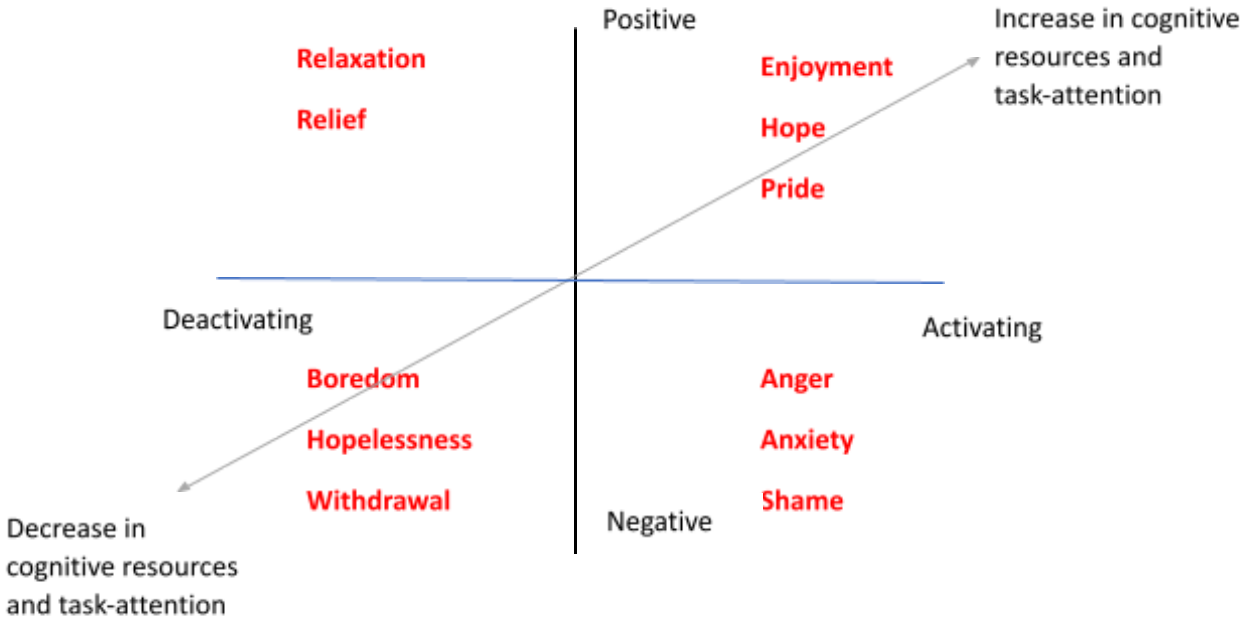
Effects of Emotion on Achievement - Reinhard Pekrun, Stephanie Lichtenfeld er al (University of Munich, 2017)

In the control-value theory, (Pekrun, 2006) two dimensions describing human affect are used to distinguish types of emotions, namely….

(i) valence (positive vs. negative or pleasant vs. unpleasant) and
(ii) activation (activating vs. deactivating).

Using these dimensions renders four groups of emotions: positive activating (e.g., enjoyment, hope, pride), positive deactivating (e.g., relaxation, relief), negative activating (e.g., anger, anxiety, shame), and negative deactivating (e.g., boredom, hopelessness). The theory proposes that these emotions influence students' cognitive resources, motivation to learn, and use of learning strategies, thus impacting their achievement (for an in-depth discussion, see Pekrun & Linnenbrink-Garcia, 2012).



Achievement reciprocally influences the appraisals that are considered to be proximal antecedents of emotion… positive emotions are thought to be promoted when perceived competence and control over achievement activities are high. For example, students should enjoy learning when they judge themselves competent to master the learning task, provided they are interested in the material.

Negative emotions should result when perceived competence and control are low. For example, anxiety about an upcoming important exam should be high if students judge themselves incompetent to pass it. One possible exception is boredom, which could be promoted by high perceived competence if coupled with low task demands (i.e., under-challenge); however, in an academic context, boredom also has been found to be linked to students' lack of perceived competence and control (e.g., Pekrun et al., 2010)

Competence and control are thought to influence both students' momentary emotions within a specific situation ***and their habitual, re-occurring emotions,*** which are based on re-occurring appraisals and related control-value beliefs (for summaries of empirical evidence, see Daniels & Stupnisky, 2012; Pekrun & Perry, 2014).

The two constructs are thought to be linked by reciprocal causation over time… amounting to positive feedback loops, and… negative feedback loops for negative activating emotions in some students and under some conditions (e.g., failure on an exam instigating a student's anxiety, and anxiety eliciting effort to avoid failing the next exam; Pekrun, 1992) …the existing evidence summarized above implies that negative activating emotions typically are aroused by failure ***and contribute to subsequent failure.***

Method

"The sample consisted of German adolescents who participated in the PALMA longitudinal study (Pekrun et al., 2007). The study included annual assessments from grades 5 to 9" ***(note: UK equivalent – years 7 to 11)***

"Samples were representative of the student population of this state in terms of student characteristics such as gender, urban versus rural location, and family background. At the first assessment (grade 5), the sample included 2,070 students from 42 schools (49.6% female, mean age = 11.7 years). The sample comprised students from all three school types within the public secondary school system as described earlier, including lowertrack schools (Hauptschule, 37.2%), intermediate-track schools (Realschule, 27.1%), and higher-track schools (Gymnasium, 35.7%).

"These three school types differ in average student achievement due to the selection of students by entry-level achievement (see Murayama et al., 2013). The distribution of students across tracks represents the distribution in the population."

"Students' emotions in mathematics were measured using the Achievement Emotions Questionnaire-Mathematics (AEQ-M; Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011). The instructions for the instrument ask respondents to describe how they typically feel when attending class, doing homework, and taking tests and exams in mathematics; in this way, the AEQ-M assesses students' habitual, trait-like math-related emotions. The instrument comprises seven scales measuring mathematics enjoyment (9 items, e.g., "I enjoy my math class"), pride (8 items; e.g., "After a math test, I am proud of myself"), anger (8 items; e.g., "I am annoyed during my math class"), anxiety (15 items; e.g., "I worry if the material is much too difficult for me"), shame (8 items; e.g., "I am ashamed that I cannot answer my math teacher's questions well"), hopelessness (6 items; e.g., "During the math test, I feel hopeless"), and Running head: EMOTION AND ACHIEVEMENT 14 boredom (6 items; e.g., "My math homework bores me to death"). Participants responded on a 1 (strongly disagree) to 5 (strongly agree) scale."

"Students' achievement was assessed by their end-of-the-year grades in mathematics as retrieved from school documents and by standardized test scores. ***End-of-the-year grades*** are summative scores based on multiple exams within each school year; they represent students' achievement in the math curriculum for the respective year. Grades range from 1 (excellent) to 6 (poor). The ***test scores*** were derived from the PALMA Mathematics Achievement Test (Pekrun et al., 2007) which measures students' competencies in mathematics, algebra, and geometry.

Results and Discussion

"The findings of this study provide robust evidence for the proposed reciprocal effects model of emotion and achievement.

Adolescents' math-related positive emotions (enjoyment and pride) positively predicted their subsequent end-of-theyear math grades, and grades, in turn, positively predicted the development of positive emotions.

Math-related negative emotions (anger, anxiety, shame, hopelessness, and boredom) were negative predictors of subsequent math grades, and grades, in turn, were a negative predictor for the development of negative emotions.

The findings were consistent across models for the seven discrete emotions, the combined positive and negative affect model, four time intervals, two different measures of achievement (grades, test scores), and the three school tracks while controlling for students' gender, SES, and intelligence. All of the effects were significant.

The findings are congruent with previous evidence showing that emotions and academic achievement are correlated (Goetz & Hall, 2013; Pekrun & Linnenbrink-Garcia, 2014; Zeidner, 1998). However, they go beyond correlational evidence by disentangling the directional effects underlying the emotion-achievement link. Specifically, the findings suggest that emotions indeed have an influence on adolescents' achievement, ***over and above the effects of general cognitive ability and prior accomplishments.***

These effects are in line with Pekrun's (2006) control-value theory which posits that emotions influence learning and achievement outcomes. Of specific importance is the finding that adolescents' positive emotions in mathematics had positive predictive effects on their math grades over time. Previous research has produced mixed findings on the relation between students' positive affect and their learning, with most studies reporting positive relations (see Linnenbrink, 2007) but some others null findings (e.g., Pekrun, Elliot, & Maier, 2009). The present analysis suggests that positive emotions can have positive effects, in line with theory and the views of educational practitioners.

However***, the effects were weaker for positive emotion than for the negative emotion constructs***, and did not reach significance for the predictive effect of positive affect on test scores. Future research should examine possible reasons why negative emotion is a stronger predictor of students' academic achievement than positive emotion. This difference may relate to general asymmetries in the impact of negative versus positive states and events on human memory and action (see e.g., Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001).

The results also contribute to our understanding of the developmental origins of students' emotions. The findings suggest that achievement impacts the development of emotions. More specifically, it appears that doing well in school can strengthen students' positive emotions reduce their negative emotions over time, whereas doing poorly in school undermines positive emotions and exacerbates negative emotions.

These effects are likely mediated by students' perceptions of competence and control over achievement, with high control promoting enjoyment and pride and low control leading to negative emotions (e.g., Pekrun et al., 2010). Taken together, these effects amount to positive developmental feedback loops linking emotions and achievement.

As noted, a few longitudinal studies have found that students' test anxiety and their achievement were linked by positive feedback loops (Meece, Wigfield, & Eccles, 1990; Pekrun, 1992). ***The present research adds to this literature by showing that emotions other than anxiety share similar links with achievement.***