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The Role of Temperament in Children's Affective and Behavioral Responses in Achievement
Situations

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Abstract

Although students' affects and behaviors in achievement situations have been shown to be influenced by their previous learning experiences, less is known about how they relate to students' dispositional characteristics, such as temperament. This study examined to what extent children's temperament is related to their affective and behavioral responses in achievement situations. Teachers rated first-graders' ($n = 153$) temperamental characteristics in the Fall semester. Children's active task avoidance, anxiety, and helplessness were rated in test situations in the Fall and Spring semesters. The results showed that the more easily distracted the children were, the more task avoidance they showed, and the more their task avoidance increased during the first grade. Moreover, children's high level of inhibition was related to high levels of anxiety and helplessness. The findings suggest that characteristics that are related to students' behavioral regulation and inhibition are particularly important for their affective and behavioral responses in achievement situations.

Keywords: anxiety, elementary school, helplessness, task avoidance, temperament

The Role of Temperament in Children's Affective and Behavioral Responses in Achievement Situations

1. Introduction

When faced with challenging tasks, students differ from each other in their affective and behavioral responses. Some students react to challenges with enthusiasm and by focusing on the task, whereas others become anxious and passive, or actively try to avoid the challenge (e.g., Dweck & Leggett, 1988). Responses such as task avoidance, helplessness, and anxiety are considered maladaptive because they do not promote students' performance and skill development (e.g., Bandura, 1993; Diener & Dweck, 1978; Pekrun, Goetz, Titz, & Perry, 2002). From motivational perspective, achievement-related affects and behaviors can be interpreted in the light of students' previous experiences in learning situations, and how these experiences influence their beliefs in their own competence, their expectations for succeeding in the tasks, and their willingness to invest effort in them (e.g., Bandura, 1993; Dweck & Leggett, 1988). Another way to understand students' affects and behaviors is through the effects of innate and early maturing individual characteristics, such as temperament. Temperamental characteristics can be reflected in the intensity of emotional reactions the situation evokes in the students, and in the students' orientation towards or away from the situation (Ahadi & Rothbart, 1994; Derryberry & Rothbart, 1997). This study aims to examine to what extent children's temperamental characteristics (distractibility, inhibition, mood, and negative emotionality) contribute to their maladaptive affects and behaviors (task avoidance, helplessness, and anxiety) in achievement situations.

1.1. Achievement-related affects and behaviors

Achievement-related behaviors, such as learned helplessness and active task avoidance, have provoked interest among researchers because these behaviors have proven to be maladaptive in terms of their effect on achievement outcomes (e.g., Aunola, Nurmi,

Lerkkanen, & Rasku-Puttonen, 2003; Dweck, 1986; Fyrstén, Nurmi, & Lyytinen, 2006; Nolen-Hoeksema, Girgus, & Seligman, 1986). Although such behaviors are students' attempts to cope with the situational demands and stress in academic settings, they have negative consequences on students' performance. Students showing *helplessness* or passive avoidance in academic settings tend to attribute success to external, unstable, and situation-specific causes (Diener & Dweck, 1978; Nolen-Hoeksema et al., 1986). This maladaptive attributional style leads the students to expect no success, to experience negative affect, and to withdraw effort (Dweck, 1986; Nolen-Hoeksema et al., 1986). Active form of *task avoidance*, on the other hand, is characterized by a low level of effort and an active attempt to avoid the challenge by engaging in irrelevant activities. Lowered beliefs in personal competence lead the students to expect nothing but failure, and to engage in task-irrelevant behaviors in order to create an excuse for this failure (self-handicapping; Midgley, Arunkumar, & Urdan, 1996; Turner, Thorpe, & Meyer, 1998).

Anxiety, on the other hand, is by far the most studied emotion in academic settings because of the detrimental effects it may have on students' performance (Pekrun et al., 2002). Feelings of anxiety can be considered as a function of the individual's outcome expectancies, goal appraisals, and beliefs of control: if avoiding a failure in the task is important to the student, but chances for personal control over the outcome are uncertain, anxiety will follow (Pekrun, 2006; Pekrun et al., 2002). Students with low self-efficacy beliefs are more vulnerable to experience achievement anxiety, because believing that something in the situation exceeds their competence or threatens their feelings of self-worth leads them to dwell on these worries instead of concentrating on adaptive functioning (Bandura, 1993; Turner et al., 1998).

1.2. Temperament in the school context

Temperament refers to inherited or early appearing individual differences in behavioral and emotional responses (Thomas & Chess, 1977), visible as reactivity towards environmental stimuli as well as self-regulation in modulating this reactivity (Rothbart, Ahadi, & Evans, 2000). Temperamental characteristics affect the kinds of environments and activities individuals choose to avoid or approach, the kinds of emotional responses the situations evoke in them, and the kinds of reactions and feedback they receive from other people (Ahadi & Rothbart, 1994; Derryberry & Rothbart, 1997; Rothbart & Hwang, 2005). For example, a child prone to reactions of fear and frustration in novel situations is more sensitive to threatening cues in the environment, and is thus more likely to experience negative emotions, to avoid these anxiety-evoking situations, and to seek help and protection from others. Conversely, a child with a strong approach-tendency and high activity level is more likely to experience positive emotions, to seek and receive intense stimulation, and consequently, to view him- or herself as active, efficacious, and independent.

A substantial amount of research has been carried out on the role of temperament in the school context (for reviews, see Keogh, 1989, 2003; Martin, 1989). Temperament has been examined in relation to, for example, students' achievement, student-teacher interactions, problem behavior, and psychosocial functioning at school (e.g., Eisenberg et al., 2009; Nelson, Martin, Hodge, Havill, & Kamphaus, 1999; Valiente, Lemery-Chalfant, & Swanson, 2010; Zhou, Main, & Wang, 2010). For example, studies among kindergartners and elementary school students have found good self-regulation or high effortful control to be positively related to students' self-efficacy (Liew, McTigue, Barrois, & Hughes, 2008), academic competence (Liew et al., 2008; Valiente et al., 2010; Zhou et al., 2010), classroom participation (Valiente, Lemery-Chalfant, Swanson, & Reiser, 2008), school liking (Valiente, Lemery-Chalfant, & Castro, 2007), and work habits (Curby, Rudasill, Edwards, & Pérez-Edgar, 2011). Kindergarten and elementary school students' shyness or behavioral inhibition,

on the other hand, has been shown to be negatively related to their academic engagement (Hughes & Coplan, 2010) and achievement (Hughes & Coplan, 2010; Valiente et al., 2010).

Findings concerning the significance of dispositional emotionality in academic functioning are sparse and less consistent (see Valiente et al., 2010; Valiente, Swanson, & Eisenberg, 2012). It has been suggested that high negative emotionality interferes with students' cognitive processes and lowers their motivation and engagement in classroom situations (Brand, Reimer, & Opwis, 2007; Zhou et al., 2010), because intense negative emotions can draw students' attention away from the task to threatening cues in the situation (Pekrun, 2005, 2006). Empirical findings among middle school students have shown that negative emotionality is associated with low levels of academic performance and self-perceived competence (Guerin, Gottfried, Oliver, & Thomas, 1994; Gumora & Arsenio, 2002). Moreover, negative mood or negative emotionality (such as expressions of anger and sadness) are positively related to elementary and middle school students' anxiety and depression (Eisenberg et al., 2009; Gumora & Arsenio, 2002; Nelson et al., 1999). The role of positive emotionality in academic functioning has received hardly any research interest (see Valiente et al., 2012). It is possible that positive emotionality or positive emotions enhance students' functioning by promoting creative thinking and engagement (Valiente et al. 2012), and by contributing to students' interest and effort (Pekrun, 2005, 2006).

Theories on achievement motivation and achievement emotions suggest that students' affective and behavioral responses in achievement situations are influenced by their beliefs, expectations, interests, and goals (e.g., Bandura, 1993; Dweck & Leggett, 1988; Pekrun, 2006). Research on the role of temperament in this process has grown in the past decade (e.g., Chang & Burns, 2005; Elliot & Pekrun, 2007; Elliot & Thrash, 2002; Rothbart & Hwang, 2005), but especially among children in the beginning of their school career, the number of studies on the relationship between students' temperament and their achievement-related

affects and behaviors is limited (for exceptions, see Chang & Burns, 2005; Harris, Robinson, Chang, & Burns, 2007; Liew et al., 2008).

The present study focuses on children's distractibility (a composite of high activity, low persistence, and high distractibility), inhibition, mood, and negative emotionality, because characteristics that are related to emotional reactivity and intensity, personal-social flexibility, and the regulation of attention and behavior are generally considered relevant for academic functioning (see Keogh, 2003).

1.3. The present study

The aim of the present study was to examine the associations between children's temperamental characteristics and their achievement-related affective and behavioral responses. The following research questions were addressed: To what extent children's distractibility, inhibition, mood, and negative emotionality in the fall semester of the first grade predict the level of and the subsequent change in their (1) active task avoidance, (2) helplessness, and (3) anxiety? The focus of the present study was on first-grade students, because the beginning of formal schooling is an essential time point for understanding the origins of children's achievement-related affective and behavioral patterns. In the present study, students' performance in reading and math tests were controlled.

We hypothesized that distractibility is positively associated with the level of active task avoidance (Hypothesis 1a), because high distractibility is a sign of a child's low ability to control his or her attention and behavior. Similarly we hypothesized that negative emotionality (or inability to control one's emotional reactions) interferes with a child's ability to stay on task, and is consequently associated with task avoidance (Hypothesis 1b). Moreover, we hypothesized that children's inhibition is a risk factor for their engagement in the situation and is positively associated with the level of helplessness (Hypothesis 2). Finally we hypothesized that both inhibition (Hypothesis 3a) and negative emotionality (Hypothesis

3b) are positively associated with children's level of anxiety, because a disposition towards feeling uneasy in unfamiliar situations and an inability to regulate one's negative emotions are likely to lead to feelings of anxiety in a challenging situation. We did not set any hypotheses concerning temperamental mood in relation to any of the achievement-related affects and behaviors, because there is not much research evidence to support hypotheses (Valiente et al., 2012). Furthermore, we hypothesized that temperament is related only to the level of children's behaviors and affects in achievement situations, but not the change in them. We assumed that innate characteristics set the initial level for students' responses in achievement situations, but changes in the responses across time are more likely to be influenced by students' aims, motives, and cognitions (Dweck & Leggett, 1988; Rothbart & Hwang, 2005).

2. Method

2.1. Participants

The present study is part of the LIGHT study (authors removed for reviewing purposes, 2007), which focuses on the role of teachers and parents in children's academic performance and motivation. The LIGHT study was conducted over a period of three consecutive years during which the sample of 153 first-graders (78 girls, 75 boys) was collected. Each year, the sampling was started by contacting the elementary schools of three medium-sized towns (63 schools in total) situated in different parts of Finland. All first-grade teachers in these schools were asked to participate in the study. During the three years of the study, a total of 334 contacts were made with the first-grade teachers (113 in the first year, 115 in the second year, and 106 in the third year). Based on these 334 contacts, 166 teachers (94.8% women; mean of years in service 16.0 years, $SD = 10.5$ years; mean of years in service as a first or second grade teacher 7.5 years, $SD = 7.5$ years) agreed to participate and signed a written consent form. Next, one student was randomly selected from each teacher's

classroom, and the parents of the student were asked to give their consent for their child's participation. If the parents did not respond or did not give their consent, another child from the same classroom was randomly selected whose parents were then contacted. This procedure was continued until one student was selected from each classroom. A total of 114 parents gave their consent in the first round, 33 in the second round, 15 in the third round, and 4 in the fourth round. Eleven children were left out of the data analyses because they were in special education classes, and two more participants were omitted because of incomplete data. Thus, the final sample consisted of 153 children.

The children participating in the study were assessed twice during the first grade of elementary school, in October/November (Time 1) and in April (Time 2). Two children left the study between Time 1 and Time 2. At Time 1, the children's age ranged from six years and nine months to eight years and four months ($M = 7.5$ years, $SD = 3.61$ months). The children were fairly representative of the student population in Finland in terms of their parents' socioeconomic status and family structure. Of the mothers of the children, 23.8% had a university or college degree (e.g., a school teacher or a lawyer), 40.8% had a technical college degree (e.g., a nurse or a sales manager), 25.9% had a vocational school degree (e.g., a cleaner or a plumber), and 9.5% had no vocational degree (e.g., a sales clerk or a driver). At the time of the study, 78.0% of the children lived in a household of two parents and children (66.7% of the parents married, 11.3% cohabiting), 12.0% in a household of a remarried couple, and 10.0% in a single-parent household.

2.2. Measures and procedure

2.2.1. Procedure

The reading and math tests were administered by trained research assistants in a one-to-one test situation, i.e., with only the child and the assistant present. The assistants (35 in total) were undergraduate psychology students who received a two-day training, and had a

chance to rehearse the tests before administering them to the children. The tests took place in a suitable room on the school premises during the school day. All tests were assessed in Finnish language. At Time 1, the tests were carried out in two sessions (usually on consecutive days), each session lasting one hour at most. At Time 2, the tests were administered in one session, lasting one hour at most. The assistant rated the child's behavior after each session. The teachers were asked to rate the child's temperament by filling a questionnaire that was sent to them by mail at Time 1.

2.2.2. Temperament

Children's temperament was rated by their teachers at Time 1. Four scales from the Temperament Assessment Battery for Children – Revised (TABC-R; Martin & Bridger, 1999; Presley & Martin, 1994) and two scales from the Revised Dimensions of Temperament Survey (DOTS-R; Windle & Lerner, 1986) were combined to constitute a scale consisting of 41 items, each rated on a 5-point scale (1 = *not at all*; 5 = *very much or very often*). The four scales from the TABC-R measured activity, inhibition, negative emotionality, and persistence. The two scales from the DOTS-R measured distractibility and mood. The combined scale of the TABC-R and DOTS-R subscales has been used before with a sample of Finnish adolescents (Mullola et al., 2010).

To examine the factor structure of the temperament scale an exploratory factor analysis was conducted using the IBM SPSS Statistics 19. The solution was generated on the basis of principal axis factoring with direct oblimin rotation. The extraction of the factors was based on eigenvalues greater than 1. In the original factor solution, all items loaded above .30 on at least one factor, and no strong cross-loadings were evident. However, because the content of five items did not match with the content of the factor they most strongly loaded on, these items were excluded from the final solution. The final solution included four factors explaining 62.2% of variance in the 36 original items. The first factor (explaining 31.9% of

the variance) combined 16 items from the DOTS-R subscale for distractibility (five items; “*Whatever the student is doing, nothing can turn his/her attention away*”) and the TABC-R subscales for activity (three items; e.g., “*The student seems to have difficulty sitting still*”) and persistence (eight items; e.g., “*The student is capable of keeping up his/her activities for a long time*”). We labeled this factor *distractibility*. In previous studies, a similar (yet reverse-coded) composite score of distractibility, activity, and persistence has been entitled task orientation (Keogh, Pullis, & Cadwell, 1982), task attention (Martin, 1989), or task persistence (Martin, Wisenbaker, & Huttunen, 1994). Since some of these constructs are used in the achievement motivation literature as well, we chose to use the concept distractibility to avoid confusion. A child’s high level of activity, lack of persistence, and high distractibility resulted in a high composite score for distractibility. The three other factors followed the original factor structure of the TABC-R and DOTS-R; mood (21.2% of the variance; seven items, e.g., “*The student smiles and laughs often*”), inhibition (5.8% of the variance; seven items, e.g., “*The student takes a long time to become comfortable in a new situation*”), and negative emotionality (3.3% of the variance; six items, e.g., “*The student lets other students know when he/she does not like something by yelling and fighting*”). The Cronbach’s alpha reliability coefficients for distractibility, mood, inhibition, and negative emotionality were .95, .95, .90, and .82, respectively.

2.2.3. Math performance

Children’s math performance was measured by two tests administered at Time 1.

(1) The child’s *Knowledge of Cardinal Numbers and Basic Mathematical Concepts* was measured using 11 tasks taken from the Diagnostic Test for Basic Mathematical Concepts (Ikäheimo, 1996). For each task, a picture with a set of dots was presented to the child who was then asked to draw a specific number of dots in a blank space provided as requested (e.g., “*Draw as many dots as there are in this picture*”; “*Draw four dots more than*

there are in this picture”). The tasks became progressively more difficult. One point was given for each correct answer.

(2) In the *Basic Arithmetic Test*, the child’s skills in basic arithmetic were assessed using a set of unfinished equations for addition (e.g., “9 + 3 = ?”) and subtraction (e.g., “57 - ? = 48”). The test included 20 tasks that were presented on a sheet of paper, and the child indicated his or her written answer with a pencil. The child was asked to complete as many of the tasks as he or she could. One point was given for each correct answer.

A total score for children’s performance in mathematics was created by calculating a mean score from the standardized scores (*z*-scores) of the two test scores. The mean score correlated with teachers’ rating of how well the child is doing in math ($r = .54, p < .001$).

2.2.4. Reading performance

Children’s reading performance was also assessed with two tests at Time 1.

(1) In the *Reading Words Test* the child was asked to read a list of 20 words aloud. The words in the list became progressively more difficult, mainly due to the fact that they became longer (e.g., ”*ja*” [and], ”*isä*” [dad], ”*ikkuna*” [window], ”*tulitikku*” [match]). The test was discontinued if the child could not read four successive words correctly. One point was given for each correctly read word, yielding a maximum score of 20. The split-half reliability for the Reading Words Test was .80 (authors removed for reviewing purposes, 2008). This subtest is known to be sensitive to the early stages of reading skills.

(2) If the child completed the Reading Words Test successfully (i.e., was able to read all or almost all of the words correctly), then he or she was next presented with the *Oral Reading Fluency Test* (Onatsu, Nurmi, & Aunola, 1999). A total of 65 (42.8%) out of 152 children could read and were presented with the Oral Reading Fluency Test. In this test, the child was asked to read a fictional story consisting of 57 words aloud as fast and accurately as he or she could. The child’s score on the test was computed by dividing the number of

correctly read words by the time (in seconds) it took for the child to read the whole story.

This subtest is known to be sensitive to more advanced reading skills.

A total score was created for children's reading performance by calculating a mean score from the standardized scores (z -scores) of the two test scores. This mean score correlated with teachers' rating of how well the child is doing in reading ($r = .69, p < .001$).

2.2.5. Achievement-related affects and behaviors

Children's affective and behavioral responses in achievement situations were rated by trained research assistants who administered all of the reading and math tests. Immediately after the testing session, the assistants rated the child's behavior in the situation using the Observer Rating Scale of Achievement Strategies (OSAS; Nurmi & Aunola, 1998). The scale contains eight items that represent three types of affective and behavioral responses: active task avoidance (two items, e.g., "*If the child is not doing well on a task, he/she directs his/her interest to other things around him/her*"); anxiety (two items, e.g., "*If the child faces problems with a task, he/she becomes distressed*"); and helplessness (four items, e.g., "*The child easily gives up trying, or the child says he/she cannot do it already before trying*"). Each item was rated on a 6-point scale (0 = *not at all*, 1 = *not very often*; 5 = *all the time or nearly all the time*). Composite scores for children's active task avoidance, anxiety, and helplessness were created by computing the mean scores of the particular items. At Time 1, the assessments were carried out in two sessions, and the mean scores were calculated for the same items at both assessment sessions. At Time 2, there was only one assessment for each child and thus only one rating. The Cronbach's alpha reliability coefficients for active task avoidance, anxiety, and helplessness were .93, .82, and .90 at Time 1, and .88, .84, and .81 at Time 2, respectively. The test-retest correlation from Time 1 to Time 2 was .61 for active task avoidance, .49 for anxiety, and .66 for helplessness. The assistants' ratings for children's

active task avoidance also correlated .35 ($p < .001$) at Time 1 and .33 ($p < .001$) at Time 2 with teachers' ratings of children's task avoidance.

2.3. Statistical analyses

The aim of the study was to examine whether children's temperamental characteristics are associated with the level of their affective and behavioral responses in achievement situations at the beginning of the first grade, and whether they predict changes in these responses across the first grade. The statistical analyses were performed in two stages. First, to estimate the level of and the change in children's achievement-related affects and behaviors from Time 1 to Time 2, latent growth curve models were carried out separately for anxiety, task avoidance, and helplessness. Although the shape of growth cannot be estimated when there are only two time points, two-wave growth curve models are still appropriate for estimating the amount of change between the time points (Duncan & Duncan, 2004), and they correspond to a paired samples t -test (Voelkle, 2007). Second, in order to investigate the extent to which children's temperamental characteristics predict the level of and the changes in their affective and behavioral responses temperamental characteristics were included as predictors in each model. Children's skill level was controlled for by including reading and math performance to the models as covariates, each in separate analyses. The final models were tested for gender differences using a multi-sample procedure. This was done by creating a non-restricted model and then comparing the fit of this model to another model in which all regression and correlation coefficients were restricted to be equal across gender.

All analyses were performed using the Mplus 5.21 statistical package (Muthén & Muthén, 1998-2007). Maximum likelihood estimation with robust standard errors (MLR) was used with each step of the analyses. The covariance coverage value for the variables ranged from .96 to .98.

3. Results

3.1. Descriptive statistics

The means, standard deviations, and correlations between the study variables are shown in Table 1. Analyses showed that there were significant gender differences in distractibility ($t(152) = -4.10, p < .001$; Cohen's $d = .66$), negative emotionality ($t(152) = -3.31, p < .001$; Cohen's $d = .54$), and active task avoidance at Time 1 ($t(151) = -2.02, p = .045$; Cohen's $d = .33$) and Time 2 ($t(151) = -2.23, p = .03$; Cohen's $d = .36$), boys being more easily distracted and showing more negative emotionality and task avoidance than girls. Girls and boys did not differ in regard to any other temperamental or achievement-related variables.

-- INSERT TABLE 1 AROUND HERE --

3.2. Latent growth curve models for affective and behavioral responses

First, latent growth curve models (LGM) were created for each type of behavioral response separately. The saturated models were constructed by setting the loadings of the tester-rated affective or behavioral response at Time 1 and Time 2 to 1 for the intercept factor (level) and to 0 and 1 for the slope factor (change), respectively. The error terms of the behavioral variables were fixed to 0 in order to achieve an identifiable model. In order to control for the impact of the level of the behavioral response on the change of it, the path from the level to the slope was estimated.

The results of LGMs showed that the mean of the change of task avoidance ($M = 1.18, SE = .11, p < .001$), as well as that of helplessness ($M = 0.17, SE = .08, p = .047$), was positive and statistically significant, indicating that children's active task avoidance and helplessness both increased from Time 1 to Time 2. The mean of the change of anxiety was positive but not significant ($M = 0.15, SE = .09, p = .09$), indicating that the mean of anxiety did not change during the first grade.

The results showed further that there was statistically significant ($p < .001$) inter-individual variation in the initial levels of task avoidance, helplessness, and anxiety, as well as in the changes of them during the first grade.

3.3. The role of temperamental characteristics in affective and behavioral responses

Next, children's temperamental characteristics were included as predicting variables of level and slope into the above-mentioned LGM models. To control for the effect of children's skill level, reading and math performance were also included as predictors, each in separate analyses. In the final models, all statistically non-significant paths were set to 0. Figures 1, 2, and 3 show the final models for helplessness, anxiety, and active task avoidance, respectively, with math performance being controlled. The models with reading performance as a covariate are described in the text.

The results for active task avoidance ($\chi^2(13) = 12.07, p = .52; CFI = 1.00; TLI = 1.01; RMSEA = .00; SRMR = .05$) showed that children's distractibility was positively associated with the level of and the change in their active task avoidance: The more easily distracted the teachers rated the children to be, the more task avoidance the children showed in test situations (Figure 1). Moreover, the more easily distracted the children were reported to be, the more their task avoidance increased from Time 1 to Time 2. The results were similar when reading performance was controlled for ($\chi^2(12) = 10.25, p = .59; CFI = 1.00; TLI = 1.02; RMSEA = .00; SRMR = .04; R^2 = .17$ for the Level and $R^2 = .32$ for the Slope).

-- INSERT FIGURE 1 AROUND HERE --

The results for helplessness ($\chi^2(13) = 12.75, p = .47; CFI = 1.00; TLI = 1.00; RMSEA = .00; SRMR = .06$) showed that children's inhibition was positively associated with the level of their helplessness: The more inhibited the teachers rated the children to be, the more helplessness the children showed in test situations (Figure 2). This result was also found when math performance was replaced with reading performance as a covariate ($\chi^2(13) =$

11.55, $p = .57$; $CFI = 1.00$; $TLI = 1.01$; $RMSEA = .00$; $SRMR = .04$; $R^2 = .17$ for the Level and $R^2 = .24$ for the Slope).

-- INSERT FIGURE 2 AROUND HERE --

The results for anxiety ($\chi^2(14) = 19.45$, $p = .15$; $CFI = 0.89$; $TLI = 0.91$; $RMSEA = .05$; $SRMR = .07$) showed that children's inhibition predicted the level of their anxiety: The more inhibited the children were according to their teachers, the more anxiety the children showed in test situations (Figure 3). This result was also found when reading performance was included as a covariate instead of math performance ($\chi^2(13) = 14.69$, $p = .33$; $CFI = 0.97$; $TLI = 0.97$; $RMSEA = .03$; $SRMR = .05$; $R^2 = .07$ for the Level and $R^2 = .23$ for the Slope).

-- INSERT FIGURE 3 AROUND HERE --

The chi-square likelihood ratio tests between the models that were restricted across gender and the models that were not restricted suggested that there were no gender differences in the models for active task avoidance (model with math performance: $\Delta\chi^2 = 11.53$, $\Delta df = 8$, $p = .17$; model with reading performance: $\Delta\chi^2 = 11.51$, $\Delta df = 9$, $p = .24$); for helplessness (model with math performance: $\Delta\chi^2 = 12.01$, $\Delta df = 8$, $p = .15$; model with reading performance: $\Delta\chi^2 = 10.30$, $\Delta df = 8$, $p = .24$), or for anxiety (model with math performance: $\Delta\chi^2 = 4.86$, $\Delta df = 5$, $p = .43$; model with reading performance: $\Delta\chi^2 = 9.81$, $\Delta df = 8$, $p = .28$).

4. Discussion

The aim of this study was to examine the extent to which children's temperamental characteristics are related to the level and change in their achievement-related affects and behaviors. The results showed that aspects of teacher-rated temperament were uniquely related to first-graders' maladaptive achievement-related affects and behaviors, regardless of their performance in reading and math tests.

The results showed that children's high level of distractibility (high activity, high distractibility, low persistence) predicted both the level and the change in their active task avoidance confirming our Hypothesis 1a. Easily distracted children had difficulty in staying focused and finishing the tasks given to them. This seems natural, since children with high levels of distractibility and activity get easily engaged with all things around them (Derryberry & Rothbart, 1997), while having a poor ability to channel their excitement towards one task at a time (Henderson & Fox, 1998). Besides the overall level of active task avoidance, distractibility also predicted the increase in task-avoidant behavior during the first grade. This suggests that active, non-persistent, and easily distracted children are at risk of developing vicious cycles of maladaptive behavior in academic settings. If a student does not possess persistence and self-regulation skills that are central to performing academic tasks, then he or she is likely to come across more and more challenging situations during his or her school years.

The results of the present study further showed that children's high level of inhibition (low adaptability, withdrawal in novel situations and with unfamiliar people) predicted the overall level of their helpless behavior, that is, passive avoidance, withdrawal, and disengagement, confirming Hypothesis 2. This result may be due to the fact that when they were faced with a challenging problem, the shy and inhibited children felt uncomfortable to ask for help from an unfamiliar adult, and hence they rather chose to quit working (Hughes & Coplan, 2010). Passivity and withdrawal may also be the result of poor self-regulation skills: Children, who were not able to turn their attention away from the distress caused by the situation, became overwhelmed by their negative emotions and ended up losing their interest in the task (Ahadi & Rothbart, 1994; Derryberry & Rothbart, 1997; Valiente et al., 2010).

Confirming Hypothesis 3a, inhibition also predicted the overall level of children's anxiety in the achievement situation. The major neurobiological system underlying

withdrawal tendencies is the behavioral inhibition system (BIS) that is sensitive to frustrating and punitive stimuli, and is likely to arouse feelings of fear and anxiety (Ahadi & Rothbart, 1994; Derryberry & Rothbart, 1997; Rothbart et al., 2000). Anxiety in children with high levels of inhibition can thus be seen as another sign of the activation of the BIS. It is possible that it was not just the distress caused by the challenging tasks, but also the fear caused by the novel situation and the presence of an unfamiliar adult that resulted in children's anxiety. Children showing anxiety in the test situation may not feel as anxious in a typical classroom situation with a familiar teacher and classmates. However, it is also possible that learning situations in general are anxiety provoking for inhibited children, because learning is about constantly dealing with new things and facing the possibility of failing or not knowing. Anxiety may result because the student feels he or she has no control over the situation (Pekrun, 2006).

Contrary to our Hypotheses 1b and 3b, children's negative emotionality was not found to be uniquely related to their task avoidance or anxiety. Previously, negative emotionality has been found to be associated, for example, with elementary school students' state anxiety (e.g., Eisenberg et al., 2009; Nelson et al., 1999). In the present study, negative emotionality did show a significant bivariate correlation with active task avoidance, although it was not a significant predictor for task avoidance when the impacts of other temperamental characteristics were taken into account. This pattern of findings is likely to result from the high correlation between negative emotionality and distractibility, causing distractibility to override the unique effect of negative emotionality when included in the models simultaneously. In contrast, there was no significant correlation between negative emotionality and anxiety (and consequently, no significant association in the final model), suggesting that the intensity of emotional expressions is not as important predictor of anxiety as, for example, inhibition is. The findings of the present study also showed that mood was

not related to children's task avoidance, helplessness, or anxiety in the achievement situation, perhaps because mood as a trait is too general or vague to play any precise role in the academic context.

As we expected, children's temperamental characteristics were related to the levels of their achievement-related affects and behaviors rather than to the changes in these (with the only exception of distractibility being related to the change in active task avoidance). This suggests that temperament is associated with the overall level of affective and behavioral responses in achievement situations but is not so much related to whatever changes might take place. Temperament may define the students' initial behavioral and emotional responses to the situation and the task, but perhaps the students' interpretations, aims, and motives define how these initial responses eventually transform into actions and how they develop across time (Dweck & Leggett, 1988; Rothbart & Hwang, 2005; Rothbart & Jones, 1998). For example, reserved students may overcome their feelings of uneasiness in achievement situations if they are motivated to do well at school or if they get experiences of performing well despite their anxiety.

In previous research on temperament, significant gender differences have been reported for boys scoring higher than girls on surgency/extraversion and lower than girls on effortful control or attention regulation (Else-Quest et al., 2006). Boys have also been reported to score higher on task-avoidant behaviors (e.g., Onatsu-Arvilommi & Nurmi, 2000), whereas helpless behaviors or passive avoidance may be more common to girls (Dweck, 1986). In the present study, boys were rated higher on distractibility, negative emotionality, and task avoidance. However, despite the mean level differences in these characteristics, gender did not affect any of the associations between temperament and achievement-related affects and behaviors.

4.1. Practical implications and future directions

In the present study, first-grade students' distractibility was found to be associated with one form of maladaptive behavioral pattern, that of active task avoidance. The type of student who is active, non-persistent, and distractible is well recognized in classrooms, because his/her off-task behavior is disturbing for the rest of the class. In previous studies, teachers have evaluated active, non-persistent, easily distracted students as less enjoyable to work with (Keogh, 2003; Martin, 1989; Nurmi et al., 2013), which is likely to lead the teachers to focus on these students' behavior instead of their abilities or learning (Nurmi et al., 2013). Instead of accusing them for their disruptive behavior, these students would benefit more from guidance on how to channel and control their impulses in order to stay focused on tasks (see Rothbart & Jones, 1998).

Inhibition was found to be related to two other types of maladaptive behavior, helplessness and anxiety. The inhibited, withdrawn type of student may often be the one who does not stand out in the class or get teachers' attention. Teachers often underestimate the abilities of these students because they are quiet, do not participate, and take a longer time to get started and finish their tasks (Hughes & Coplan, 2010; Thomas & Chess, 1977). These students would benefit if they were given enough time to prepare themselves for new things and to adjust to changes in their routines (Keogh, 1989), as well as being helped to overcome their anxiety and shift their attention away from stimuli they see as threatening (Ahadi & Rothbart, 1994).

The findings of this study emphasize the importance of recognizing dispositional factors together with motivational and ability-related factors when trying to understand the origins of young students' classroom behavior. For example, if a student does not finish his or her tasks, then this is not necessarily a sign of lack of motivation or ability but can also indicate that the student lacks patience (high level of distractibility leading to active task avoidance), or that the student is distressed and does not have the courage to ask for help

(inhibited temperament leading to helplessness). Obviously, the best ways to encourage and support young students in their learning can differ depending on where their behaviors originate.

Because of their age, first-grade students may still be immature in their self-regulatory skills. They may also be less aware of what type of behavior is appropriate and adaptive in a classroom, because the classroom is still a new environment to them. This may lead to maladaptive behavioral responses in learning situations that can further have negative consequences on young students' later school career in the form of poor learning outcomes and lowered motivation. Therefore, in the beginning of schooling when children are still learning different ways of approaching school tasks, it is crucial that they get help from adults in learning to regulate their behaviors.

Educators can also consider different ways to change children's learning environment in order to better correspond to the young students' characteristics (Curby et al., 2011; Henderson & Fox, 1998; Keogh, 2003). The appropriateness or efficiency of individual's behavior is not only determined by the individual's characteristics, but also by how these characteristics meet the situational demands (see "goodness-of-fit"; Thomas & Chess, 1977). For example, inhibition in itself is not an impediment to academic success, but it can certainly affect the child's functioning in learning situations (Henderson & Fox, 1998).

4.2. Limitations

There are at least four limitations that need to be considered when interpreting the findings of this study. The first one concerns our measure of temperament. Combining two temperament scales resulted in a factor structure that needs to be investigated in more depth in future studies. It is also noteworthy that temperament was measured by teacher ratings. Teachers may not be the best informants if we want to learn about child's innate or dispositional traits, because teacher ratings may also be affected by other factors, such as the

gender and skill level of the child. Additionally, because female teachers were substantially overrepresented in the sample, the contribution of teachers' gender on their ratings could not be controlled for. The second limitation concerns the ratings of achievement-related affects and behaviors which were performed in a special test situation by adults unfamiliar to the child. This kind of setting is different from a normal classroom learning situation and therefore the findings may not be generalizable to children's typical behavior in the classroom. The lack of inter-rater reliability data must also be acknowledged as a shortcoming, since each child's behavior was observed by only one observer. The third limitation concerns the time span of our study. Two time points at five months apart may not be enough to grasp the distinct occurrence of change in achievement behaviors and the processes leading to it. Therefore, longitudinal studies with a longer time span and perhaps more intense assessments are needed in future. The last limitation is that we examined the role of temperament only in relation to children's specific achievement behaviors. Besides temperament, more motivation-related variables (task values, self-efficacy beliefs, and success expectations) as well as contextual variables (parenting styles, parental beliefs, teaching practices, and teacher-child relationship) should be included in future studies in order to get a more comprehensive picture of the processes leading to achievement behaviors.

4.3. Conclusion

The findings of the present study add to the understanding of first-grade students' achievement-related affects and behaviors and their antecedents. Previously, it has been suggested that achievement behaviors stem from the experiences the individual has had in previous achievement situations (e.g., Dweck & Leggett, 1988; Bandura, 1993). The significance of contextual and social factors (such as parents' beliefs in their offspring's school competence, parenting styles, and teachers' beliefs and instructional support) for the individual's choice of actions has also been acknowledged (e.g., Aunola et al., 2003;

Pakarinen et al., 2011; Rubie-Davies, Flint, & McDonald, 2012). The results of the present study suggest that the patterns of young students' affects and behaviors in achievement situations are partly dispositional, or influenced by dispositional factors, such as temperament (e.g., Elliot & Thrash, 2002; Rothbart & Hwang, 2005).

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Table 1

Intercorrelations, Means, and Standard Deviations of the Study Variables

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Anxiety T1												
2. Anxiety T2	.49***											
3. ATA T1	.31***	.31***										
4. ATA T2	.27**	.47***	.61***									
5. Helplessness T1	.48***	.39***	.56***	.36***								
6. Helplessness T2	.37***	.60***	.39***	.48***	.66***							
7. Distractibility T1	.14	.14	.34***	.43***	.25**	.21*						
8. Inhibition T1	.21*	.11	.06	.01	.21**	.17*	.02					
9. Mood T1	-.07	.05	-.12	-.02	-.15	-.07	-.12	-.58***				
10. NE T1	.14	.14	.25**	.34***	.09	.10	.68***	-.02	-.20*			
11. Reading T1	-.19*	-.20*	-.34***	-.22**	-.39***	-.28**	-.38***	-.09	.01	-.22**		
12. Mathematics T1	-.19*	-.23**	-.41***	-.27**	-.48***	-.43***	-.29***	-.12	.03	-.09	.47***	
<i>M</i>	1.09	0.70	1.18	0.91	1.48	1.06	2.56	2.65	3.97	2.11	-0.21	-.01
<i>SD</i>	0.97	1.00	1.32	1.22	1.04	0.96	0.82	0.91	0.91	0.77	0.85	0.83

Note. $N = 152$. T1 = Time 1; T2 = Time 2; ATA = Active task avoidance; NE = Negative emotionality.

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

Figure captions

Figure 1. Latent growth curve model for active task avoidance with temperament and math performance as predictors (standardized estimates). * $p < .05$. ** $p < .01$. *** $p < .001$.

Figure 2. Latent growth curve model for helplessness with temperament and math performance as predictors (standardized estimates). * $p < .05$. *** $p < .001$.

Figure 3. Latent growth curve model for anxiety with temperament and math performance as predictors (standardized estimates). * $p < .05$. ** $p < .01$. *** $p < .001$.





