

## Empirical study

## The dark side of perceived positive regard: When parents' well-intended motivation strategies increase students' test anxiety

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## ABSTRACT

Parental academic conditional positive regard (PACPR) is a socializing strategy in which parents provide more affection, esteem, and attention than usual when their child studies hard and achieves in school. It is favored and recommended as a positive parenting strategy, whereas empirical findings increasingly document serious psychological costs of this well-intended strategy. PACPR can be conceptualized as an important antecedent of test anxiety. However, no study has tested this assumption yet, and research on antecedents of test anxiety is generally scarce. Based on assumptions from self-determination and control-value theory, we conducted one study with secondary students (trait test anxiety,  $N = 653$ ,  $M = 13$  years) and one study with university students (state test anxiety and test performance,  $N = 166$ ,  $M = 20$  years), to examine distal (i.e., perceived PACPR) and proximal antecedents (i.e., contingent self-esteem as value cognition; ability self-concept as control cognition) of students' test anxiety. In line with our hypotheses, path analyses revealed a positive relation between perceived PACPR and test anxiety, and that contingent self-esteem mediated this relation. Ability self-concept showed inverse relations with test anxiety, which, in turn, predicted poorer test performance in Study 2. Unexpectedly, we found no interactive effect of contingent self-esteem and ability self-concept. Our results extend prior research on psychological costs of PACPR to the field of achievement emotions, and suggest that the detrimental effects of perceived PACPR on test anxiety can be generalized onto students with high and low ability self-concept, respectively. Possible reasons of our findings, and practical implications, are discussed.

## 1. Introduction

During the last decade, research has identified one relatively unexplored form of parental control of children's schoolwork, termed parental academic conditional positive regard (PACPR; Assor & Tal, 2012; Roth, Assor, Niemiec, Deci, & Ryan, 2009). PACPR is a practice in which parents provide more affection, esteem, and attention than they usually do when children study hard and achieve. This construct has gained increasing attraction in recent years and has been subject of controversial discussions. On the one hand, PACPR appears fairly benign to quite a number of researchers and has been recommended in several parents' guide books (e.g., Frost, 2005; McGraw, 2004). On the other hand, recent research in the field of self-determination theory (SDT; Deci & Ryan, 2000) has substantiated that PACPR is associated with serious psychological costs regarding students' motivational and

emotional functioning (Assor, Kanat-Maymon, & Roth, 2014).

One of these costs refers to negative achievement emotions in academic contexts. The present study seeks to contribute to the growing research on the detrimental outcomes of PACPR by examining its impact on students' test anxiety, which is frequently reported and of utmost importance for students' well-being and achievement (e.g., Chapell et al., 2005; Ma, 1999). One construct possibly underlying this relationship is contingent self-esteem, defined as a dependency of a person's self-esteem on success and failure in a certain domain (Crocker & Wolfe, 2001). To our knowledge, no study has yet empirically tested the theoretical link between PACPR, contingent self-esteem, and test anxiety. Moreover, it is unclear whether potential relations among these variables differ depending on students' individual learning characteristics, such as their ability self-concept. Based on assumptions from self-determination theory and control-value theory, we conducted two

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studies to test whether the relation of perceived<sup>1</sup> PACPR and test anxiety is mediated by contingent self-esteem, and whether the relation of the latter variables is moderated by ability self-concept. In the first study, we examined these relations with respect to trait test anxiety using a school-based questionnaire survey. In the second study, we tested our assumptions with respect to self-reported state test anxiety and subsequent test performance using a study design in which we simulated a real examination situation. Overall, these two studies aim to illuminate the specific mechanisms through which perceived PACPR influences academic emotions and performance.

### 1.1. PACPR and test anxiety

From a behaviorist perspective, PACPR represents a special form of instrumental conditioning because it uses positive reinforcement in order to shape and direct the behavior of the child (Domjan, 2004). Thus, PACPR is supposed to raise the probability that the child will engage in the desired behavior, such as investment of time and effort toward success in school. Accordingly, PACPR is favored and recommended as a positive parenting strategy by several researchers and practitioners (e.g., Frost, 2005; McGraw, 2004), whereas a significant number of studies have also documented serious detrimental effects. These include motivational (e.g., preferring performance to learning goals, superficial engagement to intrinsic motivation), emotional (e.g., maladaptive anger and fear regulation), and interpersonal difficulties (e.g., feelings of internal compulsion to meet expectations of others; see Assor et al., 2014, for an overview).

Most researchers distinguish between two forms of parental academic conditional regard: First, PACPR, which involves the parents giving more affection than usual when the child complies, and, second, parental conditional negative regard (PACNR), which involves parents giving less affection than usual when the child does not comply with the desired outcome (Assor & Tal, 2012; Roth et al., 2009). PACNR is similar to the construct of love withdrawal, thereby showing indisputably negative effects on children's development and adjustment (Barber, 1996). Thus, and because of moderate to high correlations between PACNR and PACPR, previous research has recommended controlling for the effects of PACNR when investigating the functionality of PACPR (Assor et al., 2014).

Test anxiety—defined as the experience of evaluation apprehension during the examination process (Spielberger & Vagg, 1995)—is a common problem in everyday school life, with approximately 16% of German sixth-graders reporting marked test anxiety (Isserstedt, Kandulla, & Middendorff, 2010; Pixner & Kaufmann, 2013). Plenty of evidence supports a connection between test anxiety and diminished academic achievement. Two meta-analyses on the test anxiety/achievement link reported negative associations with medium effect sizes in students (see Hembree, 1990, and Ma, 1999). Test-anxious persons often report procrastination in test preparation, difficulties in concentration, sleeping problems, and somatic complaints (Cassady & Johnson, 2002; Fehm & Fydrich, 2011; Hank, Pohl, & Krampen, 2009). Furthermore, test anxiety is negatively associated with aspects of well-being (Hembree, 1988; Pixner & Kaufmann, 2013).

Most conceptualizations of test anxiety comprise two main components: *Worry* describes the cognitive concerns about the outcome and the consequences of the test, whereas *emotionality* refers to the

physiological reactions within a testing situation (Hodapp, Glanzmann, & Laux, 1995; Liebert & Morris, 1967). Moreover, most researchers differentiate between trait and state test anxiety. Whereas trait test anxiety refers to relatively stable (habitual) differences in the intensity and frequency of experienced state test anxiety, state test anxiety refers to the transitory (momentary) experience of anxiety in a test situation (Elliot & McGregor, 1999). Previous research has suggested that it is of particular importance to differentiate between these constructs because findings of one construct cannot be generalized onto the respective other. For example, previous studies have consistently revealed that girls report higher levels of trait test anxiety in mathematics than do boys. However, these gender differences could not be found for state test anxiety during a math test or when students attended math classes, which has been explained, to some extent, by the finding that boys have—despite comparable average math grades—higher competence beliefs than girls (Goetz, Bieg, Lüdtke, Pekrun, & Hall, 2013). Despite the proposed lack of generalizability from trait test anxiety and vice versa, most studies have solely focused on (state) test anxiety in specific test situations (Goetz & Hall, 2013).

Apart from that, despite a strong body of research on the negative consequences of test anxiety, empirical studies that regard antecedents of test anxiety in children and adolescents are relatively scarce. According to self-determination theory, PACPR is likely to lead to negative emotions, such as test anxiety. Specifically, PACPR is expected to decrease experience of autonomous motivation in children because they have to comply with the expectations of their parents to maintain their love. This frustration of the basic need for autonomy is expected to promote controlled rather than autonomous motivation because the conditional positive regard used by parents to control behavior creates the conditions for children to control their own behavior through contingent self-esteem (Deci & Ryan, 1995). This contingent self-esteem leads to a feeling of internal compulsion, which is the phenomenological hallmark of introjected regulation (Assor, Roth, & Deci, 2004). The feeling of internal compulsion and pressure is expected to constrict children's behavior making them less open to learning opportunities that are not suited to earn the appreciation of relevant others. At the same time, those learning opportunities that enable appreciation by others are becoming more important. Such learning opportunities are likely to increase the anticipated negative consequences of failure and thus contribute to higher test anxiety. Overall, PACPR is assumed to increase contingent self-esteem, which, in turn, is supposed to lead to increased test anxiety. We explore the specific links among these constructs in the following sections.

### 1.2. PACPR as an antecedent of contingent self-esteem

Self-esteem is a central psychological construct that has been accredited as having major importance in Western society (Baumeister, Campbell, Krueger, & Vohs, 2003; Ehntholt, Salkovskis, & Rimes, 1999; Sargent, Crocker, & Luhtanen, 2006; Trzesniewski et al., 2006). Although most authors agree about its importance, researchers have criticized that focusing exclusively on the overall level of self-esteem may be misleading because there seems to be more to self-esteem than whether it is high or low, bringing forward self-esteem stability and contingent self-esteem as additional trait-like constructs (Crocker & Park, 2004; Crocker & Wolfe, 2001; Kernis, 2003). In contrast to stability of self-esteem, which describes how fragile and fluctuant a person perceives his/her self-esteem, contingent self-esteem characterizes how dependent a person's self-esteem is on success and failure in a certain domain (Crocker & Wolfe, 2001). Contingent self-esteem has been conceptualized in different ways in the literature. Some theorists have emphasized that self-esteem may be more or less generally dependent on external outcomes (Kernis, 2003), whereas others have argued that people's self-esteem is contingent on experiences related to specific domains, such as physical appearance or approval from others (Crocker, Luhtanen, Cooper, & Bouvrette, 2003). Although several authors have

<sup>1</sup> In the present study, we examine the degree to which students *perceive* parental conditional regard. This is important to note as a number of studies have revealed cross-informant discrepancies between parent and child assessments (e.g., De Los Reyes & Kazdin, 2005). Moreover, self- and other-reports of parenting may differ in their predictive validity of students' outcomes such as academic achievement (Pinquart, 2016). Due to the observed differences between multiple informants we use the more precise term *perceived* PACPR throughout the manuscript.

argued for a complementary coexistence of these approaches (Crocker & Knight, 2005; Kernis, Lakey, & Heppner, 2008), a recent factor-analytic study by Schwinger, Schöne, and Otterpohl, (2015) clearly supported a domain-specific conceptualization of contingent self-esteem.

Several studies have shown that people who have a highly contingent self-esteem develop stronger feelings of shame and worthlessness when they experience failures (Deci & Ryan, 1995; Kernis, 2003). Success makes them feel more valuable. Because experiencing nothing but success is usually not possible, a highly contingent self-esteem mostly results in self-esteem instability as well (Deci & Ryan, 1995). Although contingent self-esteem can be a motivating factor in striving for success, the emerging costs potentially outweigh the benefits (Crocker & Park, 2004).

According to self-determination theory (Deci & Ryan, 1995, 2000), parents' conditional regard is an important origin of contingent self-esteem, which can be explained by one of the basic premises in self-determination theory whereby regulation of behavior can be classified into different levels of internalization (from intrinsic to extrinsic). Correspondingly, different levels of internalization are connected to different affective experiences and to different degrees of quality in the execution of the behavior. Parental conditional regard is linked to one suboptimal form of behavioral regulation—that is, introjected regulation—because the motivation to behave as wished by the parents is given through the child's desire to attain the parents' affection and the fear of losing it (Assor et al., 2004; Deci & Ryan, 2000). Introjected regulation is characterized in that the child adopts the behavioral regulation, but does not integrate it in his/her own values. Hence the execution of the desired behavior by the child is, although more probable, also more superficial and constricted (Roth et al., 2009). In other words, “contingent esteem [i.e., conditional regard] from parents can readily be transformed into contingent self-esteem that underlies introjected regulation” (Assor et al., 2004, p. 54).

Typical signs of introjected regulation are feelings of pride, shame, and guilt (Deci & Ryan, 2000). It is noteworthy that these feelings are attribution-dependent outcome emotions, which can only arise after the experience of success or failure, and which depend on the respective causal attributions of success or failure (Stiensmeier-Pelster & Heckhausen, 2017). However, we suppose that introjected regulation and contingent self-esteem are not exclusively related to (attribution-dependent) outcome emotions, but also to anticipatory emotions—such as feelings of internal compulsion and test anxiety—that occur prior to a test situation. This assumption can be derived from self-determination theory and, even more explicitly, from further theoretical approaches which will be explained in the following section.

### 1.3. Contingent self-esteem as a risk factor for test anxiety

The connection between contingent self-esteem and test anxiety has been proposed in several theories. In line with assumptions of self-determination theory, students with highly contingent self-esteem may perceive increased test anxiety because they feel an internal compulsion and pressure to achieve. Crocker and Park have assumed that students with highly contingent self-esteem have the goal to validate their own worth through school achievement (cf. *self-validation goals*; Crocker & Park, 2004, p. 393). Furthermore, as postulated in Covington's self-worth theory of achievement motivation, striving for self-esteem through academic achievement is supposed to have a causal effect on the development of test anxiety (Covington, 1984). Empirically, contingent self-esteem has been found to be linked to diminished school achievement (Burhans & Dweck, 1995; Lawrence & Crocker, 2009). Moreover, Lawrence and Williams (2013) empirically identified test anxiety as a mediator between contingent self-esteem and diminished school achievement.

Another theoretical framework for the explanation of the contingent self-esteem/test anxiety link can be derived from expectancy-value

theory (e.g., the model of achievement related choices, Wigfield & Eccles, 2000; and the control-value theory of achievement emotions, Pekrun, 2006). The control-value theory of achievement emotions aims to describe and explain how a person's subjective appraisal of a test situation leads to different achievement emotions, their regulation, and behavioral outcomes. The theory implies that two types of appraisals are of specific relevance for the genesis of achievement-related emotions: appraisals of control over achievement activities and their outcomes, and of the value of these activities and outcomes. The interplay of both appraisals is assumed to determine the occurrence, quality, and intensity of achievement emotions. For example, enjoyment of learning is most likely to be aroused when students perceive their achievement activities as valuable and controllable. By contrast, learning activities that are perceived as controllable, but less (or even negatively) valued by a student, may evoke boredom instead (Pekrun, Frenzel, Goetz, & Perry, 2007). With respect to the present study, test anxiety may particularly result from highly valued, but subjectively uncontrollable achievement activities. From an expectancy-value perspective, contingent self-esteem represents a variable that contributes to the value of achievement activities and, particularly, their outcomes. If a person's self-esteem depends on being successful on a test, the value that this person ascribes to the test outcome should increase. The increased subjective value of a test outcome, in turn, is likely to raise the threat of failure that the person perceives, and is hence supposed to lead to higher levels of test anxiety (Pekrun, 2006).

### 1.4. Contingent self-esteem and test anxiety: The moderating role of ability self-concept

As already mentioned above, a basic assumption of the control-value theory of achievement emotions is that any achievement-related emotion is a joint product of control and value appraisals. Thus, test anxiety is supposed to occur when students with highly contingent self-esteem expect to have little control over the results, and intensity of test anxiety should increase with the rising subjective experience of uncontrollability, so long as the value appraisal does not change. One construct considered to be a significant control-related cognition in control-value theory is students' ability self-concept (Pekrun, 2006). In the present study, we focus on the academic ability self-concept, defined as the entire cognitive representation of one's own abilities in the academic context (Dickhäuser, Schöne, Spinath, & Stiensmeier-Pelster, 2002). Empirically, the academic ability self-concept has often been positively connected to school achievement (e.g., Helmke & van Aken, 1995; Retelsdorf, Köller, & Möller, 2014) and part of that connection possibly stems back to the effect that the self-concept of ability may have on effort and engagement (Meyer, 1984). According to control-value theory, students with a high ability self-concept will presumably perceive themselves as having control over a test outcome. As opposed to this, students who think less of their own abilities should presumably feel that a test outcome is less controllable, and hence expect worse test outcomes. With respect to test anxiety, a highly valued test should be especially threatening if one expects to fail or have little control over the outcome. In the past few decades, several studies have shown negative correlations with medium effect sizes between students' academic self-concept and test anxiety (e.g., Bandalos, Yates, & Thorndike-Christ, 1995; Bong, Cho, Ahn, & Kim, 2012; Goetz, Cronjäger, Frenzel, Lüdtke, & Hall, 2010).

Until now, almost no study has simultaneously examined control and value cognitions with respect to students' test anxiety. One exception is a recent study of Boehme, Goetz, and Preckel (2017), who found that 5th graders' test anxiety was positively related to their control (i.e., ability self-concept), but negatively associated with their value appraisals (i.e., parent-reported family valuing of mathematics). Furthermore, they tested ability self-concept as a moderator and, in accordance with assumptions from control-value theory, found that the

relation between perceived value and test anxiety was significantly stronger among students with low, compared to high, ability self-concept.

### 1.5. The present research

In the present study, we hypothesize that higher levels of perceived PACPR increase students' academic contingent self-esteem, which, in turn, leads to greater test anxiety. We propose that this effect will even hold when controlling for the direct effect of perceived parental conditional *negative* regard on test anxiety. Moreover, we seek to examine whether academic ability self-concept (as an indicator of students' control appraisal) moderates the relationship between academic contingent self-esteem (as an indicator of students' value appraisal) and test anxiety. We expect stronger effects among students with low ability self-concept compared to among students with high ability self-concept.

We conducted two studies to test our hypotheses. In the first study, relations were examined with respect to trait test anxiety, using a school-based questionnaire survey in a large sample of students from 5th to 10th grade. In the second study, we tested our assumptions with respect to university students' state test anxiety, using a study design in which we simulated a real examination situation.<sup>2</sup> This study included an additional objective measure for test performance. Focusing on state anxiety and an objective performance measure allows us to conduct a more convincing test of the assumed causal ordering from perceived PACPR to contingent self-esteem to anxiety and thus to better establish the practical significance of our findings for real-life situations. As parental conditional regard and contingent self-esteem have been found to be domain-specific (Roth et al., 2009; Schwinger et al., 2015), we focused on the specific domain of academic achievement (i.e., parental academic conditional regard and academic contingent self-esteem).

## 2. Study 1

### 2.1. Method

#### 2.1.1. Recruitment and procedure

The project was approved by the Ministry of School and Education of the Federal state of Schleswig-Holstein, Germany. Participants were recruited in secondary schools in two mid-sized towns in northern Germany, including neighboring villages. In Germany, students attend different tracks within the secondary school system. For our study, we first selected several schools representing the highest track (prep school for university, *Gymnasium*) and a combination of the middle/lowest track (prep school for vocational training, *Gemeinschaftsschule*). All schools in the participating cities received a letter with information about the study and an inquiry to participate. Five schools out of six decided to participate in the study, three of them being highest track schools and two of them being middle/lowest track schools (school sizes varied between 520 and 1132 students). In Germany, a close coupling between families' socio-economic status (SES) and the secondary track attended by their children has repeatedly been reported. In the PISA studies, for example, the odds of students from highly privileged backgrounds attending the highest compared to the middle track were 4.28 times higher than those of students from working-class backgrounds (see Maaz, Trautwein, Lüdtke, & Baumert, 2008, for a

<sup>2</sup> We did not expect to find differential relationships in the two age groups as we assumed the psychological mechanisms to be consistent across these contexts. However, since several studies have reported age differences in the mean scores of self-esteem level and contingent self-esteem (Erol & Orth, 2011; Meier, Orth, Denissen, & Kühnel, 2011), it is unclear whether these scale mean differences lead to a substantive change of the relationships in question. Therefore, we deemed it reasonable to examine two different age groups in order to enhance the generalizability of our findings.

review). Following schools' authorization, students received an information letter with an invitation to participate in the project. In order to keep the burden on the individual classes low, only students from those grades participated who, according to the headmaster, were not currently involved in other important school activities (e.g., in preparation for an examination).

#### 2.1.2. Participants

In all,  $N = 850$  students (365 middle/lowest track [43%], 485 highest track [57%]) were invited to participate in the study. Overall,  $N = 653$  students (return rate: 77% overall, 61% middle/lowest track, 89% highest track) provided informed consent and filled out the questionnaire during a regular school lesson. Altogether, 222 students (34%) attended a middle/lowest track school and 431 (66%) visited a highest track school. The proportion of students in a highest track school was higher than the representative average in Germany (approximately 40%; German Federal Statistical Office, 2016). On the day of the survey, 53 (8.1%) of the students were in 5th grade, 22 (3.4%) in 6th grade, 261 (40.0%) in 7th grade, 294 (45%) in 8th grade, and 20 (3.1%) in 10th grade, whereas three participants did not report their current grade. In total, 322 (49.3%) of the participants were female, 324 (49.6%) male, and seven of them (1.1%) did not report their gender. Average age was 13 years ( $M = 13.17$ ,  $SD = 1.19$ ), ranging from 10 to 18 years.

#### 2.1.3. Measures

**2.1.3.1. Perceived parental academic conditional regard.** Students' perception of parental academic conditional regard was assessed by a slightly modified adaptation of the German version (Otterpohl, Keil, Assor, & Stiensmeier-Pelster, 2017) of the *Parental Conditional Regard Scale* (Assor et al., 2004). The version used in the present study consisted of 18 items, nine items each for parental academic conditional negative regard (PACNR) and parental academic conditional positive regard (PACPR). The items comprise statements about how students perceive their mother's (or the primary caregiver's, respectively) reaction to either a good school grade (PACPR) or a bad school grade (PACNR) that are to be rated on a 5-point Likert-type scale ranging from *completely disagree* to *completely agree*. Sample items are "When I get a good grade in school, my mom is much warmer toward me than she usually is." (PACPR) and "When I get a bad grade in school, my mother shows less affection to me than usual" (PACNR). Higher values on these scales indicate a higher perceived use of either positive or negative parental academic conditional regard. The original scales have been validated in extensive previous research (e.g., Assor et al., 2004, Assor & Tal, 2012; Roth et al., 2009). The psychometric quality of the German version has been recently proven in two samples of German secondary students ( $N = 144$  and  $N = 293$ ; 10–17 years). Results replicated the factor structure of the original questionnaire and demonstrated good reliability as well as expected relations with important validity criteria, such as parental autonomy support, self-esteem, emotion regulation, and school grades (Otterpohl et al., 2017). In the present study, the two scales showed excellent internal consistencies ranging from  $\alpha = 0.92$  (PACNR) to  $\alpha = 0.94$  (PACPR).

**2.1.3.2. Contingent self-esteem.** Contingent self-esteem was assessed using one subscale of the *German Self-Esteem Inventory for Children and Adolescents* developed by Schöne and Stiensmeier-Pelster (2016). The questionnaire consists of 32 items in total measuring the three dimensions *General level of self-esteem*, *Stability of self-esteem*, and *Contingency of self-esteem*. The latter subscale is based on Crocker et al. (2003) theoretical approach that contingent self-esteem is domain-specific, i.e., a person's self-esteem is contingent on experiences in different domains, such as academic success, physical appearance, or approval from others. Accordingly, the contingent self-esteem subscale contains twelve items which refer to success and failure in the academic domain (e.g. "When I get good grades, I somehow feel

as though I am more worthy”). The answers are to be given on a 5-point Likert-type scale ranging from *completely disagree* to *completely agree*. The inventory has been normed in a large sample of 3,121 students from grades 5 to 10. Good convergent and discriminant validity (e.g., relations with depression, rumination, ability self-concept) have been shown by Schöne and Stiensmeier-Pelster (2016). Higher values indicate that the person’s self-esteem depends more on success and failures in the academic domain. Internal consistency for the present study was comparable to the norm sample, with  $\alpha = 0.89$ .

**2.1.3.3. Ability self-concept.** For the assessment of academic ability self-concept, we used two subscales of the *Academic Self-concept Scales* (Schöne, Dickhäuser, Spinath, & Stiensmeier-Pelster, 2012). Items are composed of statements about one’s own academic ability that are to be rated on a five-point scale with two opposing endings at each pole of the scale. The questionnaire comprises four subscales that measure ability self-concept based on different reference norms (individual, social, criterion-based, without reference norm). These subscales show substantial intercorrelations ( $r$ s around 0.50) and are therefore typically summed into total scores (Schöne et al., 2012). Results from factor analytic studies indicate that it is also possible to distinguish two broader self-concept factors representing an individual self-concept compared to a factor comprising of the social, criterion-based, and without reference norm self-concept subscales (Baadte & Schnotz, 2014; Sparfeldt, Schilling, Rost, & Müller, 2003). For the present study, we used the *social reference norm* subscale (six items, e.g., “I think, I am ... less gifted ... more gifted for school than my classmates”) and the *criterion-based reference norm* subscale (five items, e.g., “When I consider the demands we have to meet at school, I think that I am... not intelligent ... very intelligent”). Convergent, discriminate, and predictive validity (e.g., relations with achievement motivation, self efficacy beliefs, and goal orientations) have been well demonstrated by Schöne et al. (2012). The authors report internal consistencies from  $\alpha = 0.82$  to  $\alpha = 0.88$  for the norm sample. The questionnaire is normalized for students from 5th to 10th grade.

We used the social and the criterion-based reference norm subscales because we considered these items as most relevant when examining trait test anxiety in the context of typical school-related tests or examinations. We suppose that success or failure in this academic context—typically mirrored by school grades—depends strongly on the extent to which students meet a predefined horizon of expectations (criterion-based reference norm) and—though possibly to a lesser extent—on the class’ performance (social reference norm). To operationalize academic ability self-concept, one total score from the items of the two subscales was computed. High values on the scales indicate a high ability self-concept. The internal consistency was  $\alpha = 0.88$ .

**2.1.3.4. Test anxiety.** Test anxiety was assessed with a 15-item short form (TAI-G-XU, Wacker, Jaunzeme, & Jaksztat, 2008) of the widely used *Test Anxiety Inventory* (TAI-G, German version: Hodapp, 1991; original version: TAI; Spielberger, 1980). This questionnaire captures individual differences in test anxiety as a situation-specific personality trait and is applicable for students starting 5th grade. Students are asked to report how frequently they experience specific symptoms of anxiety before, during, and after tests and examinations. The TAI-G-XU (short form) contains four subscales, using a 4-point Likert-type scale ranging from *almost never* to *almost always*. It comprises the two traditional subscales *Worry* (5 items; e.g., “During tests I find myself thinking about the consequences of failing”) and *Emotionality* (4 items; e.g., “While taking examinations, I have an uneasy, upset feeling”), as well as two additional subscales that have been often discussed as further sub-components of worry (*Interference*, 3 items; e.g., “Different thoughts come to my mind and interfere with my concentration on tests”; *Lack of confidence*; 3 items; e.g., “When I take a test, I trust in my competence; (r)”). The utilized short form is highly correlated with its original version ( $r = 0.98$ ) and has proven to have a high internal

consistency ( $\alpha = 0.89$ ) in a large sample of 720 German university students (TAI-G-XU, Wacker et al., 2008). Higher values on the scales indicate a higher proneness toward anxiety in test situations. In the present study, we used a total score (as most researchers do when using the TAI-G, e.g., Krispenz & Dickhäuser, 2018), which had a high internal consistency ( $\alpha = 0.89$ ).

#### 2.1.4. Statistical analyses

We specified path diagrams in AMOS 24.0 (Arbuckle, 2016) in order to test our hypotheses. Regarding the model fit, cut-off criteria by Hu and Bentler (1999) were used as recommendations, which include values close to 0.95 for CFI and 0.05 for RMSEA for a comparatively good model fit. The full information maximum likelihood estimation (FIML) incorporated in AMOS 24.0 was used for estimation of missing data (overall 0.2% of data were missing in study 1). All variables were screened for outliers and normality. No outliers were detected and no variables exceeded the cutoff values of 2 for skewness and 7 for kurtosis (West, Finch, & Curran, 1995). To examine our hypotheses on the moderating function of ability self-concept, we compared two competing models: one model simulating independent effects of ability self-concept and contingent self-esteem and a second one simulating a moderator effect of ability self-concept on the relationship between contingent self-esteem and trait test anxiety.

To test whether contingent self-esteem mediates the effect of perceived PACPR on trait test anxiety, we determined indirect effects using the bootstrapping procedure implemented in AMOS 24.0. Bootstrapping is a recommended procedure to test the significance of mediation effects that involves repeatedly randomly sampling observations, with replacement from the data set, and computing the statistic of interest in each resample. Over many bootstrap resamples, sampling distributions of the statistics can be empirically approximated and used for hypotheses testing (Shrout & Bolger, 2002). One necessary condition for bootstrapping is that the data set does not contain missing values. Accordingly, all cases with missing values ( $N = 13$ ) from the original data set were excluded for the purpose of bootstrapping analysis, and bootstrapping analyses were conducted with the remaining  $N = 640$  students.

## 2.2. Results

### 2.2.1. Preliminary analyses

Mean scores, standard deviations, internal consistencies, and intercorrelations are presented in Table 1. Intercorrelations are depicted below the diagonal. As expected, trait test anxiety correlated highly negatively with ability self-concept ( $r = -0.46$ ) and highly positively with contingent self-esteem ( $r = 0.53$ ). Analyses revealed that perceived PACPR and PACNR were predominantly related to contingent self-esteem, and trait test anxiety, respectively, with medium positive correlations ranging from  $r = 0.24$  to  $r = 0.32$ . Moreover, as predicted, perceived PACPR and PACNR showed only small, albeit significant, negative correlations ( $r = -0.08$  and  $r = -0.13$ ) with ability self-concept.

### 2.2.2. Ability self-concept as moderator of the effect of contingent self-esteem on trait test anxiety

To examine the interplay of ability self-concept and contingent self-esteem with respect to the prediction of test anxiety, we conducted two competing models as briefly outlined before: We first estimated an *independent effects model* in which ability self-concept and contingency of self-esteem were modeled as independent predictors of trait test anxiety. Next, we conducted an *interactive effects model* by adding the product (interaction term) of ability self-concept and contingent self-esteem as a third predictor to the first model, depicting ability self-concept as a moderator of the relationship between contingent self-esteem and trait test anxiety. Furthermore, both models included one path modeling a direct effect of perceived PACNR on test anxiety and

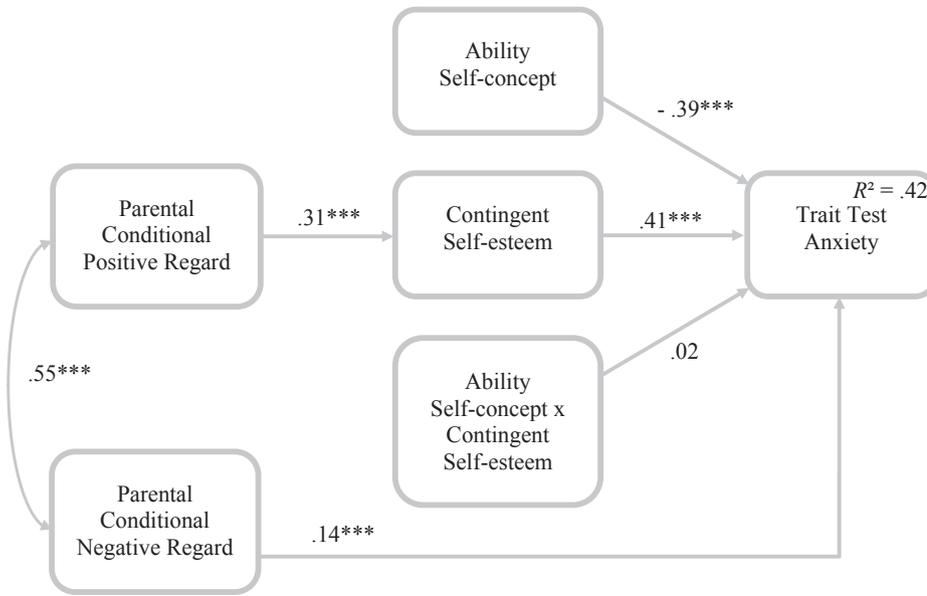
**Table 1**  
Means, standard deviations, internal consistencies, and intercorrelations (Study 1 and Study 2).

	Study 1			Study 2			(1)	(2)	(3)	(4)	(5)	(6)
	M	SD	$\alpha$	M	SD	$\alpha$						
(1) Parental Conditional Positive Regard	2.26	1.04	0.94	2.30	1.00	0.94		0.53**	-0.02	0.31**	0.18*	-0.02
(2) Parental Conditional Negative Regard	1.54	0.79	0.92	1.69	0.88	0.94	0.54**		0.03	0.21**	0.18*	-0.04
(3) Ability Self-concept	3.35	0.68	0.88	4.17	0.63	0.85	-0.08*	-0.13*		-0.26**	-0.34**	0.23**
(4) Contingent Self-esteem	2.62	0.88	0.89	2.65	0.76	0.88	0.32**	0.29**	-0.22**		0.43**	-0.21**
(5) Test Anxiety	2.23	0.64	0.89	2.21	0.48	0.77	0.24**	0.30**	-0.46**	0.53**		-0.32**
(6) Test Performance	-	-	-	7.45	3.60	-	-	-	-	-	-	-

Note. Intercorrelations for Study 1 are displayed below the diagonal, for Study 2 above the diagonal.

\*  $p < .05$ .

\*\*  $p < .01$ .



**Fig. 1.** Study 1: Interaction model of the relationship between parental positive and negative conditional regard, contingent self-esteem, ability self-concept, and trait test anxiety ( $\chi^2 [df = 6, N = 653] = 24.788; p = .01; CFI = 0.975; RMSEA = 0.069$ ). Note. Continuous lines indicate expected significant effects. Intercorrelations between ability self-concept, contingent self-esteem, and their interaction term are not depicted for the sake of clarity. All coefficients are standardized. +  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

**Table 2**  
Models comparisons (Study 1 and Study 2).

	$\chi^2 (df)$	Comparison	scaled $\Delta\chi^2 (df)$	AIC	CFI	RMSEA
<i>Study 1: Trait test anxiety</i>						
(a) Independent Model (ability self-concept as predictor)	23.013** (4)	(a) vs. (b)	1.775 (2)	55.013	0.973	0.085
(b) Interaction Model (ability self-concept as moderator)	24.788** (6)	-	-	66.788	0.975	0.069
<i>Study 2: State test anxiety</i>						
(a) Independent Model (ability self-concept as predictor)	6.273** (7)	(a) vs. (b)	2.437 (5)	46.273	1.000	0.000
(b) Interaction Model (ability self-concept as moderator)	8.710** (12)	-	-	54.710	1.000	0.000

Note. CFI = Confirmatory fit index; RMSEA = Root Mean Square Residual; AIC = Akaike Information Criterion.

\*  $p < .05$ .

\*\*  $p < .01$ .

another path modeling an indirect effect of perceived PCPR on test anxiety via contingent self-esteem (see Fig. 1). These two models were compared to each other regarding several fit indices, such as CFI, AIC, and RMSEA (Hu & Bentler, 1999). According to these criteria, both models fit the data sufficiently well, with  $\chi^2 [df = 4, N = 653] = 23.01; p = .01; CFI = 0.97; RMSEA = 0.08$ , and  $\chi^2 [df = 6, N = 653] = 24.78; p = .01; CFI = 0.97; RMSEA = 0.06$  for the independent effects model. However, the independent effects model—that is, the more parsimonious model—did not fit significantly worse than the interactive effects model in a scaled  $\chi^2$  difference test (Satorra & Bentler, 2001), with scaled  $\Delta\chi^2 (df) = 1.77 (2), p = .41$  (see Table 2). Whereas ability self-concept was substantially linked with trait test anxiety in both models ( $\beta = -0.39, p < .001$  for the interactive effects model), the interaction term of ability self-concept and contingent self-

esteem was not significantly related to trait test anxiety ( $\beta = 0.02$ ). Results for the interactive effects model are depicted in Fig. 1.

2.2.3. Contingent self-esteem as mediator of the effect of perceived PACPR on trait test anxiety

The independent and the interactive effects model revealed only minor differences regarding the magnitude of the respective path coefficients. Thus, for the sake of brevity, we only report results for the interactive effects model (Fig. 1). Over and above the effect of ability self-concept ( $\beta = -0.39, p < .001$ ) and perceived PACNR ( $\beta = 0.14, p < .001$ ), trait test anxiety was predicted by contingent self-esteem ( $\beta = 0.41, p < .001$ ), but not by the interaction of ability self-concept and contingent self-esteem ( $\beta = 0.02$ ). Contingent self-esteem, in turn, was predicted by perceived PACPR ( $\beta = 0.31, p < .001$ ). The results

from an analysis with 5000 bootstrapped samples (based on the original sample of  $N = 640$  students without missing values on any variables) revealed the indirect effects of perceived PACPR on trait test anxiety to be significantly different from zero, with  $\beta = 0.13$ , 90% CI (0.10, 0.16),  $p < .001$ ,  $N = 640$ .

### 3. Study 2

Our aims for study 2 were threefold. First, we sought to replicate the findings from study 1 regarding the interplay of perceived PACPR, contingent self-esteem, ability self-concept, and test anxiety. Second, we wanted to investigate whether the respective relationships hold true in a specific test situation, that is, with respect to state test anxiety. Third, we aimed to expand the scope of outcome variables by including test performance as an objective measure of achievement.

#### 3.1. Method

##### 3.1.1. Recruitment and procedure

The study was conducted as part of a psychology seminar on the application of empirical quantitative research methods in the summer of 2017. Students attending the seminar organized recruitment and data collection under close supervision of their professor. Every student was asked to recruit ten participants by contacting either fellow students in joint courses or unfamiliar students in different departments of the university. This procedure has turned out to be beneficial in prior studies as the participants of the seminar were student teachers who studied psychology as a minor subject and covered a wide range of main subjects. Inclusion criteria for participation in the study were enrollment in one of the degree programs of the university, no prior knowledge of educational and/or clinical psychology (e.g., enrollment in psychology courses, prior participation in psychological experiments in educational psychology), and informed consent. The study task procedure was tripartite: First, participants who provided informed consent received a standardized instruction with the cover story that they partook in a study aptitude test including a questionnaire and a standardized intelligence test. In a next step, participants were requested to answer a short questionnaire (approximately 15 min) on their retrospective perception of parental conditional regard, academic ability self-concept, academic contingency of self-esteem, and their actual (state) test anxiety with regard to the upcoming intelligence test. Subsequently, participants completed one subscale of a well-established standardized intelligence test (approximately 15 min). All tests were administered individually. Participants were elucidated about the true aim of the study directly after intelligence test completion. We conducted the study in accordance with the ethical principles of the German Psychological Society.

##### 3.1.2. Participants

The sample consisted of  $N = 166$  university students from 28 different degree programs at a large public research university ( $N = 26,000$  students) in the Federal State of Hesse, Central Germany. Most of them (21.1%) were enrolled in teacher training studies. Moreover, 17.8% were enrolled in natural sciences, engineering, or computer science, 9.9% in economic sciences, 9.8% in law studies, 3% in social sciences, 3% in medical studies, and 21.9% in other degree programs. About 13.5% did not specify their degree program. By and large, this distribution is consistent with the official university statistics on students' enrollments to the different degree programs (e.g., 19.6% teacher training studies; 30.0% natural sciences, engineering or computer science, 9.6% economic sciences, 7.5% law studies). In total,  $n = 84$  (50.6%) of the participants were female,  $n = 79$  (47.6%) male, whereas three of them (1.8%) did not report their gender. Age ranged from 16 to 31 years ( $M = 20.74$ ,  $SD = 2.48$ ), being representative for students from German universities.

#### 3.1.3. Measures

**3.1.3.1. Perceived parental academic conditional regard.** Parallel to study 1, we measured students' perception of parental academic conditional regard with the aforementioned *German version of the Parental Conditional Regard Scale* (Otterpohl et al., 2017). In contrast to the first study, as participants of the present study were university students, perceived parental conditional regard in the academic domain was assessed in retrospect,<sup>3</sup> and items were slightly adapted accordingly (e.g., "When I got a good grade in school, my mom was much warmer toward me than she usually was"). Internal consistencies were  $\alpha = 0.94$  for perceived PACNR and PACPR, respectively.

**3.1.3.2. Contingent self-esteem.** Here again, we administered the *German Self-Esteem Inventory for Children and Adolescents* (Schöne & Stiensmeier-Pelster, 2016) and slightly modified some of the items to assess academic contingent self-esteem at university instead of school (e.g., "When I get good grades in a university course, I somehow feel as though I am worthy"). The scale had good internal consistency ( $\alpha = 0.88$ ).

**3.1.3.3. Ability self-concept.** We used two subscales of the university student version of the *Academic Self-concept Scales* (Schöne et al., 2012). We administered the *criterion-based reference norm subscale* from study 1 and a 5-item subscale that assesses the academic ability self-concept *without reference norm* instead of the social reference norm subscale because social comparisons might play a minor role in the context of an individual study aptitude test, or intelligence test, respectively. As an indicator of academic ability self-concept, we used the mean score from the items of the two subscales (10 items in total). Internal consistency was  $\alpha = 0.85$ . High values on the scales indicate a high ability self-concept.

**3.1.3.4. State test anxiety.** For the measurement of state test anxiety, we used the questionnaire from study 1 (TAI-G-XU, Wacker et al., 2008) and rephrased the items with respect to the upcoming intelligence test (e.g., *Emotionality*: "I have an uneasy, upset feeling right now" instead of "While taking examinations, I have an uneasy, upset feeling"). We eliminated three items that could not be appropriately adapted from a general context to a concrete test situation. Participants answered a 4-point Likert-type scale ranging from *completely disagree* to *completely agree*. A total score was computed from all items ( $\alpha = 0.77$ ). Higher values on the scale indicate a higher level of state test anxiety.

**3.1.3.5. Test performance.** Test performance was assessed with one subtest of the *Intelligence Structure Test* (IST 2000 R, Liepmann, Beauducel, Brocke, & Amthauer, 2007). The IST-R is a well-established intelligence test battery based on a structural model of intelligence that measures nine components of intelligence belonging to numerical, verbal, and figural intelligence. A detailed description of the theoretical basis and results of analyses concerning reliability and validity (e.g., relations with established nonverbal intelligence tests, concentration tests, Big Five personality traits, and school grades) of the battery are reported in Liepmann et al. (2007). The test is suitable for persons 15 years of age and older. In the present study, we used one of

<sup>3</sup> The main reason for assessing PACPR retrospectively in study 2 was that most university students no longer live at home with their parents. As a consequence, the amount of daily situations in which parents can express their conditional regard and in which the child may feel dependent on the benevolence of the parents decreases significantly. This said, studies have shown that typically more autobiographical data can be remembered from adolescence and young adulthood than from adjacent phases of life. Moreover, retrospective assessments of the experienced parenting behavior show high similarities among siblings (Schumacher, Eisemann, & Brähler, 2000). These arguments support the assumption that parenting behavior can also be assessed retrospectively (Parker, 1989).

the numerical intelligence subtests in which participants have the task to continue the given series of numbers using logical reasoning (the number series subtest). Participants are requested to solve as many items as possible within a standardized time limit of 8 min. Results of the paper–pencil test were assessed by counting the number of correctly solved items. Higher scores represent a better test performance.

### 3.2. Results

Using the same procedure and analytical approach as in study 1, we specified two path models in AMOS 24.0 (Arbuckle, 2016) representing an independent effects model and an interactive effects model (overall 14.4% of missing data were handled via FIML in study 2). Test performance was included as an additional outcome variable predicted by state test anxiety. As in study 1, no variables exceeded the cutoff values of 2 for skewness and 7 for kurtosis (West et al., 1995).

#### 3.2.1. Preliminary analyses

Mean scores, standard deviations, internal consistencies, and inter-correlations are presented in Table 1. Intercorrelations are depicted above the diagonal. Pattern of results between perceived PACPR/PACNR, ability self-concept, contingency of self-esteem, and test anxiety were comparable to findings from study 1, except for non-significant associations between perceived PACPR/PACNR and ability self-concept. With respect to the additional outcome of test performance, state test anxiety was associated with lower test performance ( $r = -0.32$ ). Moreover, test performance was significantly related to ability self-concept ( $r = 0.23$ ) and contingent self-esteem ( $r = -0.21$ ) in the expected directions, but not associated with perceived PACPR/PACNR.

#### 3.2.2. Results from path analyses

As in study 1, model comparisons were conducted to compare the assumption that ability self-concept moderates the effect of contingent self-esteem on state test anxiety. Analyses could replicate the findings from study 1: Both the *independent effects model* ( $\chi^2 [df = 7, N = 166] = 6.27; p = .01; CFI = 1.00; RMSEA = 0.00$ ) and the *interactive effects model* ( $\chi^2 [df = 12, N = 166] = 8.71; p = .01; CFI = 1.00; RMSEA = 0.00$ ) fit the data well. Likewise, the independent effects model did not fit the data significantly worse than the interactive effects model, with scaled  $\Delta\chi^2 (df) = 2.44 (5), p = .78$ , see Table 2).

Again, all predictor variables except the interaction term of ability self-concept and contingent self-esteem ( $\beta = -0.06$ ) showed significant relations with the respective outcomes. Perceived PACPR was related to higher levels of contingent self-esteem ( $\beta = 0.31, p < .001$ ), which, in turn, predicted state test anxiety ( $\beta = 0.34, p < .001$ ) over and above ability self-concept ( $\beta = -0.25, p < .001$ ) and perceived PACNR ( $\beta = 0.12, p < .10$ ). Furthermore, state test anxiety was associated with poorer test performance ( $\beta = -0.33, p < .001$ ). Results are presented in Fig. 2. Results from bootstrapping analyses with 5000 bootstrapped samples could replicate the indirect effect of perceived PACPR on test anxiety via contingent self-esteem ( $\beta = 0.12, 90\% CI [0.06, 0.18], p < .001$ ). Moreover, analyses revealed an indirect effect of contingent self-esteem on poorer test performance, which was mediated by higher state test anxiety ( $\beta = -0.13, 90\% CI [-0.20, -0.06], p < .001$ ).

## 4. Discussion

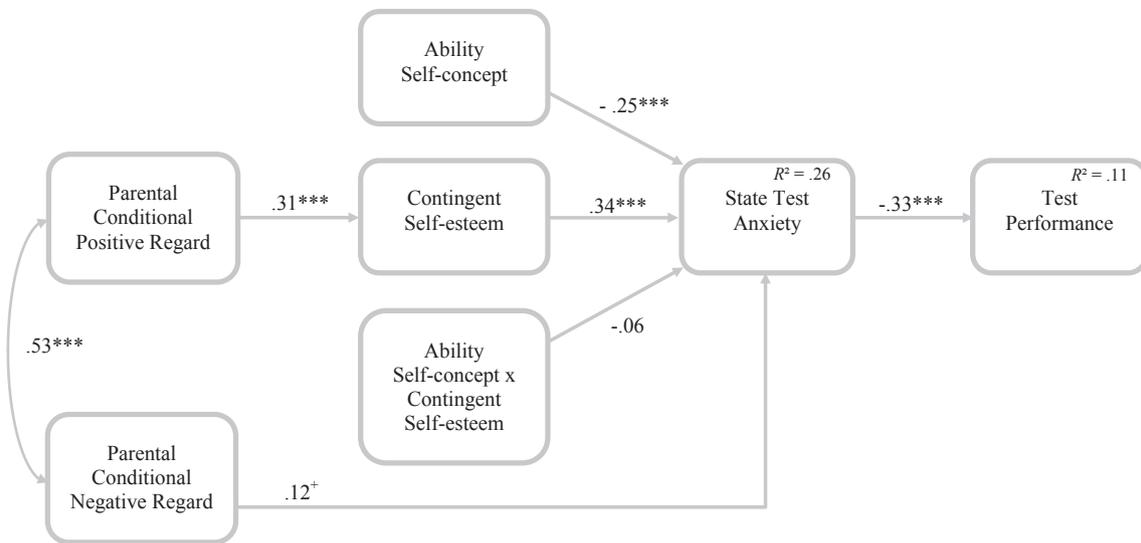
The goals of the present study were to examine perceived parental academic conditional regard as a social antecedent and contingent self-esteem and ability self-concept as individual antecedents of students' trait and state test anxiety and test performance. We tested underlying mechanisms of these constructs by addressing basic assumptions of Deci and Ryan's self-determination theory, and Pekrun's control-value theory of achievement emotions. Moreover, we examined whether our

assumptions were generalizable for trait and state test anxiety.

#### 4.1. Perceived PACPR, contingent self-esteem and ability self-concept as antecedents of test anxiety

Results supported our hypothesis that higher levels of perceived PACPR are associated with increased contingent self-esteem, which, in turn, relates to higher trait and state test anxiety and poorer test performance. These results suggest that students whose self-esteem depends on academic achievements may be more likely to develop test anxiety; their parents may contribute to this process by showing their children more affection, esteem, and attention following school-related success. Our findings are in line with Boehme et al. (2017) conclusion that parents have an important impact on their children's test anxiety. Moreover, our results showed the indirect effect of perceived PACPR on test anxiety to be significant, over and above direct negative effects of perceived PACNR. This is particularly important because previous studies have found that students' perceptions of parental conditional positive and negative regard are remarkably correlated (Assor et al., 2014). Accordingly, one could argue that empirical findings on the negative consequences of perceived PACPR emerge due to a spurious correlation, as perceived PACPR typically goes along with perceived PACNR. However, our findings arouse skepticism to this plausible assumption. Bearing these concerns in mind and considering the background of previous studies in which students have reported that their parents use conditional positive regard much more frequently than negative regard (e.g., Otterpohl et al., 2017), it seems even more important to gain deeper theoretical insight into the functionality of PACPR. Overall, our studies are in line with predictions from self-determination theory that if basic psychological needs—in this case the need for autonomy—are only partially fulfilled negative effects on motivational-affective functioning are likely to arise. Moreover, it seems reasonable to conclude that certain emotional problems such as test anxiety are a consequence of the adoption of controlled forms of motivation (Roth et al., 2009) and the development of a contingent rather than “true” self-esteem (Deci & Ryan, 1995).

As a further issue, we assumed that academic ability self-concept moderates the relationship between academic contingent self-esteem and test anxiety. We hypothesized further that there would be higher associations between contingent self-esteem and test anxiety for students with low ability self-concept compared to students with high ability self-concept. Unexpectedly, and in contrast to Boehme et al.'s study, our findings did not support our assumption about a moderating role of ability self-concept. Contradicting the theoretical considerations of expectancy-value theory, model comparisons consistently revealed the interaction model not to be superior to the more parsimonious independent model, and the interaction term made no significant contribution to the prediction of test anxiety. At least two aspects have to be considered in this regard: First, it is important to note that our findings are consistent with modern expectancy-value approaches (e.g., Wigfield & Eccles, 2000), which primarily focus on independent (i.e., additive) effects of expectancy and value components, whereas the interaction effect plays a lesser role. Second, several methodological challenges have been reported in connection with expectancy-value theory. Trautwein et al. (2012), for example, outline that there is typically not enough statistical power to detect interactions of usual effect sizes, unless studies comprise very large sample sizes. However, further studies with larger sample sizes would be necessary to explore this alternative explanation. Either way, our findings indicate that, besides ability self-concept, perceived PACPR and contingent self-esteem represent substantive predictors of test anxiety. Accordingly, we consider perceived PACPR as an innovative and promising starting point in the prevention of test anxiety (as further outlined in the implications section). Targeting perceived PACPR and/or students' contingent self-esteem in the classroom may complement traditional approaches that target students' expectancy cognitions (e.g., attributional retraining).



**Fig. 2.** Study 2: Interaction model of the relationship between parental positive and negative conditional regard, contingent self-esteem, ability self-concept, state test anxiety, and test performance ( $\chi^2 [df = 12, N = 166] = 8.710; p = .01; CFI = 1.00; RMSEA = 0.000$ ). *Note.* Continuous lines indicate expected significant effects. Intercorrelations between ability self-concept, contingent self-esteem, and their interaction term are not depicted for the sake of clarity. All coefficients are standardized. +p < .10, \*p < .05, \*\*p < .01, \*\*\*p < .001.

Particularly, students who do not respond as desired to expectancy-related interventions (e.g., students with learning disabilities who are at higher risk of experiencing academic failures more constantly) may profit from reducing perceived PACPR because of its potential compensational effect.

**4.2. Strengths and limitations**

We believe that our findings offer valuable insight into two important fields of research. First, our findings shed additional light on the controversially discussed, but insufficiently studied effects of perceived parental conditional regard on achievement emotions. Second, our findings contribute to a better understanding of the complex interplay of (perceived) social and individual antecedents of test anxiety, which has been highly neglected in previous research. Furthermore, we examined the interactive effect of control and value cognitions, a basic assumption of expectancy-value models seldom studied in test anxiety research. One innovative theoretical strength of the present study is that it builds on different established theoretical approaches and integrates some of their basic assumptions in order to generate deeper knowledge about underlying mechanisms in the socialization of achievement emotions. Recently, Dweck has impressively demonstrated that combining different theoretical approaches allows us to overcome the challenge that “we have some powerful theories, but many seem to be isolated theories explaining isolated phenomena” (Dweck, 2017, p. 689). Regarding the two studies presented here, hypotheses derived from self-determination theory and from control-value approaches were basically congruent. That is, the frustrated need for autonomy led to the same theoretical prediction of an increasingly contingent self-esteem and subsequent higher test anxiety as the interplay of a low control and a high value appraisal. Further (methodological) strengths of the present study are that it addresses both trait and state test anxiety and that it includes two studies with different samples from two large educational contexts (i.e., secondary school vs. university students). Moreover, our study does not solely rely on students’ self-reports, but relates students’ perception of PACPR and test anxiety to objective achievement (i.e., performance in an intelligence subtest).

Despite these strengths, our study also has several limitations. Most important, we used a cross-sectional design in both studies which does not allow any causal interpretations. This limitation is important since on the basis of the anxiety literature one could also assume the reversed

causal cycle leading more anxious students to perceive that their parents judge them by their academic performance (Sowislo & Orth, 2013). Nevertheless, we think that we have carefully described our theoretical rationale for the causal ordering tested in this manuscript which is why we deem it appropriate to use these data as a cautious starting point for interpretation of the relationships in question. Future studies should use longitudinal designs to consider possible reciprocal processes in the fields of perceived parental conditional regard, contingent self-esteem, and achievement-related emotions. As a similar limitation, our results are exclusively based on students’ self report which could be problematic in various respects. For example, it can be misleading to assume that students’ perceptions accurately reflect parental behavior. Due to potential shared method variance, associations could be overestimated when all information comes from the same source. However, past research has also reported negative effects of other-informant measures of parental conditional regard (e.g., Roth et al., 2009). Moreover, exclusively relying on parent-based reports may be also problematic since parents’ assessments of their own behavior may be affected by a tendency to give socially desirable answers and to avoid reporting problematic behaviors to a third party. Further research should combine multiple-informant assessments in order to ensure a more valid interpretation of the causality of effects. Another limitation refers to the fact that although we used different methodological approaches to examine both trait and state test anxiety, we did not include them simultaneously. Therefore, further studies are needed to replicate and extend our findings. Additional methodological approaches, such as experience sampling, would be promising because they allow one to investigate state and trait anxiety simultaneously and in everyday-life situations (see Goetz et al., 2013). Moreover, although participants of our first study stem from different school tracks of the German secondary school system, participants of the highest track school were overrepresented compared to the average distribution of the German school system, which can be explained by the lower response rates of the middle/lowest track students. Likewise, the second study consisted of a convenience sample of university students. Thus, generalizability of our findings is limited in that these groups of students might be generally more capable than their peers, who are enrolled in a lower school track or in a vocational training instead of university. This bias might have resulted in reduced variance with regard to ability self-concept and/or test anxiety. Moreover, the two samples in the present study may not cover the full range of parenting styles of German families due to the

overrepresentation of students from families with a higher social status. These families are typically characterized by an authoritative parenting style, whereas authoritarian or neglecting parenting is less common (see Hoff, Laursen, & Tardiff, 2002, for a review). Further studies are needed to investigate whether the same pattern of results also emerge for students with lower academic capacities and/or lower social status. For example, it could be examined whether the proposed interaction effect of contingent self-esteem and ability self-concept can be observed in these academically less successful students. Finally, findings from the present study are restricted to test anxiety and cannot be generalized onto other critical emotions in academic contexts (e.g., frustration or helplessness).

#### 4.3. Practical implications

Our findings have several important implications for parents and teachers. First, our study can help to provide parents with fundamental knowledge about potential psychological costs of PACPR, a strategy which is commonly used by parents because it may appear fairly benign on the one hand, and has high (though short-lived) effects on children's behavior on the other. Not only this, but also those parents who have already learned to apply instrumental conditioning may profit from being sensitized to differences between PACPR and other forms of instrumental conditioning, which have positive effects on their children's learning free from detrimental and unintended side-effects. In this regard, it is particularly important to differentiate forms of instrumental conditioning, which refer to the behavior of the child (cf. “process feedback”; Kamins & Dweck, 1999) from parental conditional regard, which inherently refers to the worth of the child him/herself, as it uses affection as a reinforcement (cf. “person feedback”; Kamins & Dweck, 1999). Parents who use punishment and rewards to shape their children's behavior are therefore not necessarily using parental conditional regard. In other words, strategies of instrumental conditioning (e.g., praise) may, but need not, be supportive of a child's development; and, at the same time, they may, but need not, be detrimental. Our findings are in line with conclusions from previous research that praise can backfire under certain conditions (cf. *paradox effects of praise*; Brummelman, Crocker, & Bushman, 2016). To date, these important points are neither addressed in most of the parenting guides and trainings, nor are they explicitly taught to (student) teachers and other professions in educational contexts.

Although parents often question their influence on their teenagers and young adults, our results support previous findings (e.g., Otterpohl & Wild, 2015) that how parents behave (or, more precisely, how their children perceive their behavior) substantially impacts students' emotional experience at this stage of development. Our finding that perceived PACPR not only affects students' emotions, but also their achievement, suggests the risk of a potential vicious cycle set on by either perceived PACPR or poor achievement, which has to be broken by external persons. In this regard, studies report increasing importance of additional socializing agents (e.g., peers, teachers) the older children get (e.g., Salisch, Zeman, Luepschen, & Kanevski, 2014; Booker & Dunsmore, 2017). Thus, our findings also have implications for teachers and other professions working with students. First, students' perception of PACPR may be an important topic for parent–teacher communication because it affects a connecting link between students' school and home environment. Second, teachers may buffer the indirect influence of perceived PACPR by creating a classroom climate that is likely to enhance students' motivation and academic achievement without increasing students' academic contingent self-esteem. For this purpose, they can use socialization strategies, such as process feedback and autonomy support, to encourage students to use individual reference norms and foster learning, rather than performance goal orientations (Dickhäuser, Janke, Praetorius, & Dresel, 2017; Steinmayr & Spinath, 2011; Stiensmeier-Pelster & Otterpohl, 2017).

In sum, reducing (students' perception of) PACPR and replacing it

with other effective socializing strategies at home and in school may be an additional starting point to prevent students' test anxiety besides traditional approaches that aim to foster control cognitions. Informing both parents and teachers about the detrimental effects of perceived PACPR might help students to study and achieve well, without being put under emotional pressure.

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#### Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.cedpsych.2018.11.002>.

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