experiences.

Moreover, students' effortful control also uniquely contributed to students' stress. Previous studies on children and early adolescents found that high effortful control was related to a decrease in adolescents' threat appraisal (Thompson et al., 2014) and, further, to better adjustment in terms of low internalizing and externalizing problems (Lengua & Long, 2002; Thompson et al., 2014). This is supported by the present finding of high effortful control being predictive of lower stress in relation to schoolwork. In stressful situations, high effortful control enables students to turn their attention toward relevant stimuli and away from irrelevant ones, to focus on feelings of self-efficacy and control, and to make better use of their stress coping skills (see Derryberry & Rothbart, 1997). Instead of experiencing stressful events as potential threats to their self-beliefs and goals, students with high effortful control may be able to focus their attention on ways of controlling the events, thus turning the threats into challenges they can master.

It is worth noting that the largest proportion of students' experiences of school-related stress in the spring term was predicted by their stress level in the autumn term. The relatively high stability of interindividual differences in school stress across the school year suggests

that students with a high level of stress are in danger of experiencing prolonged stress symptoms. This is alarming considering that the students in the study sample were relatively young, being in the sixth grade of primary school. Prolonged stress symptoms can increase the risk for school burnout (Salmela-Aro et al., 2016; Salmela-Aro et al., 2009) and even further, for school dropout (Bask & Salmela-Aro, 2013). Consequently, it is important to be able to identify the individual and environmental factors that can prevent the accumulation of symptoms and reduce students' experiences of stress. The findings suggest that students benefit from believing in their ability to respond successfully to school-related setbacks and pressure, and, thus, interventions could be targeted especially at supporting students' self-perceptions of their abilities and resources (see Authors, 2018b). It has been suggested that academic buoyancy can be promoted with interventions aiming at increasing students' self-confidence, commitment, planning skills, and feelings of control and at reducing their feelings of anxiety (Martin & Marsh, 2006; Martin et al., 2010). Students can benefit from instruction in goal setting and in use of adaptive learning strategies, because these support students' beliefs of being in control of their learning (Martin & Marsh, 2006).

When interpreting the findings of the present study, some limitations need to be considered. First, because academic buoyancy was measured at one time point only, no conclusions can be drawn from whether the relationship between academic buoyancy and school-related stress is bidirectional. Previously, it has been found that risk and resilience affect each other (Martin et al., 2013), and, consequently, it would be important in future studies to study not only whether high buoyancy reduces stress but also whether high stress reduces buoyancy. A second limitation concerns the use of self-reports in academic buoyancy and school-related stress, which may have caused common method bias. In future, other information sources, such as teacher ratings or psychophysical measures of stress, should be considered supplementary to self-ratings. Finally, the present study followed students of one

age cohort during one school year. To get a broader understanding of processes leading to students' experiences of school stress, it is important to study students at different ages and at different phases of the school year.

5. Conclusions

A high level of school-related stress can have consequences on students' well-being, such as various psychosomatic and somatic symptoms (Ang & Huan, 2006; Hjern et al., 2008; Low et al., 2012; Murberg & Bru, 2004) or even school burnout (Salmela-Aro et al., 2016; Salmela-Aro et al., 2009). Following this, knowledge of factors that contribute to students' everyday stress appraisals in the school context can have a remarkable significance in promoting students' wellbeing and in planning interventions that support students' stress management skills. The findings of this study suggest that promoting students' ability to pull through everyday academic challenges and pressure may significantly reduce their experiences of stress at school. If students believe they possess enough resources to overcome setbacks and to control their workload, they can perceive challenging situations as more positive and less stressful.

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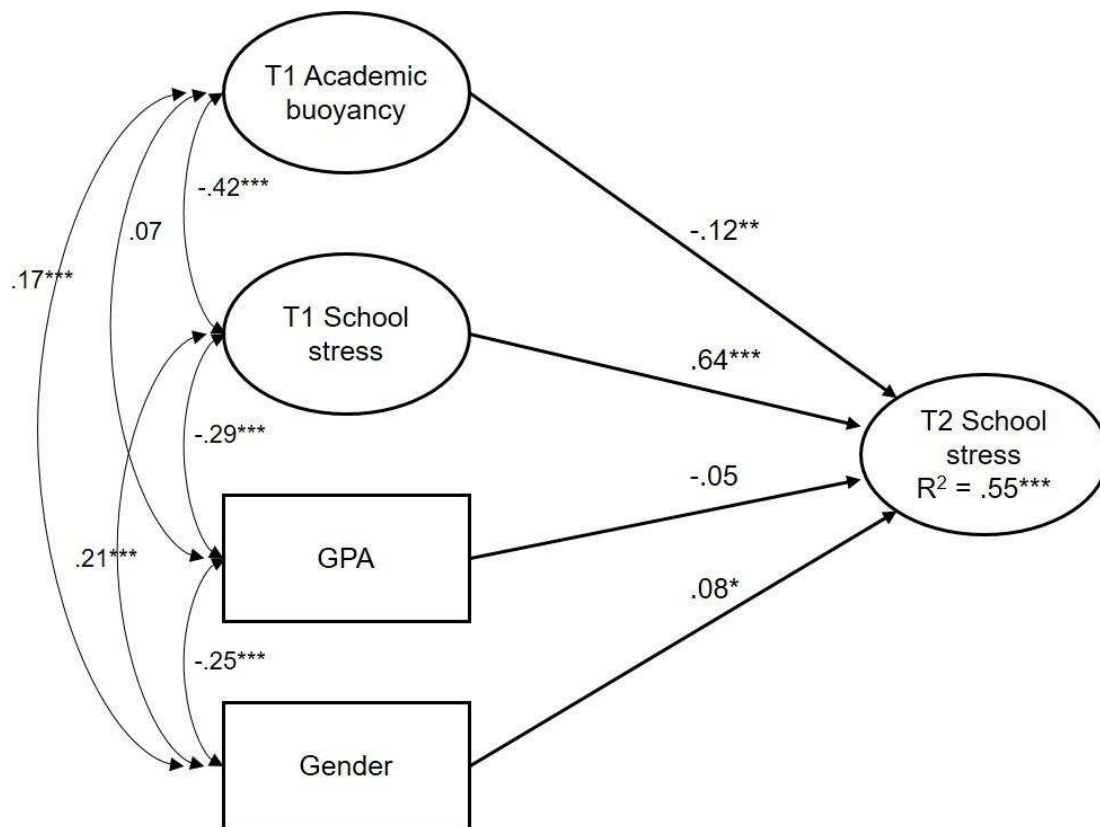


Figure 1. Structural equation model to predict T2 school-related stress from T1 academic buoyancy, controlling for gender, GPA, and T1 stress (standardized estimates).

* $p < .05$. ** $p < .01$. *** $p < .001$.

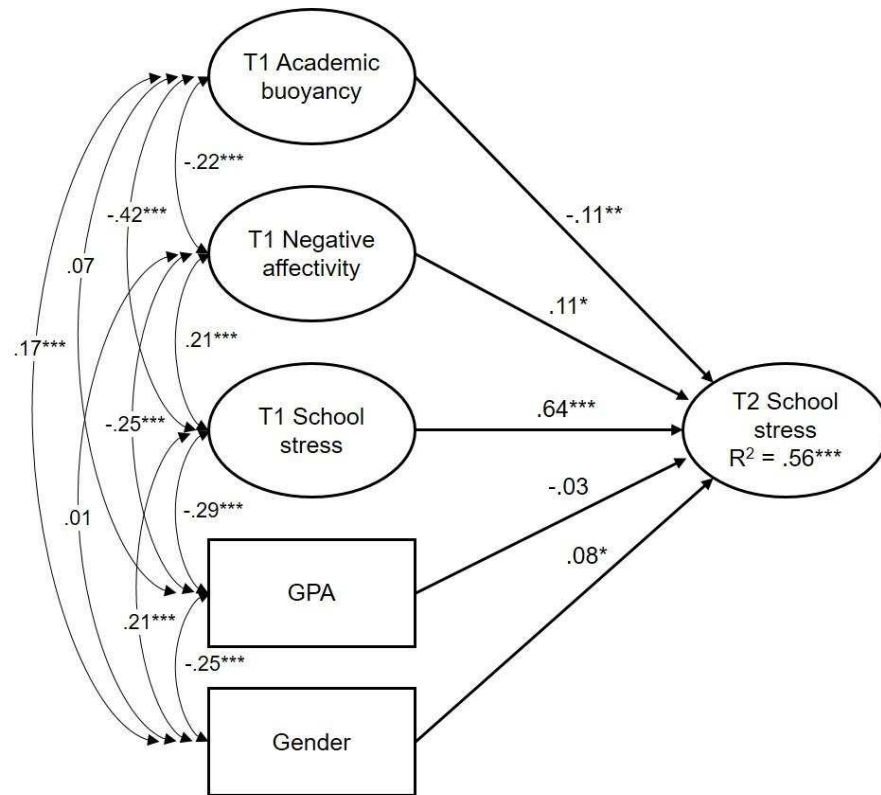


Figure 2a. Structural equation model to predict T2 school-related stress from T1 academic buoyancy and negative affectivity, controlling for gender, GPA, and T1 stress (standardized estimates).

* $p < .05$. ** $p < .01$. *** $p < .001$.

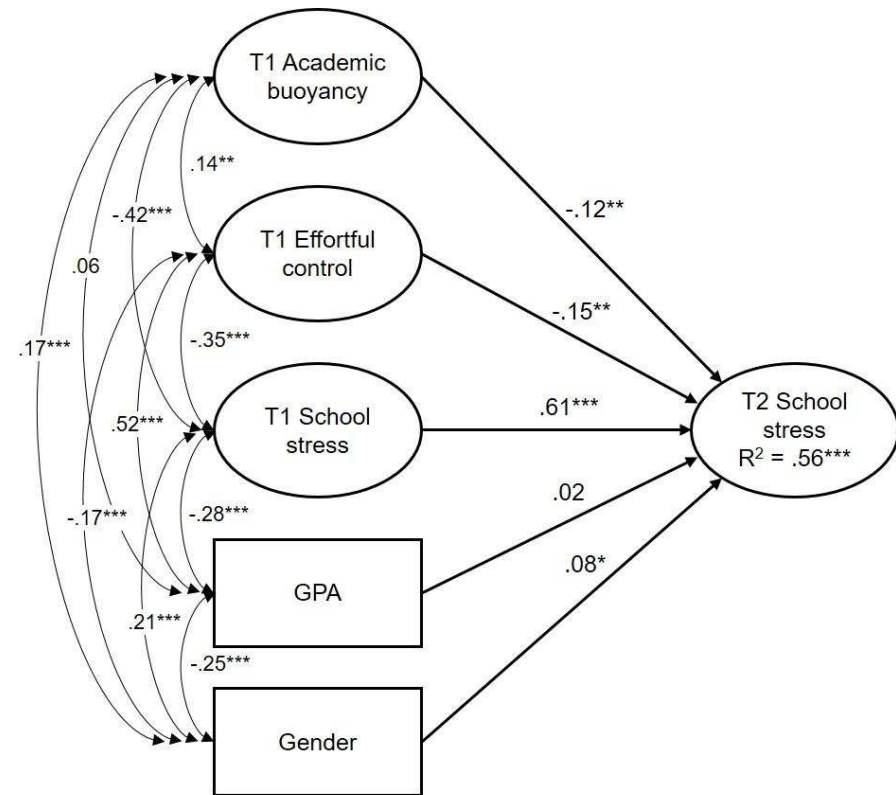


Figure 2b. Structural equation model to predict T2 school-related stress from T1 academic buoyancy and effortful control, controlling for gender, GPA, and T1 stress (standardized estimates).

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 1

Descriptive Statistics of the Study Measures

	<i>n</i>	<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>
T1 School stress	835	1.00	5.00	2.50	0.81
T2 School stress	834	1.00	5.00	2.43	0.76
T1 Academic buoyancy	834	1.00	5.00	3.84	0.73
T1 Negative affectivity	659	1.13	4.06	2.31	0.54
T1 Effortful control	659	1.94	5.00	3.60	0.57
GPA	694	5.73	9.82	8.23	0.67

Note. *N* = 845.

Table 2

Unstandardized and Standardized Factor Loadings for the Five-Factor Measurement Model

	Unstandardized	SE	Standardized
T1 School-related stress ^a			
<i>I have too much schoolwork.</i>	1.00	.00	.76
<i>Schoolwork is difficult for me.</i>	0.78	.05	.67
<i>Schoolwork is tiring.</i>	1.11	.05	.75
<i>School things bother me even on my free time.</i>	0.93	.07	.62
T2 School-related stress ^a			
<i>I have too much schoolwork.</i>	1.00	.00	.75
<i>Schoolwork is difficult for me.</i>	0.78	.05	.64
<i>Schoolwork is tiring.</i>	1.11	.05	.72
<i>School things bother me even on my free time.</i>	0.93	.07	.58
Academic buoyancy			
<i>I don't let study stress get on top of me.</i>	1.00	.00	.73
<i>I'm good at dealing with school work pressures.</i>	1.02	.06	.79
<i>I don't let bad marks or failures affect my confidence.</i>	1.14	.09	.76
<i>I'm good at dealing with setbacks at school (e.g., poor results or negative feedback on my work).</i>	1.03	.10	.70
Negative affectivity			
<i>Fear</i>	1.00	.00	.52
<i>Frustration</i>	1.44	.17	.77
<i>Sadness</i>	1.14	.11	.68
Effortful control			
<i>Activation control</i>	1.00	.00	.77
<i>Attention</i>	0.90	.04	.83
<i>Inhibitory control</i>	0.80	.05	.78

Note. $N = 845$. SE = standard error. T1 = Time 1; T2 = Time 2. ^a = Factor loadings for equivalent items are constrained equal between T1 and T2 (metric invariance).

Table 3

Intercorrelations of the Latent Factors and Control Variables

	1	2	3	4	5	6
1. T1 School-related stress						
2. T2 School-related stress	.73***					
3. T1 Academic buoyancy	-.42***	-.39***				
4. T1 Negative affectivity	.23***	.28***	-.22***			
5. T1 Effortful control	-.35***	-.39***	.14**	-.78***		
6. GPA	-.28***	-.26***	.06	-.27***	.52***	
7. Gender ^a	.21***	.20***	.17***	.04	-.17***	-.25***

Note. $N = 845$. ^a 0 = girl; 1 = boy.

* $p < .05$; ** $p < .01$; *** $p < .001$

Highlights

- Sixth-grade students' school-related stress was studied over one school year.
- Academic buoyancy predicted low school stress, controlling for prior stress level.
- The effect of buoyancy remained after controlling for gender, GPA, and temperament.
- Effortful control and negative affectivity also had unique effects on school stress.