Achievement Emotions in Higher Education

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Holding a degree in higher education has never been of more personal, social, or financial significance than it is today. The countless hours college students spend studying, attending class, completing projects, taking exams, and building social and professional relationships translate into progress towards crucial life goals–goals which are attained via individual and collective agency in college settings. Given the subjective importance of these settings, it is no wonder that they abound with emotions.

Emotions are both *experienced* in the college setting as well as *instrumental* for college achievement and personal growth (Pekrun, Goetz, Titz, & Perry, 2002a; Pekrun, Goetz, Titz, & Perry, 2000b). For instance, experiencing enjoyment while working on a challenging project can help a student envision goals, promote creative and flexible problem solving, and support self-regulation (Ashby, Isen, & Turken, 1999; Clore & Huntsinger, 2007, 2009; Clore, Schwarz, & Conway, 1994; Forgas & Vargas, 2000; Fredrickson, 2001; Isen, Daubman, & Nowicki, 1987; Loewenstein & Lerner, 2003; Parrott & Spackman, 2000; Pekrun et al., 2002a). On the other hand, experiencing excessive anxiety about exams can impede a student's academic performance, compel him to drop out of college, and negatively influence his psychological and physical health (Zeidner, 1998, 2007). The far-reaching consequences of emotional experiences are also likely reflected in the tragic numbers of attempted and committed suicides on college campuses each year (Westefeld et al., 2005).

The importance of emotions in higher education equally extends to instructors, professors, and administrators. For example, instructors are not only responsible for imparting knowledge, but also for inspiring passion for the discipline and excitement about learning. Of these outcomes, passion and excitement are the most elusive, because college instructors receive little or no training in the principles of affect and learning. If they succeed at inspiring excitement about the course content, the motivational benefits should extend far beyond the course itself. If they fail, however,

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the ensuing negative emotions, such as anxiety or boredom, can quickly undermine motivation and the will to remain in the course or even in college.

Despite the clear relevance of emotions for education, emotions have been neglected by higher education research, and by educational research more generally (Pekrun & Frese, 1992; Schutz & Lanehart, 2002; see the literature search in Pekrun et al., 2002b). The few exceptions include research on test anxiety (Zeidner, 1998, 2007) and on attributional antecedents of achievement emotions (Weiner, 1985). Over the past 10 years, however, the number of studies focusing on students' emotions has steadily increased (Efklides & Volet, 2005; Linnenbrink, 2006; Schutz & Pekrun, 2007) and produced important, initial findings, particularly with respect to K-12 students' emotions. However, the extent to which these findings can be generalized to college students' emotions may be limited, given the developmental and intellectual distinctions between school-aged children and college students. By implication, there is a clear need for empirical research specifically addressing college students' emotions.

The present chapter addresses the emotions experienced by college students, with a specific focus on their achievement emotions. By necessity, given the paucity of empirical research, much of this chapter will be a call for empirical research, rather than a review of cumulative evidence and derived practical applications. The first part of the chapter discusses conceptual issues and provides definitions of emotion and achievement emotions. Next, the occurrence of emotions in academic settings at college and university is discussed. The third part addresses the assessment of students' emotions, with particular attention given to test anxiety questionnaires and the Achievement Emotions Questionnaire (AEQ; Pekrun et al., 2002b; Pekrun, Goetz, & Perry, 2005) as examples of instruments that measure achievement emotions. The fourth part attends to the functional relevance of students' emotions for academic learning and achievement. The fifth and sixth parts center on the antecedents and development of students' emotions, and on coping, emotion regulation, and therapy. In conclusion, implications for educational practice and future research in higher education are discussed.

Conceptual Issues: Emotions and Achievement Emotions

It is generally accepted that *emotions* are multifaceted phenomena that involve systems of interrelated psychological components including: emotion-specific subjective feelings (affective component), cognitions (cognitive component), motivational tendencies (motivational component), physiological processes (physiological component), and expressive behavior (expressive component; see Kleinginna & Kleinginna, 1981; Roseman, Wiest, & Swartz, 1994; Scherer, 1984, 2000). For instance, a college student experiencing pre-exam anxiety may feel uneasy and nervous (affective component), perceive low personal control to avoid failure (cognitive component), want to flee the impending exam situation (motivational component), have sweaty palms (physiological component), and her brow may be furrowed and her lips pulled backward (expressive component).

In contrast to other emotion components which may or may not be present when an emotion is instigated, the affective component is a necessary, core constituent of emotion. From a neuropsychological perspective, this component comprises an activation of subcortical brain structures (e.g., the amygdala in anxiety), as well as feedback loops between subcortical and cortical structures that make it possible to experience an emotion as a subjective feeling state (Damasio, 2004). In comparison to emotions, *moods* are of lower intensity, have less specific reference objects (Fridja, 1986), and are typically of longer duration (Ekman, 1992). However, since moods can be comprised of similar components as more intense emotions and can be qualitatively distinct from one another (e.g., cheerful, angry, or anxious moods), they can be regarded as low-intensity emotions (Pekrun, 2006).

We define *achievement emotions* as emotions that are tied to achievement activities (e.g., studying) or achievement outcomes (success and failure; see Table 1). Most of the emotions experienced in achievement settings can be classified as achievement emotions because they relate to activities and outcomes that are judged according to competence-based standards of quality. As such, the social emotions experienced in achievement settings (e.g., empathy for individuals in one's study group) would not necessarily be considered achievement emotions. However, overlap between achievement and social emotions can occur in terms of emotions directed towards the achievement of others (e.g., contempt, envy, empathy, admiration; Weiner, 2007).

Past research on achievement emotions predominantly focused on emotions induced by achievement *outcomes*, such as hope and pride related to success, or anxiety and shame related to failure. Two important traditions of research on outcome emotions are test anxiety studies (Zeidner, 2007) and studies on the attributional antecedents of emotions following success and failure (e.g., Weiner, 1985). Though outcome emotions are of critical importance for achievement strivings, emotions directly pertaining to the *activities* performed in achievement settings (i.e., activity emotions) are also achievement emotions and are of equal relevance

Table 1 A three-dimensional taxonomy of achievement emotions

	Positive[a]		Negative[b]	
Object focus	Activating	Deactivating	Activating	Deactivating
Activity	Enjoyment	Relaxation	Anger Frustration	Boredom
Outcome/prospective	Hope Joy[c]	Relief[c]	Anxiety	Hopelessness
Outcome/retrospective	Joy Pride Gratitude	Contentment Relief	Shame Anger	Sadness Disappointment

[a] Positive = pleasant emotion.
[b] Negative = unpleasant emotion.
[c] Anticipatory joy/relief.

for achievement strivings. The excitement arising from the commencement of a new project, boredom experienced when performing monotonous routine tasks, or anger felt when task demands seem unreasonable are examples of activity-related emotions. These emotions have traditionally been neglected.

In Pekrun's (2006, Pekrun et al., 2002a) three-dimensional taxonomy, achievement emotions are categorized along three dimensions: object focus, valence, and activation (Table 1). *Object focus* refers to the differentiation between activity and outcome emotions. For example, enjoyment experienced while working collaboratively with others is an activity emotion, while pride experienced after an insightful contribution to classroom discussion is an outcome emotion. In addition, as emotions more generally, achievement emotions can be grouped according to their valence and to the degree of activation implied (Table 1). In terms of *valence*, positive emotions can be distinguished from negative emotions, such as pleasant enjoyment versus unpleasant anxiety. In terms of *activation*, physiologically activating emotions can be distinguished from deactivating emotions, such as activating excitement versus deactivating relaxation. By using the dimensions valence and activation, the taxonomy is consistent with circumplex models that arrange affective states in a two-dimensional (valence x activation) space (Feldman Barrett & Russell, 1998).

The Occurrence of Achievement Emotions in College Settings

What emotions do students experience in college and how often do they experience these emotions? In our own research, we have conducted a number of exploratory studies, to analyze the diversity of emotions experienced by college students. In these studies we asked our participants about their emotional experiences in three key academic contexts: studying, attending class, and taking tests and exams (Pekrun, 1992a; Molfenter, 1999; Spangler, Pekrun, Kramer, & Hofmann, 2002; Titz, 2001). The studies used semi-structured interviews and questionnaires to explore college students' emotions. In each of these interviews and questionnaires, students were asked a series of fixed questions and could give open-ended answers to provide qualitative narratives of emotional episodes. Video-stimulated recall and psychophysiological analyses were also used in some of this research to facilitate and validate respondents' self-reports. In some of the studies, students were asked to recall typical academic episodes from their autobiographical memories and to report about the emotions experienced within these episodes (Pekrun, 1992a). Other studies used a situated approach in which emotions were assessed immediately after specific academic situations. Students' descriptions of emotional episodes were recorded, transcribed, and analyzed using both qualitative and quantitative methods.

As expected, the results of these studies showed that students experience a wide variety of emotions in academic settings. All major human emotions—save for disgust—were reported in students' narratives. Anxiety, in particular, was reported most often, and constituted 15–27% of all emotional episodes across all three academic situations (i.e., studying, during class, during exams). The pervasiveness

of anxiety found in our research corroborates the importance of test anxiety research and underscores the high-stakes climate of college—factors which may pose serious threats to students' psychological health and well-being. At the same time, however, the findings suggest that the vast majority of emotions experienced in academic settings pertain to emotion categories other than anxiety. Overall, positive emotions (e.g., enjoyment, satisfaction, hope, pride, and relief) and negative emotions (e.g., anger, anxiety, shame, and boredom) were reported with equal frequency. Students also mentioned less frequently experienced emotions like hopelessness, as well as social emotions like gratitude, admiration, contempt, and envy.

The relative frequencies of emotions differed across the three types of academic situations. During classroom instruction and studying, positive emotions accounted for slightly more than 50% of reported emotions, whereas during test taking, negative emotions outweighed positive emotions. Typically, attending class and studying involve less pressure for achievement and more autonomy for self-regulation than writing an exam, which may explain these differential frequencies.

The findings from our exploratory research thus confirm that the college experience is pervaded by a rich diversity of emotions (also see Beard, Clegg, & Smith, 2007). However, there may be limits to the generalizability of these findings. First, emotions that are experienced less intensely may be underreported in any self-report assessment of emotions, since self-report relies on the availability of emotional episodes in situational or long-term memories. Also, culturally defined rules regarding reporting about emotions may play a role, perhaps implying that emotions like contempt or envy are experienced more frequently than acknowledged by participants in self-report studies. Furthermore, our studies used samples of German university students, thus these findings pertain to emotions experienced within the German university system. Higher education systems share many features across countries, but there also are differences that may limit the cross-cultural generalizability of the findings. More exploratory and baserate research on the emotions experienced by students in higher education in different countries is clearly warranted.

Assessment of Students' Achievement Emotions

Exploratory research can be used to investigate the occurrence and phenomenology of emotions, but more rigorous quantitative methodology is needed to gather precise evidence on their functions, antecedents, and development. To begin such an endeavor, measurement instruments are needed. Many self-report instruments assessing students' test anxiety are available; however, suitable measures assessing achievement emotions other than test anxiety are in short supply. This section addresses test anxiety measurement and a recently constructed instrument that assesses various achievement emotions (Achievement Emotions Questionnaire, AEQ; Pekrun et al., 2002b; Pekrun, Goetz, Perry, Kramer, & Hochstadt, 2004; Pekrun et al., 2005).

The diversity of emotion components outlined in the first section implies that there may be numerous ways to assess emotions, including self-report questionnaires, implicit assessment, neuroimaging methods (e.g., EEG, fMRI), analysis of peripheral physiological processes, and observation of nonverbal behavior (e.g., facial, gestural, and postural expression or the prosodic features of verbal speech). With the exception of self-report instruments, all of these methods are still underused within educational research. As a case in point, while video-based research on classroom interaction flourishes, this research has yet to attempt to analyze the emotional processes that characterize interactions between instructors and students. This could be accomplished by adapting methods developed in emotion research (e.g., the Facial Action Coding System, FACS; Ekman & Rosenberg, 1997) for use in classroom observation. Similarly, neuroimaging techniques could be used to analyze neuronal indicators of students' emotional reactions when confronted with academic tasks, and physiological indicators such as heart rate, skin resistance, and cortisol levels could be used to analyze students' emotional activation in academic settings (see e.g., Spangler et al., 2002).

Assessing Test Anxiety

Due to anxiety's long-standing renown among educational researchers, the development of instruments assessing this emotion has made significant progress over the past seven decades (Pekrun, Goetz, Perry, Kramer, & Hochstadt, 2004; Zeidner, 1998). Self-report instruments are the most frequently used method, including interviews, think-aloud protocols, single-item rating scales, and questionnaire scales asking students to report about their anxiety experienced prior to, during, or after exams. Among these instruments, multi-item questionnaire scales are highly popular because they are easy to administer, show good psychometric qualities (Hodapp & Benson, 1997; Zeidner, 1998), and are temporally adaptable by making it possible to assess both momentary emotional reactions to exams (*state* test anxiety) and habitual emotional reactions to exams (*trait* test anxiety).

The first questionnaire that assessed students' test anxiety was developed by C. H. Brown at the University of Chicago in the 1930s (Brown, 1938), but this instrument did not gain widespread acceptance. In contrast, G. Mandler's and S. B. Sarason's Test Anxiety Questionnaire (TAQ; Mandler & Sarason, 1952) became the progenitor of many of the questionnaires that were developed over the past five decades. The TAQ was a uni-dimensional instrument, suggesting that test anxiety is a homogenous, one-dimensional phenomenon. Progress as to dimensionality was made when Liebert and Morris (1967) proposed to distinguish affective and physiological components of test anxiety (referred to as "emotionality") from cognitive components (referred to as "worry"). Since 1967, test anxiety measurement has further refined the worry-emotionality distinction. Today, there are dozens of scales assessing this single emotion and its components (cf. Hodapp & Benson, 1997; Zeidner, 1998). Examples of current instruments that can be used with

university students are the *Test Anxiety Inventory* (TAI; Spielberger, 1980), the *Reactions to Test* instrument (Sarason, 1984), the integrative test anxiety scale proposed by Hodapp and Benson (1997), and the test anxiety scale of the *Achievement Emotions Questionnaire* (Pekrun et al., 2004) discussed below.

The sophistication achieved in test anxiety measurement has enabled research on test anxiety to successfully analyze the effects and developmental trajectories of this emotion, and to analyze the outcomes of treatments against its crippling effects. However, there also are problems that remain to be solved. Specifically, there seems to be little agreement between test anxiety researchers as to the precise nature of the multidimensionality of the construct. Whereas all of the major instruments available to date assess affective, physiological, and worry components of test anxiety, there is dispute as to which additional components should be included in the construct (e.g., lack of self-confidence, task-irrelevant thinking, manifest behaviors; Zeidner, 1998). A second major problem is that test anxiety research has disregarded other exam-related emotions, and has therefore disregarded problems of discriminant validity. For instance, it is often the case that items meant to measure cognitive components of test anxiety also pertain to cognitive components of hopelessness and despair (e.g., items like "Before taking a test, I worry about failure"; Sarason, 1984). Typically, these items do not differentiate between worries associated with anxiety (characterized by subjective uncertainty of failure) and worries associated with hopelessness (characterized by subjective certainty of failure; Pekrun et al., 2004). Additionally, many items tapping into the physiological components of test anxiety also assess physiological activation characteristic of other activating emotions, such as anger and shame. It is therefore possible that current test anxiety instruments still measure "more than they denote" (Nicholls, 1976) by assessing a variety of negative emotions, in addition to anxiety. Future research on the assessment of achievement emotions like test anxiety should pay more attention to issues of discriminant validity, in addition to internal structural validity that has been emphasized over the past decades.

Assessing Diverse Achievement Emotions: The Achievement Emotions Questionnaire (AEQ)

As outlined above, college students experience a wide variety of emotions while engaging in key academic contexts (i.e., studying, attending class, taking tests and exams). However, measures of students' emotions other than test anxiety are still largely lacking. Attending to this deficit, we used the findings from our exploratory research mentioned above to construct a multi-dimensional instrument that would be able to measure a variety of major achievement emotions, including test anxiety and other achievement emotions (Achievement Emotions Questionnaire, AEQ; Pekrun et al., 2002b, 2004, 2005).[1]

The AEQ is a self-report instrument that assesses college students' achievement emotions. This instrument measures a number of discrete emotions for each of the

Table 2 Achievement emotions questionnaire (AEQ): scales and reliabilities

	Scales					
	Class-related emotions		Learning-related emotions		Test emotions	
Emotions	α	Items	α	Items	α	Items
Enjoyment	0.89	15	0.90	14	0.90	23
Hope	0.84	9	0.86	9	0.89	16
Pride	0.86	9	0.84	9	0.92	16
Relief	–[a]	–	–	–	0.89	14
Anger	0.85	11	0.89	14	0.89	17
Anxiety	0.89	13	0.92	18	0.94	31
Hopelessness	0.88	10	0.93	13	0.94	21
Shame	0.91	15	0.90	14	0.93	19
Boredom	0.93	14	0.93	17	–[b]	–

[a] Relief scale for test emotions only.
[b] Boredom scales for learning-related and class-related emotions only.

three main categories of academic situations: attending class, studying, and taking exams (Table 2). Because these situations differ in terms of functions and social structures, the emotions pertaining to these situations can also differ. For example, enjoyment of classroom instruction should be differentiated from the enjoyment experienced during a challenging exam—some students may be excited when going to class, others when writing exams. Therefore, the AEQ provides separate scales for class-related, learning-related, and test-related emotions.

By varying the instructions accordingly, the AEQ is able to assess students' general emotional reactions in academic situations (*trait* achievement emotions), emotional reactions in a specific course or domain (*course/domain-specific* achievement emotions), or emotions at a specific time-point (*state* achievement emotions). In its current version, the AEQ can be used to assess eight different class-related emotions, eight learning-related emotions, and eight test emotions (see Table 2). Specific emotions were selected based upon reported frequency and theoretical relevance (Pekrun et al., 2002b).

The class-related emotion scales include 80 items and instruct students to report how they feel before, during, or after class with regard to class-related enjoyment (e.g., "I enjoy being in class"), hope (e.g., "I am full of hope"), pride (e.g., "I am proud of myself"), anger (e.g., "I feel anger welling up in me"), anxiety (e.g., "I feel nervous in class"), shame (e.g., "I feel ashamed"), hopelessness (e.g., "I feel hopeless"), and boredom (e.g., "I get bored"). The learning-related emotion scales include 75 items and instruct students to report how they feel before, during, or after studying with regard to the same eight emotions as above. Finally, the test-related emotion scales include 77 items and instruct students to indicate how they feel before, during, or after taking tests and exams with regard to test-related enjoyment, hope, pride, relief, anger, anxiety, shame, and hopelessness.[2] Within each section (class-related, learning-related, test-related), the items are ordered in three

blocks assessing emotional experiences before, during, and after an encounter with the specified academic context. Sequencing items this way is in line with principles of situation-reaction inventories (Endler & Okada, 1975) and is intended to help respondents access their emotional memories.

The construct definitions underlying the AEQ use the same definition of "emotion" as cited above. As such, the items in each of the scales pertain to the affective, cognitive, physiological/expressive, and motivational components of each measured emotion. This is consistent with leading-edge test anxiety measures, but extends test anxiety assessment in two important ways. Although most current test anxiety instruments assess affective, physiological, and cognitive components of anxiety, they neglect the motivational component. Items pertaining to this component were originally part of Mandlers' and Sarason's (1952) Test Anxiety Questionnaire, but later motivational components were omitted. Second, effort was made to construct items that ensure discriminant content validity of scales measuring different discrete emotions; this includes differentiating between test anxiety and closely neighboring emotions like test-related shame and hopelessness.

The reliabilities of the AEQ scales range from adequate to very good (Alpha =0.84–0.94; Table 2). The structural validity of the AEQ scales has been tested by confirmatory factor analysis (e.g., Pekrun et al., 2004). As to external validity, the AEQ has been shown to predict students' academic achievement, course enrollment, and dropout rates. Also, achievement emotions as assessed by the AEQ relate to components of students' learning processes such as study interest, achievement goals, intrinsic and extrinsic motivation to learn, cognitive and metacognitive strategies of learning, investment of study effort, and the self-regulation of academic learning (Goetz, 2004; Goetz, Pekrun, Hall, & Haag, 2006; Kleine, Goetz, Pekrun, & Hall, 2005; Molfenter, 1999; Pekrun, Elliot, & Maier, 2006; Pekrun, Elliot, Maier, 2009; Pekrun et al., 2002a, 2002b; Pekrun et al., 2004; Perry, Hladkyi, Pekrun, & Pelletier, 2001; Perry, Hladkyj, Pekrun, Clifton, & Chipperfield, 2005; Spangler et al., 2002; Titz, 2001). Further, gender, social feedback, teachers' instructional behavior, and the composition and social climate of classrooms have also proven important correlates of the achievement emotions assessed by the AEQ (e.g., Frenzel, Pekrun, & Goetz, 2007a,b; Pekrun, 2000; Pekrun, Frenzel, Goetz, & Perry, 2006).

In sum, college students' emotions can be assessed by means of diverse measures including self-report, behavioral observation, neuroimaging, and physiological analysis. Standardized self-report scales are the most widely used instruments to date, and have proven reliable, valid, and cost-effective. Traditionally, these measures solely addressed students' test anxiety; however, instruments such as the AEQ have broadened this spectrum to include a variety of achievement emotions. Future research will benefit from the development of more scales assessing emotions other than test anxiety. Also, research should explore alternative ways of assessing students' emotions, including the measurement of more implicit emotional processes that are less well represented in conscious awareness (an example is the Implicit Positive and Negative Affect Test, IPANAT; Quirin, Kazén, & Kuhl, 2009).

Functional Relevance of Students' Achievement Emotions

Considerable empirical attention has been given to the functional importance of emotions. In experimental research, affective states have been found to influence a wide range of cognitive processes, including attention, memory storage and retrieval, social judgment, decision making, problem solving, and creative thinking (e.g., Ashby et al., 1999; Clore & Huntsinger, 2007, 2009; Isen et al., 1987; Lewis & Haviland-Jones, 2000; Loewenstein & Lerner, 2003). Much of this research, however, has focused on the effects of positive versus negative mood, without drawing distinctions between specific, discrete mood states and emotions (for notable exceptions see e.g., Izard & Ackerman, 2000; Lerner & Keltner, 2000; Zeelenberg, Nelissen, & Pieters, 2007).

Three important, cumulative findings related to cognitive performance deserve mention. First, as addressed by the resource allocation model proposed by Ellis and Ashbrook (1988), emotions (both positive and negative; Pekrun, 1992b, 2006) consume *cognitive resources* by focusing attention on the object of emotion. As a consequence, fewer resources are available for task completion, which can have negative implications for performance (Meinhardt & Pekrun, 2003). For example, while preparing for an exam, a student may fear and worry about failure, which in turn may distract her attention away from the task at hand.

Second, mood can enhance *mood-congruent memory processes* (e.g., Levine & Burgess, 1997). In general, positive mood facilitates the retrieval of positive self- and task-related information and negative mood facilitates the retrieval of negative information. For example, positive mood can foster positive self-appraisals and thus benefit motivation to learn and performance; in contrast, negative mood can foster negative-self appraisals and thus hamper motivation and performance (e.g., Olafson & Ferraro, 2001).

Third, positive and negative mood have been shown to impact *cognitive problem solving*. Specifically, experimental evidence suggests that positive mood promotes flexible, creative, and holistic ways of solving problems, and a reliance on generalized, heuristic knowledge structures (e.g., Fredrickson, 2001; Isen et al., 1987). Conversely, negative mood has been found to promote focused, detail-oriented, and analytical ways of thinking (e.g., Clore & Huntsinger, 2007, 2009). A number of theoretical explanations have been proffered for these findings. For example, in mood-as-information approaches, it is assumed that positive affective states signal that "all is well" (e.g., sufficient goal progress), whereas negative states signal that something is wrong (e.g., insufficient goal progress; e.g., Bless et al., 1996). "All is well" conditions imply safety and the discretion to creatively explore the environment, broaden one's cognitive horizon, and build new actions, as addressed by Fredrickson's (2001) "broaden-and-build" metaphor of positive emotions. In contrast, "all is *not* well" conditions may imply a threat to well-being and agency, thus making it necessary to focus on these problems in analytical, cognitively cautious ways. Furthermore, positive emotions may facilitate flexible thinking via increasing brain dopamine levels (Ashby et al., 1999), and negative moods may promote effort

investment and performance on analytical tasks by inducing a need for "mood repair" (e.g., Schaller & Cialdini, 1990).

While experimental research has exposed some of the basic mechanisms of human mood and emotions, it is open to question whether the findings of this research are generalizable to settings outside of the laboratory, and to the more intense emotions experienced in these settings. It may be that different mechanisms operate under natural conditions, or that these mechanisms interact in different ways. For example, traditional experimental mood research suggests that positive emotions can be detrimental for task motivation and cognitive performance (see Aspinwall, 1998). However, recent empirical evidence, as well as the layperson's everyday experiences, indicate that positive emotions can exert positive effects on performance in academic and work-related settings. Laboratory research is unfortunately confined by methodological and ethical constraints; as such, this research may be useful for generating hypotheses, but it cannot replace a more ecologically valid analysis of college students' real-life emotions.

The following sections examine the available evidence related to the effects of college students' emotions on their academic learning and achievement. To date, this evidence mainly refers to the effects of test anxiety. However, a small proportion of the studies reported here have begun to consider the effects of emotions other than anxiety. Based on the evidence from these studies, a generalized theoretical framework addressing the cognitive and motivational effects of students' achievement emotions is outlined.

Effects of Test Anxiety

The relationships of test anxiety with learning and performance have been analyzed in hundreds of studies (Hembree, 1988; Zeidner, 1998, 2007). Many of these studies focused on test anxiety experienced in college classrooms. Of these, four types of investigations are most prominent. In *group comparison* studies, the cognitive performance of low test-anxious students is compared with the performance of high test-anxious students. In experimental *test anxiety induction* studies, anxiety is induced by increasing the personal value (e.g., ego-threat) of an experimental task (e.g., by delivering social comparison information on performance). In *cross-sectional* field studies, students' test anxiety is correlated with performance scores. Finally, in *longitudinal* field studies, the predictive or cross-lagged relations between test anxiety and academic achievement are analyzed. Whereas group comparison, anxiety induction, and cross-sectional studies are quite frequent, longitudinal field studies on test anxiety remain scarce, and most of these studies pertain to K-12 students (Zeidner, 1998).

In experimental *group comparison* and *anxiety induction* studies, test anxiety has been found to impair performance on complex or difficult tasks that demand cognitive resources, such as difficult intelligence test items. Performance on easy, less complex, and repetitive tasks was found to be either unaffected or even enhanced. Several arguments have been offered to explain this finding. In *interference* and

attentional deficit models of test anxiety (e.g., Wine, 1971), it is assumed that anxiety produces task-irrelevant thinking that interferes with performance on tasks requiring cognitive resources in terms of working memory capacity. These models are in line with assumptions of the resource allocation model cited above (Ellis & Ashbrook, 1988; Meinhardt & Pekrun, 2003). An extension of interference models is Eysenck's *processing efficiency* model, which assumes that anxiety can reduce the efficiency of cognitive processing due to its impact on working memory load (Eysenck, 1997). Finally, an alternative hypothesis proffered by *skills-deficit models* (Zeidner, 1998) suggests that test anxious students suffer first and foremost from a lack of competence, which leads both to an increased likelihood of failure on complex tasks, and to increased anxiety as a function of perceived personal deficits.

We regard these models as complementary rather than mutually exclusive. Empirically, test anxiety has been linked to task-irrelevant thinking, and the available evidence also shows that low-ability students are more prone to experience exam-related anxiety. Furthermore, it seems reasonable to assume that competence, anxiety, and performance are often linked by reciprocal causation over time: Lack of competence can induce anxiety of failure, anxiety can impair the quality of learning and performance, and low quality learning leads to a lack of competence.

In line with experimental findings showing detrimental effects on cognitively demanding tasks, *cross-sectional field studies* have found that self-reported anxiety correlates moderately negatively with college students' academic performance. The results of meta-analyses imply generally that 5–10% of the variance in students' achievement scores is explained by self-reported anxiety (Hembree, 1988; Zeidner, 1998). Importantly, correlations are higher for test anxiety than for students' general anxiety, since measures of general anxiety do not specifically pertain to the academic domain.

However, caution should be exercised when interpreting these correlations in causal ways, for at least two reasons. First, it might be that relations between test anxiety and achievement are primarily caused by effects of academic success and failure on the development of students' anxiety, rather than by effects of anxiety on students' academic performance. The *longitudinal evidence* available to date suggests that test anxiety and students' academic achievement are linked by reciprocal causation across the school years, but this evidence also seems to suggest that achievement effects on anxiety are stronger than effects of anxiety on achievement (Meece, Wigfield, & Eccles, 1990; Pekrun, 1992c; Schnabel, 1998). These longitudinal findings pertain to upper elementary, middle, and high school students, but the basic pattern of results is likely generalizable to college students.

Second, correlations with performance variables have not been uniformly negative across studies. Zero and positive correlations have sometimes been found, pointing to the complexity of anxiety-achievement relationships. Also, between-subject correlations are sample statistics that cannot be generalized to each and every individual student (Schmitz & Skinner, 1993). Detrimental and beneficial effects of anxiety on performance may be balanced differently in different individuals. In general, anxiety likely has deleterious effects in many students, but it may

induce motivation to study harder, and thus facilitate overall performance, in individuals who are more resilient to the devastating aspects of this emotion (Pekrun & Hofmann, 1996). For instance, *defensive pessimists* (Norem & Cantor, 1986) are found to experience anxiety when preparing for performance situations, and in response set low expectations for their performance and extensively think through alternate plans and outcomes. As a function of planning and envisioning possible outcomes, defensive pessimists appear to be able to manage and "harness" their anxiety which is ultimately linked to better performance (Norem & Cantor, 1986).

Furthermore, to get a more complete picture of the effects of test anxiety on college students' academic agency, it would be necessary to also take the motivational effects of anxiety into account. It is noteworthy that so many studies have analyzed the relations between test anxiety and cognitive performance, whereas only few studies have analyzed effects on students' academic motivation. The findings of these studies imply that test anxiety negatively relates to students' interest and intrinsic motivation (e.g., Pekrun et al., 2004). However, they also indicate that test anxiety can positively relate to students' extrinsic motivation. Specifically, test anxiety has been found to relate positively to students' effort investment to avoid failure (failure-avoidance motivation) and performance-avoidance goals (e.g., Pekrun et al., 2006, 2009). In sum, the overall effects of test anxiety on academic motivation appear to be quite variable.

From an educator's perspective, however, any immediate benefits of anxiety are certainly outweighed by its overall negative effects on performance, interest, and intrinsic motivation in the vast majority of students. Despite differences in relative maturity and self-regulatory capacities, the available evidence suggests this should be equally true for college students and K-12 students (Hembree, 1988). Also, beyond effects on academic achievement, test anxiety can have severe consequences for college students' long-term psychological well-being, social adaptation, and physical health (Zeidner, 1998), thus indicating an urgent need to ameliorate students' fear of failing in their academic careers.

Effects of Anger, Shame, Boredom, and Hopelessness

Few studies have addressed college students' negative emotions other than anxiety, despite theoretical accounts that emotions like shame, hopelessness, or boredom can be equally deleterious for academic and personal outcomes (e.g., Metalsky, Halberstadt, & Abramson, 1987). Similar to anxiety, anger and shame are two frequently experienced activating negative emotions (Table 1). Boredom and hopelessness, on the other hand, are two deactivating emotions.

Anger can be induced by many kinds of academic situations, particularly when students' perceive barriers to goal-attainment or well-being. Although college students frequently experience anger related to academic settings (Pekrun, 1992a), this emotion has rarely been studied empirically. The few available studies suggest that overall correlations between self-reported anger and academic performance are zero

to moderately negative in K-12 and college student populations (Boekaerts, 1993; Pekrun et al., 2004; Stratton, 1927; Titz, 2001). Students' anger has been shown to be positively correlated with task-irrelevant thinking (Pekrun et al., 2004) and lack of motivation ("a-motivation"; Assor, Kaplan, Kanat-Maymon, & Roth, 2005), and to be negatively correlated with measures of academic self-efficacy, perceived academic control, interest, and self-regulation of learning (Pekrun et al., 2002b, 2004).

However, as with anxiety, the underlying pattern of functional mechanisms may be complex and imply more than just negative effects. For example, in a study with undergraduate students reported by Lane, Whyte, Terry, and Nevill (2005), depressed mood interacted with anger experienced before an academic exam such that anger was related to *improved* performance in students who did not feel depressed (see also Lane, Terry, Beedle, Curry, & Clark, 2001, for related evidence in school children). Similarly, in a preliminary study examining the differential effects of anger versus anxiety on task-perception, Stephens and Pekrun (2009a) found that college students induced to feel anger were more likely to judge an upcoming math task as a positive challenge, whereas students induced to feel anxiety were more likely to judge the same task as a threat. Likely, anger is detrimental for motivation and performance under many conditions, but can translate into increased task motivation when expectancies for agency and success are favorable.

S*hame* is at the core of negative feelings of self-worth, often implying devastating, pervasive feelings of self-debasement. In traditional achievement motivation theories, shame was regarded as central to the fear of failure motive (Atkinson, 1964; Heckhausen, 1991). Similar to anxiety and anger, students' achievement-related shame (as measured by the AEQ shame scales) tends to show negative overall correlations with academic achievement and overall self-reported effort (Pekrun et al., 2004; Titz, 2001). However, as with anxiety and anger, shame seems to exert variable motivational effects. For instance, in a study by Schwinger and Stiensmeyer-Pelster (2009), college students who experienced shame together with low expectations of success concerning an important upcoming task were more likely to engage in self-handicapping behavior and to demonstrate poor performance. In contrast, Turner and Schallert (2001) showed that students who experienced shame following negative exam feedback increased their motivation when they continued to be committed to future academic goals and believed these goals were attainable (see also Thompson, Altmann, & Davidson, 2004).

Boredom and *hopelessness*, in contrast to anxiety, anger, and shame, reduce both intrinsic and extrinsic motivation, and prove detrimental for any kind of cognitive performance (with rare exceptions of indirect benefits produced by efficient coping with these emotions; Sansone, Weir, Harpster, & Morgan, 1992). Despite findings showing that boredom is frequently experienced by students, this emotion—like the less frequent, but devastating emotion hopelessness—has received very little attention. Early research on emotions suggested that boredom at work is induced by monotonous assembly-line work (e.g., Wyatt, 1930). More recently in educational research, boredom has been discussed with relation to gifted K-12 students, but has

been neglected in research on college students. In our own studies using the AEQ boredom scales, boredom correlated negatively with indicators of motivation and self-regulated learning (Pekrun et al., 2002b in press; Titz, 2001). Similarly, hopelessness has shown uniformly negative correlations with measures of motivation, study behavior, and academic achievement (Pekrun et al., 2004; Titz, 2001).

Effects of Positive Emotions

Traditionally, functional accounts of emotions considered positive emotions maladaptive for performance by inducing unrealistic appraisals, fostering superficial information processing, and reducing motivation to pursue challenging goals (Aspinwall, 1998; Pekrun et al., 2002a). Much of the available experimental, laboratory-based evidence seems to support such a view. For example, positive mood has been shown to (a) lead to illusionary probability estimates for favorable outcomes and an underestimation of the probability of failure; (b) induce relaxation and undermine effortful action by signalling that everything is going well; (c) induce motivation to maintain pleasant mood by avoiding negative thoughts and neglecting cautionary prevention of future adversities; and (d) reduce cognitive resources needed for task purposes (Aspinwall, 1998).

As aptly summarized by Aspinwall (1998), traditional experimental approaches to positive emotions thus imply that "our primary goal is to feel good, and feeling good makes us lazy thinkers who are oblivious to potentially useful negative information and unresponsive to meaningful variations in information and situation" (p. 7). However, recent experimental evidence, in addition to educators' personal experiences, stands in contrast to the view that positive emotions are uniformly detrimental for motivation and cognitive performance. Specifically, as noted above, experimental research has shown that positive mood can enhance divergent thinking and flexible problem solving, and can thus facilitate many kinds of cognitive performance (e.g., Isen et al., 1987). Also, experimental evidence suggests that positive mood can enhance elaborate information processing when the goal is to solve a problem (as is typical for academic situations), rather than just to maintain present positive mood (Aspinwall, 1998).

Empirical evidence on the effects of students' positive emotions in higher education is scarce, but supports the view that positive emotions can enhance academic learning and performance. Specifically, enjoyment of learning is positively correlated with K-12 and college students' academic performance (Pekrun et al., 2002a, 2002b). Furthermore, in research with the enjoyment, hope, and pride scales from the AEQ, we found that all three of these positive emotions correlated positively with study interest, study effort, elaboration of learning material, and self-regulation of learning. These findings highlight that positive emotions can be beneficial for college students' academic agency. However, as with correlational evidence on negative emotions cited above, caution should be exercised when interpreting these correlations in causal ways.

Towards a General Theoretical Model of the Cognitive and Motivational Effects of College Students' Emotions

Thus far, it would appear that the available evidence on the functions of emotions and moods in academic contexts is somewhat disjointed. How can we make sense of these available findings? Clearly, it would seem insufficient to simply distinguish between positive versus negative affect, or to assume uniformly positive or negative effects for specific emotions. Rather, more differentiated conceptions of emotions and their functional mechanisms are needed (for more detailed discussions see Pekrun, 1992b, 2006; Pekrun et al., 2002a, 2002b).

Regarding concepts of emotions, it may be useful to group emotions in terms of both the valence and the activation dimensions mentioned in the first section. This makes it possible to distinguish four groups of emotions, including *positive activating emotions* such as enjoyment, hope and pride; *positive deactivating emotions* such as relief and relaxation; *negative activating emotions* like anger, anxiety, and shame; and *negative deactivating emotions* like boredom and hopelessness (Pekrun, 2006; Table 1). As to functional mechanisms mediating effects of these emotions on students' academic performance, processes that likely are important include (a) emotion-induced consumption or preservation of *cognitive resources*; (b) intrinsic and extrinsic *motivation* to learn and perform; (c) the use of cognitive *learning strategies*; and (d) self-directed versus external *regulation of learning*, including the use of meta-cognitive, meta-emotional, and meta-motivational strategies. Emotions within the four categories described above can be assumed to affect these mechanisms and academic achievement in the following ways.

(1) Cognitive resources. The experimental evidence cited earlier seems to imply that any emotion consumes cognitive resources by distracting attention away from the task at hand. However, in interpreting this evidence, the ecological validity of the experimental procedures of mood research has to be considered. In these settings, mood induction procedures have been used that focus participants' attention on emotion-arousing stimuli (pictures, life events etc.), implying that less attention was available for a subsequent task. This situation is similar to academic situations in which a student experiences emotions focused on objects or events that are separate from the learning task at hand, like anxious worries about an upcoming exam. However, if the emotion is focused on the learning task itself, the situation may be quite different. In this type of emotion arousal, rather than being distracted away from the task, attention can be directed towards on-task efforts. A prototypical example for such an emotion is enjoyment of learning activities. Enjoyment of ongoing activities can induce flow experiences which imply focused attention on the activity, and such immersion in the task that even the perception of time and borders between the self and environment diminish in subjective consciousness (Csikszentmihalyi & Csikszentmihalyi, 1988).

Based on these considerations, it can be assumed that emotions reduce the availability of cognitive resources available for task purposes, with the exception of those

positive emotions that focus attention on the task at hand.[3] We refer to these emotions as *task-intrinsic* emotions, since they relate to inherent properties of the task material or to interaction with the material (Pekrun et al., 2002b). In contrast, we regard emotions focused on aspects of the setting, other persons, the self, the future, etc., as *task-extrinsic* emotions which should distract attention away from learning and task completion.

(2) Motivation, interest, effort, and goal adoption. Generally, emotions are adaptive in that they can instigate, modulate, or reduce emotion-specific motivational impulses underlying adaptive behavior. This also is true for achievement emotions which can induce motivation and motivation-based effort by shaping students' goals and intentions (Daniels et al., 2009; Linnenbrink, 2007; Linnenbrink & Pintrich, 2002; Stephens & Pekrun, 2009b). This process can be facilitated by mood-congruent recall of motivationally relevant information, such as positive self- and task-related information in a positive mood, threat-related information in an anxious mood, and aggression-related information in an angry mood (Levine & Burgess, 1997). From this perspective, positive activating emotions like enjoyment of learning can enhance academic motivation and effort, whereas negative deactivating emotions like hopelessness and boredom should be detrimental. Furthermore, enjoyment of learning can contribute positively to the development of students' interest in learning material (Krapp, 2005). Boredom and hopelessness, on the other hand, can undermine interest development since they are incompatible with enjoyment.

The motivational effects of positive deactivating emotions and negative activating emotions, however, are likely more complex. As argued by Pekrun et al. (2002a, 2002b), positive deactivating emotions such as relief and relaxation may reduce situational motivation, but they may also serve to reinforce long-term investment of effort. Similarly, anger, anxiety, and shame can be assumed to exert ambiguous effects. The evidence cited above is clearly in line with this view. Specifically, whereas these negative activating emotions can reduce intrinsic motivation and interest because they tend to be incompatible with enjoyment, they can produce strong extrinsic motivation to cope with the aversive events that caused them. For example, anger can produce motivation to overcome obstacles, and anxiety, as well as shame, can strengthen motivation to avoid failure. The overall effects on total motivation and effort may depend on the situation-dependent, person-specific balance of these different mechanisms (Pekrun & Hofmann, 1996).

In addition to experienced emotions, *anticipated emotions* can also influence students' motivation and goal adoption. Anticipated emotions serve as indicators of the value of success and failure (anticipated positive emotions in the case of success and anticipated negative emotions in the case of failure). Because subjective values provide a general interpretive frame and behavioral guide for future choices (e.g., Feather, 1988), anticipated emotions about achievement outcomes should guide students' achievement goal adoption (cf. Bagozzi, Baumgartner, & Pieters, 1998). As preliminary evidence for the functions of anticipated emotions in students' goal setting, Stephens and Pekrun (2009b) used one cross-sectional and one prospective study to examine the value of college students' anticipated

achievement emotions for explaining the adoption of goals in the 2 × 2 achievement goal framework (mastery-approach, mastery-avoidance, performance-approach, performance-avoidance goals; Elliot & McGregor, 2001).

In the cross-sectional study, college students were first asked to identify their currently most important class and to imagine succeeding or failing in this class with regard to mastery-related outcomes (defined by individual or absolute standards of competence), or with regard to performance-related outcomes (defined by normative standards of competence; cf. Elliot & McGregor, 2001). For mastery and performance success outcomes, students were asked to imagine how strongly they would feel positive emotions (mastery success emotions, performance success emotions). For mastery and performance failure outcomes, students were asked to imagine how strongly they would feel negative emotions (mastery failure emotions, performance failure emotions). Furthermore, they reported about their current achievement goals in the course (Elliot & Murayama, 2008). In regression analyses, anticipated mastery failure emotions emerged as strong predictors of mastery-approach and mastery-avoidance goals, whereas anticipated performance failure emotions emerged as strong predictors of performance-approach and performance-avoidance goals.

In the prospective study, anticipated emotions were assessed before the beginning of the semester and achievement goals were assessed 6–8 weeks into the semester. Again, anticipated mastery failure emotions emerged as strong predictors of mastery-approach and mastery-avoidance goals. In addition, anticipated performance success emotions were predictors of performance-approach and performance-avoidance goals. The results of the two studies demonstrate that anticipated emotional reactions to achievement outcomes may serve as guides for achievement goal adoption, thus adding to explaining the functional relevance of emotions for college students' motivation.

(3) Cognitive learning strategies. The experimental evidence on mood and problem solving cited earlier suggests that positive emotions enhance the use of creative, flexible ways of learning, like elaboration and organization of learning material or critical thinking. Negative emotions, on the other hand, should sustain more rigid, detail-oriented learning, like simple rehearsal of learning material. The correlational evidence from our own research (Pekrun et al., 2002b, 2004) supports this view. However, for deactivating positive and negative emotions, these effects may be less pronounced. Deactivating emotions, like relaxation or boredom, may produce shallow information processing rather than any more intensive use of learning strategies.

(4) Meta-strategies and self-regulation of learning. Self-regulation of learning includes the use of meta-cognitive, meta-motivational, and meta-emotional strategies (Wolters, 2003) making it possible to adopt goals, monitor and regulate learning activities, and evaluate their results in flexible ways, such that learning activities can be adapted to the demands of academic tasks. An application of these strategies presupposes cognitive flexibility. Therefore, it can be assumed that positive emotions foster self-regulation and the implied use of meta-strategies. Negative emotions, on

the other hand, can motivate the individual to rely on external guidance. The correlational evidence provided by Pekrun and colleagues (Pekrun et al., 2002b; 2004) is in line with these propositions (positive correlations for academic enjoyment and hope with college students' perceived self-regulation of learning, and for anxiety with external, instructor-provided regulation of learning). However, the reverse causal direction may also play a role in producing such correlations—self-regulated learning may instigate enjoyment, and external directions for learning may trigger anxiety.

(5) Academic achievement. Since many different mechanisms can contribute to the functional effects of emotions, the overall effects of students' emotions on their academic achievement are inevitably complex, and may depend on the interplay between different mechanisms, as well as between these mechanisms and task demands. Nevertheless, it seems possible to derive hypotheses on net effects from the above considerations.

Specifically, due to their positive effects on interest, motivation, use of flexible learning strategies, and self-regulation, *positive activating* emotions likely are beneficial to college students' overall academic agency (e.g., Daniels et al., 2009). Specifically, this may be true for task-intrinsic emotions, such as excitement and enjoyment of learning, which focus attention on academic tasks and thereby induce states of flow. In contrast, the attention-distracting and motivation-reducing effects of *negative deactivating* emotions, such as boredom and hopelessness, likely imply that these emotions are simply detrimental. The correlational evidence cited above is in line with these assumptions (Pekrun et al., in press).

In contrast, for *positive deactivating* and *negative activating* emotions, the effects may be diverse and may depend in part on task demands and individual propensities. We expect that emotions of these two groups distract attention, reduce momentary interest and intrinsic motivation, and do not foster flexible, self-regulated learning. On the other hand, there may also be positive motivational effects, including long-term beneficial effects in positive deactivating emotions, and positive effects on extrinsic motivation in negative activating emotions. Also, negative activating emotions may facilitate the use of rigid learning strategies and a reliance on external regulation, which may be beneficial for achievement under conditions of teacher-centered instruction and exams that focus on rote memory performance. For positive deactivating emotions, there is no substantial evidence to validate assumptions and draw any firm conclusions. For the negative activating emotions of anger, anxiety, and shame, the evidence outlined above is in line with these hypotheses. However, this evidence also indicates that, on an average, the deleterious effects of negative activating emotions on academic achievement outweigh any potential benefits.

In sum, theoretical assumptions, the evidence produced by experimental studies, and findings from field studies imply that emotions typically have profound effects on college students' academic learning, motivation, and achievement. As such, administrators and instructors should pay attention to students' emotions. Most likely, the effects of students' enjoyment of learning are beneficial, and the impact of hopelessness and boredom detrimental. The effects of emotions like anger,

anxiety, or shame are more complex, but for the average college student, these emotions have negative overall effects as well.

Origins of Students' Achievement Emotions

Given the relevance of emotions for student learning and achievement, research examining their antecedents is necessary, such that evidence-based recommendations to foster these emotions can be derived. Generally, emotions can be caused and modulated by numerous factors including cognitive appraisals, situational perceptions, emotion schemata, neurohormonal processes, and sensory feedback from facial, gestural and postural expression (Davidson, Scherer, & Goldsmith, 2003; Lewis & Haviland-Jones, 2000; Mauss, Bunge, & Gross, 2007; Scherer, Schorr, & Johnstone, 2001). Among these factors, cognitive appraisals likely play a major role in the emotions experienced by college students. In contrast to emotions aroused in phylogenetically older and more constrained situations, such as enjoyment of physiological need fulfillment or interactions between caregiver and child, emotions in academic situations pertain to culturally defined demands in settings that are a recent product of civilization. In settings of this kind, the individual has to learn how to adapt to situational demands while preserving individual autonomy—a process inevitably guided by appraisals.

This may be especially true in college and university settings, since the transition from high school to college often implies breaking habits developed during childhood and adolescence. Typically, this transition entails challenges to adapt to new academic demands; to leave one's home, move to a new city, and live on one's own; and to create new friendships and social networks. All of these changes make it necessary to appraise new situations and to re-appraise one's personal strengths and weaknesses, and these appraisals certainly play a major role in the emotions college students experience.

In line with such considerations, most theories on the determinants of students' emotions focus on the emotional relevance of self-related and task-related appraisals, and on the importance of situational factors that shape students' emotions by influencing their appraisals. This section discusses theoretical approaches and empirical evidence pertaining to the individual, instructional, and social determinants of students' emotions. Based on this discussion, we outline basic propositions of the control-value theory of achievement emotions (Pekrun, 2000, 2006; Pekrun et al., 2002b) which integrates core assumptions of previous theories and makes an attempt to explain a broader variety of achievement emotions, including the emotions experienced by students at college and university.

Individual Antecedents

Research on the individual determinants of students' emotions has focused on the antecedents of test anxiety, on the causal attributional antecedents of emotions

following success and failure, and on the role of achievement goals for students' positive versus negative affect. Studies beyond these three specific research agendas are rare, with a few exceptions pertaining to the antecedents of activity-related academic emotions like enjoyment of learning and boredom (Pekrun et al., 2002a).

Test anxiety. Test anxiety is a prospective emotion related to threat of failure on an upcoming or ongoing evaluation (i.e., test or exam). Therefore, many authors have regarded threat-related appraisals as the main proximal determinants of test anxiety. More specifically, from the perspective of R. S. Lazarus' transactional stress model (Lazarus & Folkman, 1984, 1987), test anxiety is based on two kinds of appraisals. The *primary appraisal* pertains to the likelihood and subjective importance of failure. In the *secondary appraisal*, possibilities to cope with the situation are explored cognitively. Depending on the combined result of the two appraisals, different emotions can be aroused. In the case of threat and insufficient perceived control over threatening failure, anxiety is assumed to be instigated.

Lazarus' analysis implies that achievement-related anxiety is aroused when two conditions are met. First, there has to be an anticipation of possible failure on a subjectively important evaluative task. Second, the individual has to doubt whether potential failure can be avoided. In an expectancy-value model of test anxiety, and of anxiety more generally, Pekrun (1984, 1992c) has made an attempt to reconceptualize these two assumptions in more precise, mathematically formalized ways. In this model, it is assumed that test anxiety is a function of (a) the expectancy of failure (specifically, the subjective likelihood of failure), and (b) the subjective value of failure. Both components are posited to be necessary for test anxiety to be instigated (if one is sure that failure cannot happen or if one is indifferent to failure, anxiety should not be experienced). The expectancy of failure is postulated to depend on situation-outcome expectancies (Bolles, 1972; Heckhausen, 1991) that failure will result from the situation if no counteraction is undertaken, and on action-related expectancies that suitable actions, such as sustained effort in preparing for an exam, can be performed and will prevent failure. Anxiety is proposed to be a curvilinear function of expectancy, and is expected to be replaced by hopelessness if failure is subjectively certain. The subjective value of failure is seen to be a function of both the intrinsic importance of achievement, and of its extrinsic, instrumental relevance in terms of producing further outcomes. For example, failing an exam may be threatening for a student because failure is inherently negative for him or her, because positive outcomes such as future career prospects are compromised, and/or because negative consequences like punishment can result (for formalized versions of these assumptions, see Pekrun, 1984; for a conceptual discussion, Pekrun, 1992c).

Typically, situational appraisals of these kinds are based on objective characteristics of the setting, such as the relative difficulty of exam material, but they are also influenced by individual expectancy- and value-related beliefs. These beliefs can take "irrational" forms (Ellis, 1962), for example when failure is appraised as likely despite high individual ability, or when failure on subjectively unimportant outcomes is perceived as undermining self-worth. Irrational beliefs can make students highly vulnerable to anxiety and related negative achievement emotions,

like shame and hopelessness ("I am not allowed to fail. If I fail, I am a worthless person").

The available empirical evidence is in line with these propositions. Specifically, test anxiety has been found to correlate positively with students' expectancies of failure, and negatively with their self-concepts of ability, academic self-efficacy expectations, and academic control beliefs (Hembree, 1988; Pekrun et al., 2004; Zeidner, 1998). Also, in research on the relationship between achievement goals and test anxiety, students' performance-avoidance goals (implying high subjective relevance of failure) are consistently positively related to their test anxiety scores (see Linnenbrink & Pintrich, 2002; Pekrun et al., 2006, 2009).

Attributional determinants of achievement emotions. Extending the perspective beyond test anxiety, B. Weiner (1985) proposed an attributional approach to the appraisal antecedents of achievement emotions following success and failure. In Weiner's theory, causal attributions of success and failure in achievement settings are considered primary determinants of many of these emotions. More specifically, it is assumed that achievement outcomes are first subjectively evaluated as success or failure. This outcome appraisal immediately leads to "primitive", cognitively less elaborated, "attribution-independent" emotions, namely, happiness following success, and frustration and sadness following failure (Weiner, 1985, p. 560). Following the outcome appraisal and immediate emotional reaction, causal ascriptions are sought that lead to differentiated, attribution-dependent emotions.

Three dimensions of causal attributions are assumed to play key roles in determining attribution-dependent emotions: (a) the perceived *locus* of causality differentiating internal versus external causes of achievement (e.g., ability and effort vs. environmental circumstances or chance), (b) the perceived *controllability* of causes (e.g., subjectively controllable effort vs. uncontrollable ability), and (c) the perceived *stability* of causes (e.g., stable ability vs. unstable chance). Weiner posits that *pride* should be experienced when success is attributed to internal causes (e.g., effort or ability); that *shame* should be experienced when failure is attributed to uncontrollable, internal causes (e.g., lack of ability); and that *gratitude* and *anger* should be experienced when success or failure, respectively, are attributed to external, other-controlled causes.

Consistent with the retrospective perspective of causal attributions for success and failure, Weiner's theory focuses primarily on retrospective emotions following success and failure; however, some predictions for prospective, future-related emotions also exist. Specifically, hopefulness and hopelessness are expected to be experienced when past success and failure, respectively, are attributed to stable causes (e.g., stable ability). Furthermore, Weiner (2007) recently extended his theory by also speculating about the causal attributional antecedents of "moral" emotions like envy, scorn, sympathy, admiration, regret, and "Schadenfreude".

Much of the evidence on the validity of these assumptions comes from scenario studies in which students were asked how they, or others, might react to success and failure. In such studies, participants' subjective theories about links between achievement outcomes, attributions, and emotions following achievement

were tested. Findings support the congruence between attributional theory and students' subjective theories. However, there also are experimental and field studies with samples of college students corroborating the validity of many of Weiner's assumptions (Heckhausen, 1991).

Additionally, other approaches to the affective relevance of causal attributions have also provided evidence that attributions can play a role in students' emotional reactions. Specifically, studies on the *reformulated helplessness and hopelessness theories* of depression have found that emotions experienced at college can be explained, in part, by students' attributional styles (e.g., Metalsky et al., 1987). In this research tradition, the perceived *globality* of causes, defined as their degree of generalization across situations, is held to be an additional important dimension of causal attributions.

Achievement goals as determinants of positive versus negative affect. A handful of studies have analyzed relations between students' achievement goals and their positive versus negative affect experienced at college and university (see Daniels et al., 2008; Daniels et al., 2009; Linnenbrink & Pintrich, 2002; Pekrun et al., 2006, 2009). Most of these studies have used a dichotomous model of achievement goals, which differentiates between mastery goals (focus on competence defined by individual or absolute standards) and performance goals (focus on competence defined by normative standards; e.g., Elliott & Dweck, 1988). Findings from studies using dichotomous conceptions of goals and affect (i.e., positive vs. negative affect) have been inconsistent, except for the positive relation between mastery goals and positive affect (e.g., Linnenbrink & Pintrich, 2002).

As argued by Pekrun et al. (2006, 2009), this lack of consistency may have been due to insufficient differentiation between types of goals and types of emotions. Specifically, as to goals, approach goals and avoidance goals may have quite different effects on students' emotions. In the studies reported by Pekrun et al. (2006), U.S. and German undergraduate students' achievement goals were assessed early in the semester, and their course-related achievement emotions later in the semester. Mastery-approach goals were positive predictors of course-related enjoyment of learning, hope, and pride, and negative predictors of boredom and anger. Performance-approach goals were positive predictors of pride, whereas performance-avoidance goals were positive predictors of anxiety, hopelessness, and shame (see also Daniels et al., 2008, 2009; Pekrun et al., 2009). These findings underscore how value-related cognitions, like achievement goals, can be important for subsequent emotional experiences.

Determinants of activity-related emotions (enjoyment and boredom). Activity-related emotions have been neglected by cognitive approaches to the determinants of students' emotions. The limited evidence on these emotions seems to imply that positive self-evaluations of competence, as well as task-related goals and interest in academic tasks, are positively related to enjoyment of learning (Daniels et al., 2008; Pekrun et al., 2002a, 2006, 2009). Studies by Vodanovich, Weddle, and Piotrowoski (1997) and Watt and Vodanovich (1999) imply that boredom is related to students' external work values and reduced educational involvement.

In sum, theories and the corresponding empirical evidence on achievement emotions imply that failure expectancies and perceived lack of competence are primary determinants of college students' test anxiety, and that causal attributions of achievement are important antecedents of emotions following success and failure. Moreover, there is evidence that students' achievement goals can be important determinants of their emotions. Beyond these three specific bodies of research, however, the evidence on individual determinants of college students' emotions is too scarce to allow generalizable conclusions.

Classroom Instruction and Social Environments

Within programs of empirical research on psychological phenomena, research questions are often addressed sequentially. As a first step, the relevance of the phenomenon has to be shown such that the scientific community can be convinced that related research should be acknowledged and funded. Typically, the next step involves refining concepts and assessment, and an analysis of internal structures and individual determinants. Contextual antecedents, however, are often addressed last in psychologically oriented research. It seems that research on students' emotions is no exception to this rule. The classroom and social antecedents of college students' emotions have been neglected even more than other aspects of their affective life. Again, research on students' test anxiety is an exception. A number of consistent findings on the relevance of task demands and social environments for students' anxiety emerged from this research. The following summary is based on the overview given by Zeidner (1998), who also provides a detailed list of references to relevant studies.

Instruction and learning environments. Lack of structure and clarity have been found to relate positively to students' test anxiety. Also, excessively high task demands can contribute to achievement-related anxiety. The effects of these factors are likely mediated by students' perceived lack of control and expectancies of failure (Pekrun, 1992c).

Exam format. With exams as well, lack of structure and transparency have been shown to contribute to students' anxiety. The findings suggest that important factors include clarity concerning demands, materials and procedures of exams, and concerning grading standards. Furthermore, open-ended test items are found to induce more anxiety than multiple-choice items. Because open-ended formats require more working memory capacity, the worry and task-irrelevant thinking associated with anxiety can consume cognitive resources needed for the task at hand, thus inducing more threat and debilitating performance in anxious students. The use of multiple-choice formats can reduce these effects. Also, providing external aids, such as books and computers, can reduce working memory load and the threat of failure. Finally, giving students the choice between items, relaxing time constraints, and giving second chances in terms of retaking a test–factors which likely increase perceived control and alleviate expectations of failure–can reduce test anxiety.

Expectancies, feedback, consequences of achievement, and competition in the classroom. High achievement expectancies from important others, negative evaluation feedback, and negative consequences of failure correlate positively with students' test anxiety (Hembree, 1988). Additionally, interpersonal competition within the classroom is positively related to test anxiety—likely because competition reduces expectancies for success and increases the importance of avoiding failure (Zeidner, 1998). In contrast, in K-12 research, social support from parents and teachers and a cooperative classroom climate have been found to be uncorrelated with students' test anxiety scores (Hembree, 1988). Two explanations may account for these findings. First, coercive components of supportive behavior may counteract the beneficial effects of support (Helmke, 1983). Second, support and anxiety may be linked by negative feedback loops: Social support can alleviate anxiety (negative effect of support on anxiety), but anxiety can engender support (positive effect of support on anxiety), thus yielding an overall correlation of zero.

The Control-Value Theory of Achievement Emotions: An Integrative Approach to the Determinants of College Students' Emotions

The assumptions of different approaches to the determinants and effects of students' emotions seem to be largely complementary—not contradictory or mutually exclusive. It should thus be possible to create more integrative frameworks to better interpret extant empirical findings, derive new hypotheses, and develop practical recommendations. To this end, the control-value theory of achievement emotions aims to integrate and expand assumptions from R. S. Lazarus' transactional stress model (Lazarus & Folkman, 1984, 1987), expectancy-value models (Pekrun, 1992c; Turner & Schallert, 2001), as well as attributional (Weiner, 1985) approaches to achievement emotions (Pekrun, 2000, 2006; Pekrun et al., 2002b; Pekrun, Frenzel, Goetz, & Perry, 2007). The theory explains a variety of achievement emotions, including both outcome emotions and activity emotions, and pertains to both individual and social determinants of these emotions. In its most recent version, the theory also addresses the effects of achievement goals on students' emotions (Pekrun et al., 2006, 2009).

Control and value determinants of achievement emotions. Students' control- and value-related appraisals are posited to be the most important proximal determinants of their achievement emotions (Fig. 1). *Control appraisals* pertain to the perceived controllability of achievement-related actions and outcomes, as implied by causal expectations (e.g., self-efficacy expectations and outcome expectancies; Bandura, 1997), causal attributions of achievement, and competence appraisals (e.g., academic self-concepts of ability). *Value appraisals* relate to the positive or negative subjective importance of achievement activities and their outcomes. These appraisals imply judgments about the direction (positive vs. negative) and strength (perceived importance) of values.

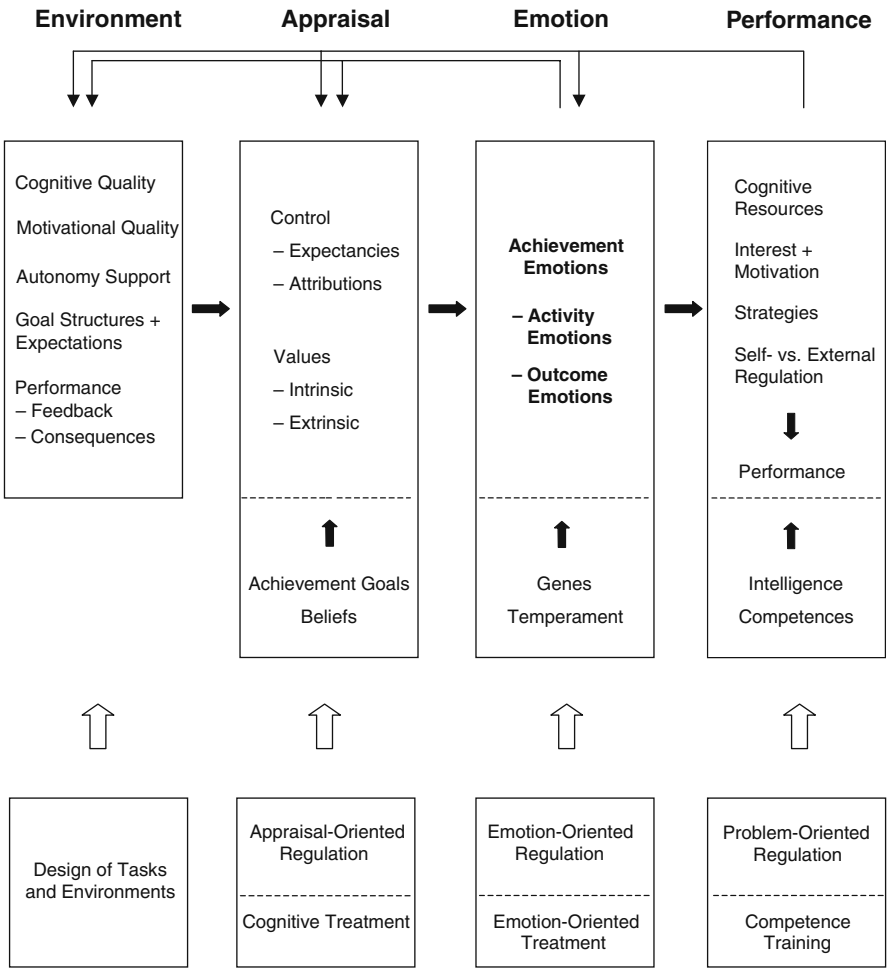

Fig. 1 Basic propositions of the control-value theory of achievement emotions (adapted from Pekrun et al., 2007)

Different kinds and combinations of control and value appraisals are assumed to instigate different kinds of emotions, including prospective outcome emotions, retrospective outcome emotions, and activity emotions (Table 1). According to the control-value theory, *anticipatory joy* and *hopelessness* should be experienced when a student perceives high control or no control, respectively, with regard to upcoming success or failure. Further, *hope* and *anxiety* should be experienced when there is uncertainty about control over achievement outcomes; in the case of hope, attention is focused on the possibility of future success, in the case of anxiety, attention is focused on the possibility of future failure. A student who is unsure about his ability to succeed on an upcoming exam may therefore hope for success, fear failure, or both.

Regarding retrospective outcome emotions, in line with Weiner's (1985) theorizing, the control-value theory postulates that *joy* and *sadness* should be experienced directly following success and failure, respectively, further cognitive mediation by control cognitions not being necessary (control-independent emotions). In contrast, *disappointment* and *relief* are posited to depend on the perceived match between one's expectations and the actual outcome. Hence a student should experience disappointment when an anticipated success does not occur, and relief when an anticipated failure does not occur. Finally, *pride* and *shame* should be experienced when a student attributes success or failure, respectively, to herself, whereas *gratitude* and *anger* should be experienced when a student attributes success and failure to another person.

The control-value theory of achievement emotions (Pekrun, 2006; Pekrun et al., 2007) diverges from Weiner's (1985) attributional theory of outcome emotions with respect to the object focus of controllability for the initiation of these emotions. Specifically, according to the control-value theory, the perceived controllability of success and failure—not the controllability of the *causes* of success and failure, such as ability and effort—is posited to elicit various emotions. Success and failure may be controllable via the use of causal factors that are themselves uncontrollable, such as ability.

Furthermore, the control-value theory proposes that these outcome-related emotions also depend on the subjective importance of achievement outcomes, implying that they are a joint function of perceived control and value. For instance, a student should feel worried if she judges herself incapable of performing well (low control) on an important exam (high value). In contrast, if she feels that she is able to perform well (high control), or is indifferent about the exam (low value), her anxiety should be low. In an experimental test of the effects of control and value appraisals on anxiety, Pekrun, Lichtenfeld, and Maier (2009) manipulated students' perceptions of control (high vs. low) and perceived value (high vs. low) of performance. Across three studies, anxiety scores were highest when students perceived low control and high value of performance; other combinations of control and value appraisals did not show these effects. These findings underscore the importance of control and value appraisals for the emergence of students' anxiety, and achievement emotions more generally (for related correlational evidence, see e.g., Hall, Perry, Ruthig, Hladyj, & Chipperfield, 2006; Pekrun et al., 2002a, 2002b; Pekrun et al., 2004; Titz, 2001).

Finally, achievement-related *activity emotions* are also assumed to depend on control and value appraisals. Based on the control-value theory, *enjoyment* of achievement activities (e.g., enjoyment of working on a project) should be experienced when perceptions of control over the task are high, and when the subjective value of the task (completing the project) and its objects (e.g., project-relevant learning material) are high as well. In contrast, in case of feelings of incompetence or disinterest, the activity is not enjoyable. Further, *anger* and *frustration* should be experienced when the subjective value of the activity is negative (e.g., when working on a complex project is experienced as unnecessarily burdensome). Finally,

boredom should be experienced when the activity lacks any intrinsic incentive values (Pekrun et al., 2008, in press).

Implications I. Automatic achievement emotions. The control-value theory does not posit that students' achievement emotions are always mediated by conscious appraisals. Rather, it is assumed that recurring appraisal-based induction of emotions can become automatic and non-reflective over time. When specific emotion-inducing academic experiences are repeatedly encountered, appraisals and the induction of emotions can become routinized such that conscious mediation of emotions is reduced or no longer occurs (Pekrun, 1988; Reisenzein, 2001). In this way, a direct link can exist between a perceived situation and an emotion (e.g., the mere smell of the chemistry building inducing joy).

Implications II. Achievement goals and achievement emotions. In a recent extension of the control-value theory (Pekrun et al., 2006, 2009), students' achievement goals (Elliot & McGregor, 2001) were posited as distal individual antecedents of achievement emotions. Achievement goals are cognitive representations of positive or negative competence-relevant aims that are used to guide behavior in achievement settings (Elliot & Thrash, 2001). These goals can be organized based on two criteria: the definition of competence (*mastery*: intrapersonal or absolute standard vs. *performance*: interpersonal standard) and the motivational direction (*approach*: focus on success vs. *avoidance*: focus on failure). Crossing these dimensions yields the four types of achievement goals composing the 2×2 achievement goal framework (Elliot & McGregor, 2001): mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance goals.

Important for the instigation of achievement emotions, achievement goals are assumed to direct and focus attention during the appraisal process (Pekrun et al., 2006). Mastery-based goals should focus attention on an ongoing activity and its usefulness for competence development. Specifically, mastery-approach goals should focus attention on the controllability and positive value of achievement activities and should thus foster positive activity emotions like enjoyment of learning, and reduce negative activity emotions such as boredom and anger. In contrast, performance-based goals should focus attention on normative outcomes (i.e., performance relative to others). Specifically, performance-approach goals should focus attention on the controllability and positive value of normative success. Therefore, these goals should facilitate prospective hope and retrospective pride (in the case of success). Performance-avoidance goals should focus prospective attention on the uncontrollability and negative value of normative failure. Therefore, these goals should promote the experience of prospective anxiety and hopelessness, and of retrospective shame (in the case of failure).

The available evidence from studies examining the relationships between achievement goals and discrete achievement emotions largely supports these hypotheses. Best documented is the relationship between performance-avoidance goals and anxiety. However, as outlined in the previous section, recent research also shows clear relationships between mastery goals and activity emotions (positive relation to enjoyment, negative relation to boredom) and between performance

goals and pride, shame, and hopelessness (Daniels et al., 2008, 2009; Pekrun et al., 2006, 2009).

Moreover, the close relationships between achievement goals and achievement emotions suggest that emotions may (at least partly) explain the impact of achievement goals on performance. In the prospective study reported by Pekrun et al. (2009), college students' achievement goals (mastery-approach, performance-approach, and performance-avoidance goals) were assessed one week before a midterm exam and their study-related achievement emotions one day before the midterm exam; midterm exam grades were the dependent variable in this study. For performance-approach goals, significant indirect links were observed between these goals and performance through both hope and pride. The goal-performance relation was partially mediated by these emotions. For performance-avoidance goals, significant indirect links were found between these goals and performance through six emotions: hope, pride, anger, anxiety, hopelessness, and shame. The goal-performance relation was fully mediated by the emotions. For mastery goals, significant indirect links were observed between these goals and performance through six emotions: hope, pride, boredom, anger, hopelessness, and shame. Again, the goal-performance relation was fully mediated by the emotions. In sum, these findings suggest that the different foci of achievement goals evoke different emotions during the process of preparing for an upcoming exam, and that these emotions exert a proximal influence on performance outcomes (also see Linnenbrink, Ryan, & Pintrich, 1999, for general negative affect as a mediator of goal effects).

Implications III. Instructional and social antecedents of achievement emotions. The control-value theory proposes that environmental factors shaping students' perceptions of academic control and values also influence their achievement emotions. The following factors are posited to be of particular importance (Fig. 1).

(1) Cognitive quality of learning environments and tasks. Classroom instruction and assignments of high cognitive quality (e.g., clear structure, potential for cognitive stimulation) should positively influence college students' perceived competence and control and the value of academic contents, thus positively influencing achievement emotions. The relative difficulty of instruction and task demands should also influence control and value appraisals. Perceived difficulty should influence perceptions of control, and the match between task demands and students' perceived competencies should influence subjective task value. If demands are too high or too low, task value may be reduced to the extent that boredom is experienced (Czikszentmihali, 1975; Pekrun et al., 2008, in press).

(2) Motivational quality of learning environments and tasks. Professors and peers convey direct (verbal) and indirect (behavioral) messages about academic values (e.g., regarding the importance of mastery vs. performance classroom goals), which should subsequently affect college students' achievement emotions. Two indirect means by which the social environment within the college classroom influence value, and thus achievement emotions, may be most salient. First, instruction, learning environments, and assignments that are shaped to meet students' needs should foster positive activity-related emotions. For example, learning environments that

support cooperative student learning should help students fulfill their need for social relatedness, thus making class more enjoyable (Krapp, 2005; also see Nummenmaa & Nummenmaa, 2008, for positive emotions experienced when actively participating in computer-based collaborative learning). Second, college professors' and instructors' expressed enthusiasm toward academic material can facilitate students' adoption of academic values. Observational learning and emotional contagion may be primary mechanisms that mediate the effects of teachers' enthusiasm on students' values (Hatfield, Cacioppo, & Rapson, 1994; Frenzel, Goetz, Lüdtke, Pekrun, & Sutton, 2009).

(3) Autonomy support. Learning environments constructed to support students' autonomy (e.g., by promoting self-regulated learning) should increase perceptions of control. In addition, such environments should accommodate students' needs for autonomy, and thus increase academic values (Deci & Ryan, 1987). These beneficial effects, however, most likely depend upon the fit between students' perceived competence, individual need for academic autonomy, and the opportunities for autonomy support afforded within these environments. In case of a mismatch, loss of control and negative emotions may result.

(4) Classroom goal structures. Different standards for defining achievement can imply individualistic (mastery), competitive (normative performance), or cooperative goal structures (Johnson & Johnson, 1974). Goal structures can be assumed to influence students' emotions in two ways. First, to the extent that students adopt classroom goal structures (Murayama & Elliot, 2009), they should influence students' achievement goals and any emotions mediated by these goals, as outlined previously. Second, goal structures and grading practices determine the relative opportunities for students to experience success and perceive control, thus influencing control-dependent emotions. Specifically, classrooms with competitive goal structures imply that some students will experience success, and thus positive outcome emotions, whereas others will experience failure, and thus negative outcome emotions. As such, students' average perceived control over achievement within classrooms endorsing competitive goals structures can be low, such that average values of negative prospective outcome emotions like anxiety and hopelessness are increased.

(5) Feedback and consequences of achievement. Cumulative success should strengthen students' perceived control, whereas cumulative failure should undermine perceived control. In environments involving frequent testing, test feedback is likely one primary mechanism determining students' outcome-related achievement emotions. In addition, the perceived consequences of success and failure are important, since they affect the perceived value of achievement outcomes. Positive outcome emotions like hope for success can be increased if success is perceived as both fruitful for long-term outcomes (e.g., future career opportunities) and under individual control (e.g., contingent upon one's own effort investment). Negative outcomes of academic failure (e.g., future unemployment), on the other hand, may increase students' achievement-related anxiety and hopelessness.

Implications IV. Reciprocal causation of antecedents, emotions, and effects. The control-value theory proposes that environmental antecedents, individual antecedents, achievement emotions, learning, and performance are linked by

reciprocal causation (Fig. 1). For example, classroom instruction is assumed to affect the goals and appraisals mediating students' achievement emotions; these emotions, in turn, are assumed to influence learning and achievement. Students' emotions and their emotion-dependent achievement, however, can in return influence individual and environmental determinants. Specifically, emotions can influence goal adoption, control appraisals, and value appraisals, by way of emotion-dependent cognitive processes like mood-congruent recall of task information (see the discussion in the previous section regarding the functional relevance of emotions). Furthermore, students' emotion-dependent academic behaviors and achievement can influence both classroom instruction and the wider social context. For instance, the disruptive, off-task student behavior caused by students' boredom can negatively affect professors' engagement; conversely, engaged students can fuel professors' enthusiasm (cf. Frenzel et al., 2009).

Determinants, emotions, and effects can thus be linked by feedback loops over time. These feedback loops can take different forms. Referring once again to professors' enthusiasm, enthusiasm and students' instruction-related enjoyment can be linked by *positive* feedback loops. Over the semester, professors' enthusiasm should enhance students' enjoyment, which, in turn, should have positive effects on students' course engagement and quality of learning: students' engagement, in turn, should positively impact professors' enthusiasm. Positive feedback loops entailing negative emotions are also possible. For example, achievement pressure in the classroom should increase students' anxiety, which, in turn, should have negative effects on performance: low performance, in turn, may motivate professors to increase achievement pressure in the course. More complex mechanisms may also be at work, including *negative* feedback loops. For example, if a discrepancy between task demands and competence increases a student's anger, but anger fuels effort to raise competences, thus reducing the initial discrepancy, then relative demands, anger, and achievement may be linked by a negative feedback loop over time. Although these reciprocal effects of emotions, their determinants, and their effects have barely been addressed by educational research to date, to attain any complete assessment of classroom reality, these complex dynamics of students' emotions would need to be taken into account (also see Turner & Waugh, 2007).

Implications V. Universality of achievement emotions across genders, settings, and cultures. As for emotions more generally, we assume that general functional mechanisms of achievement emotions are bound to universal, species-specific characteristics of our mind. In contrast, specific reference objects of these emotions, as well as specific values of process parameters (e.g., intensity of emotions), may be specific to different individuals, genders, achievement settings, and cultures. The basic structures and causal mechanisms of achievement emotions are expected to follow nomothetic principles, whereas reference objects, intensity, and duration of emotions can differ (Pekrun, 2009).

Evidence corroborating these propositions comes primarily from studies with K-12 students. For example, we found that the relationships between girls' and boys' appraisals and their achievement emotions in mathematics were structurally equivalent across the two genders (Frenzel, Pekrun, & Goetz, 2007b). However, perceived control in this domain was substantially lower for girls. As a consequence,

girls reported less enjoyment in mathematics, as well as more anxiety and shame. Concerning achievement settings, we found that students' emotions experienced in mathematics, science, and languages differed in mean levels across subject domains, but showed equivalent internal structures and linkages with academic achievement across domains (Goetz, Frenzel, Pekrun, Hall, & Lüdtke, 2007). Similarly, in a cross-cultural comparison of Chinese and German students' achievement emotions, we found that mean levels of emotions differed between cultures, with Chinese students reporting more achievement-related enjoyment, pride, anxiety, and shame, and less anger. Nevertheless, the functional linkages of these emotions with perceived control, important others' expectations, and academic achievement were equivalent across cultures (Frenzel, Thrash, Pekrun, & Goetz, 2007).

Principles of universality may hold for cross-cultural differences between college students' achievement emotions as well. In our research on achievement goals and emotions, students from U.S. and German universities differed regarding mean levels of goals and emotions, but the structural relations between these goals and emotions were equivalent across countries (Pekrun et al., 2006). Similarly, in research analyzing the determinants and performance effects of students' boredom in university courses, Pekrun et al. (2008, in press) found that boredom was predicted by low academic control and values, and had negative effects on academic performance, in structurally equivalent ways in Canadian and German samples of university students.

Emotion Regulation, Coping, and Therapy

As argued up to this point, emotions can be facilitative for academic success, but they can also be deleterious for effortful information processing and students' academic careers. If emotions impede higher-order goals, such as recurring test anxiety perpetually hindering academic achievement, attempts can be made to regulate these emotions. Regulation of negative emotions, and of stress situations which tax or exceed individual capabilities, is referred to as *coping* in the emotions literature (Zeidner & Endler, 1996). More severe emotional problems warrant the help of a professional therapist (*therapy* of achievement emotions). Furthermore, college instructors and administrators can influence students' emotions by shaping *educational practices* (e.g., learning environments and tasks at college) in beneficial ways. In this section, emotion regulation, coping, and therapy of achievement emotions are discussed. Implications for educational classroom practices are addressed in the next section.

Emotion Regulation and Coping with Test Anxiety

Emotion regulation serves higher-order goals like physical or psychological well-being, academic achievement, and the maintenance of social relations. Generally

(but not always), emotion regulation implies strengthening or maintaining positive emotions, and decreasing or preventing negative emotions. Basic components of regulation include recognizing and understanding one's emotions, managing one's emotions, and using emotions for action and goal attainment (e.g., for studying, completing projects). More specifically, managing one's own emotions can be done by targeting the symptoms of the emotion (*emotion-oriented regulation*), by changing underlying appraisals (*appraisal-oriented regulation*), or by acquiring competences to study more efficiently, thus making it possible to experience the emotional benefits of ensuing academic success (*problem-oriented regulation*; see Fig. 1). Furthermore, beyond regulatory competences pertaining to one's own emotions, emotional competences also comprise abilities to recognize, understand, manage, and use the emotions of others. Cognitive competences to regulate one's own and others' emotions have become popular under the label of *emotional intelligence* (Matthews, Zeidner, & Roberts, 2002).

To date, little is known about students' emotion regulation in college and university. The only major exception is research on coping with test anxiety, and with the exam stress causing test anxiety. Coping with anxiety has been addressed by Lazarus' transactional stress model cited above (Lazarus & Folkman, 1984, 1987). In this model, appraisals of threat, as implied by situations taxing or exceeding one's own capabilities, are assumed to induce test anxiety, and anxiety is thought to lead to attempts to regulate this emotion and/or the stress that caused it. After Lazarus proposed his model, many taxonomies of coping with negative emotions, and with test anxiety more specifically, were proposed. Basic to most of these conceptions is a differentiation between (1) problem-oriented coping, (2) emotion-oriented and appraisal-oriented coping, and (3) avoidant coping (Rost & Schermer, 1987; Zeidner & Endler, 1996; for a critical view, see Skinner, Edge, Altman, & Sherwood, 2003).

Problem-oriented coping entails active attempts to change the situation that causes subjective stress and negative emotions. In exam-related situations, problem-oriented coping would involve employing cognitive, metacognitive, and resource-oriented learning- and problem-solving strategies, both while studying and taking exams. Problem-oriented coping related to exams (i.e., preparing for the exam) can have adverse effects, such as increased situational anxiety, since dealing with the exam material can arouse thoughts about the upcoming exam (Bolger, 1990). Over the long run, however, for most students the beneficial effects of preparing and improving one's competences (e.g., increased control beliefs, improved academic performance, and decreased anxiety) likely outweigh any negative situational effects.

Emotion-oriented and appraisal-oriented coping is aimed toward directly changing unpleasant emotions, including attempts at actively modifying the symptoms of these emotions. Typical strategies include (a) anxiety reduction by means of alcohol, nicotine, or pharmaceutical consumption, or by means of relaxation techniques; (b) reduction of emotional tension by simply accepting anxiety and the possibility of failure ("secondary control"; Morling & Evered, 2006; Rothbaum, Weisz, & Snyder, 1982; Perry, Stupnisky, Haynes, Chipperfield, & Pekrun, 2010); (c) induction of positive, anxiety-incompatible emotions (e.g., by using humor, music, or emotional

support from others); and (d) cognitively reappraising the situation as more controllable or less subjectively important. Many of these strategies are in fact effective at reducing negative emotions. Some of them, however, clearly have negative side effects, in terms of reduced achievement or health.

Avoidance-oriented coping implies behaviorally or mentally escaping from a stress-inducing situation. Examples of such strategies include (a) searching for mental distraction by focusing attention on task-irrelevant contents and effort withdrawal; (b) procrastination, prolonged phases of recess, and precocious termination of preparing; and (c) truancy, exam-avoidance, and premature terminiation of study programs and college. Like emotion-oriented coping, these strategies can lead to a reduction of situational (immediate) anxiety. However, the side effects can be severe. First, consciously avoiding the experience of anxiety can lead to a detrimental increase of less conscious emotional arousal on a physiological level (see Spangler et al., 2002). Moreover, although these strategies may immediately, yet temporarily, reduce anxiety, the underlying factors contributing to the experience of anxiety (e.g., low perceived control) go untreated. Finally, all of these strategies can clearly be detrimental for students' learning, achievement, and future career prospects.

Most of the coping literature used these or related concepts to describe coping strategies. All too often ignored, however, was that specific strategies can be classified into more than one of the categories cited. Classifying strategies may depend on the observer's perspective. For example, as seen from the perspective of stress reduction, relaxation techniques would imply emotion-oriented coping. However, to the extent that reduction of emotional tension helps academic agency, relaxation can also be regarded as problem-oriented coping. Contemporary measurement instruments of coping using traditional classifications thus run the danger of assessing behavioral surface structures of students' attempts to cope with stress, while missing deeper structures of functional equivalence.

A second problem in much of the existing literature is the simplistic assumption that problem-oriented coping should be adaptive, and emotion-oriented as well as avoidance-oriented coping maladaptive since they don't change the stress-inducing situation. First, different criteria can be used to judge adaptation (is it more important to increase achievement, or to live a life free of excessive anxiety?). Second, the employment of any strategy can have side effects that themselves can be either adaptive or maladaptive, and need not be congruent to the main effects the strategy produces. For example, while persistent, time-consuming academic studying can raise academic achievement and reduce exam stress, it can also cause a break-up of friendships, implying that problem-oriented coping need not always be adaptive. Conversely, caution should also be exercised regarding emotion-oriented or avoidance strategies as maladaptive by default. In the waiting phase after an exam, for example, it can be quite functional to simply reduce any thoughts about the exam or the upcoming announcement of exam results. Any attempts at problem-oriented coping would be futile in this situation, since exam results can't be changed after the fact. Also, an emotion-driven dropping out of a program of studies that does

not match individual needs and capabilities can be a blessing for a student's future development.

Treating Test Anxiety

Individual test anxiety is treatable; in fact some of the treatments for test anxiety are among the most successful psychological therapies available, with effect sizes above $d = 1$ (Hembree, 1988). Similar to the various kinds of individual strategies of emotion regulation and coping, different test anxiety treatments focus on different manifestations and antecedents of this emotion (Fig. 1). These include: affective-physiological symptoms (emotion-oriented therapy), cognitive appraisals (cognitive therapy), and competence deficits caused by lack of strategies for learning and problem-solving (skills training, competence development; for a review of test anxiety treatments see Zeidner, 1998).

Emotion-oriented therapy includes anxiety induction (e.g., flooding), biofeedback procedures, relaxation techniques (e.g., progressive muscle relaxation; Jacobson, 1938), and systematic desensitization. *Cognitive therapies* aim to modify anxiety-inducing control beliefs, values, and styles of self-related thinking. Examples are cognitive-attentional training, cognitive restructuring therapy, and stress-inoculation training. *Study-skills training* teaches students to understand and use task-oriented learning strategies and problem-solving skills that promote academic success and thus decrease anxiety. Finally, *multimodal therapies* integrate different procedures to address different symptoms and antecedents of anxiety within one treatment.

Cognitive and multimodal therapies have proven especially effective at both reducing test anxiety and enhancing academic performance (Zeidner, 1998). Study-skills training has been shown to successfully reduce test anxiety in students with deficits in their learning strategies. Consistent with the arguments above, therapy focusing exclusively on emotion-oriented procedures has been shown to successfully reduce anxiety, but has proven less effective at improving academic achievement. These kinds of therapy address the affective and physiological components of anxiety, but not the underlying cognitive components of anxiety that are primarily responsible for the performance-debilitating effects of this emotion.

Implications for Practice and Research in Higher Education

This chapter set out to provide a summary review of research on students' achievement emotions in higher education. As described throughout the sections of this review, cumulative evidence exists on the nature, assessment, effects, development, and treatment of college students' test anxiety; however, this is merely one of the major emotions experienced by students at college and university. As such, a number

of practical recommendations for educational practices in higher education institutions concerning test anxiety can be derived. As for emotions other than anxiety, research has only just begun to accumulate knowledge that might help in the development of more complete accounts of students' emotions, and to construct more comprehensive guidelines for fostering these emotions in college classroom settings. By necessity, the findings reviewed in this chapter imply that more research on emotions other than anxiety is necessary, and that evidence-based recommendations to date are largely confined to treating and managing test anxiety.

Implications for Educational Practice in Higher Education

While students' achievement emotions may be deeply rooted in pre-college experiences, the college environment provides new settings and challenges that have the potential to change students' emotional approaches to learning and achievement in fundamental ways. Situational demands for more self-regulation at college, for example, pose new tasks and tests of students' self-development. Also, the community of college students within classrooms and across campus provides new reference groups for evaluating own abilities, and fresh experiences that can drastically differ from any previous experiences at high school. It is the responsibility of educators and administrators to shape college environments to foster students' academic development and health, including their emotional approaches to learning. However, due to the lack of educational intervention research targeting student emotions to date, practical recommendations regarding how to foster students' adaptive emotions and prevent or reduce maladaptive emotions remain largely speculative.

Theoretically, it can be assumed that educational practices intended to foster adaptive emotions such as enjoyment of learning can refer to different components and antecedents of emotions, much as treatment practices pertaining to test anxiety do (see above). For example, while announcements of specific grading practices can be suited to change students' emotion-inducing control perceptions, teachers' own emotions can model the affective and expressive components of students' emotions by way of emotional contagion. As to environments and practices that may be suited to influence student emotions, assumptions can be inferred from the discussion on instructional and social determinants of emotions in the previous section, and a limited number of more firmly based recommendations can be derived from test anxiety studies.

Shaping learning environments and task assignments. One potential means of positively affecting college students' learning-related enjoyment relates to increasing the *cognitive quality* of tasks and classroom instruction. As noted earlier, this can be achieved by creating learning assignments that optimally match task demands and students' competences (e.g., by using differentiated task structures; Rosenholtz & Simpson, 1984), which should prevent boredom and promote enjoyment. Furthermore, shaping learning environments such that they meet students'

needs for social relatedness should also have beneficial emotional effects (e.g., by providing opportunities for collaboration; Johnson & Johnson, 1974).

Learning environments that create demands to engage in *self-regulated learning* can also promote positive emotions. As stated above, when the learning environment affords opportunities for self-regulated learning and when students perceive themselves as capable of regulating their learning, positive course-related emotions (e.g., enjoyment) should be increased for at least two reasons. First, students can fulfil their need for autonomy and increase their sense of personal control. Second, students can select and organize learning material to meet their individual interests, thus increasing the subjective value of the course and course material. However, if the learning environment is not designed to support self-regulated learning and/or if students feel unable to regulate their learning, negative emotions may be promoted.

Extending beyond the structure of learning environments and tasks, displays of *excitement and enthusiasm* may be one primary emotional tool instructors can use in the college classroom to induce enjoyment of academic learning, and to prevent boredom in classrooms. However, excitement and enthusiasm probably need to be enacted such that true emotions are displayed, since insincere emotions can be recognized from subtle cues indicating incomplete or distorted facial expression, which would probably undermine any positive modelling effects.

Shaping exams, grading practices, and the consequences of achievement. As implied by the evidence on the determinants of test anxiety, structuring exams and grading practices in appropriate ways can be one of the most effective, albeit complex means of fostering adaptive emotions. Drawing from test anxiety research, measures that increase perceived control, decrease the importance of failure, or decrease the impact of anxiety on performance, can be beneficial. Regarding *exams*, these measures include: (a) making demands transparent by clearly structuring materials and procedures; (b) giving students a choice between tasks; (c) giving students second chances; (d) providing external aids, such as access to lecture notes, text books, or computers; and (e) using closed item formats to ease working memory load. Naturally, some of these measures also have disadvantages. For example, using highly structured material may benefit anxious students, but may impede less anxious students' performance. Further, using only multiple-choice items may reduce anxiety, but may preclude the use of item formats that are better suited to assess deep-level thinking and creative problem-solving.

As to *grading practices* and the ensuing classroom goal structures, competitive practices based on social comparison norms probably increase average levels of student anxiety, shame, and hopelessness by limiting chances for success and raising the visibility and social importance of academic performance (by increasing the value of achievement, competition might also increase positive emotions if success is experienced; Frenzel, Pekrun, & Goetz, 2007a). Grading based on social comparison may be needed for purposes of placement and selection, implying that goals of fostering student emotions, on the one hand, and producing usable information on student achievement, on the other, may be in conflict. However, to the extent that assessments aim to serve teaching and learning rather than being used for selection

purposes, criterion-oriented grading pertaining to mastery of the learning material probably is more recommendable than the normative practices prevailing in today's college classrooms.

Finally, regarding *consequences of achievement* and the value of academic success and failure for future outcomes (e.g., career opportunities), it should prove helpful to highlight connections between students' academic effort and the attainment of future prospects. Effort-outcome associations of this type should increase perceived control, thus strengthening positive and reducing negative future-related achievement emotions. To the contrary, should future desired outcomes not be contingent upon students' academic effort, then students may experience reduced perceived subjective control and increased negative prospective emotions like anxiety or hopelessness.

Directions for Future Research

Given the clear importance of many of the achievement emotions experienced by college students, more extensive research on these emotions is overdue. This section discusses some of the pressing concerns that research should attempt to tackle and resolve in the upcoming years (see Pekrun & Schutz, 2007).

Concepts of emotion and emotion taxonomies. At present, the boundaries of the concept of "emotion" still remain unclear. While there is consensus that anxiety, anger, or joy are basic emotions that belong to this conceptual category, this is less clear for a number of other phenomena. For example, interest has variously been seen as an emotion, as an amalgam of values and emotion (more specifically, enjoyment), or as a construct different from emotion. Defining the conceptual relations betweens students' interest and their emotions, however, is a necessary precondition for conceptualizing their functional relations (is students' interest part of the domain of emotions, or does it function as a determinant or an effect of emotions?).

Also, should emotions be seen as separate from students' mood, or is mood just one subcategory of emotion? In social psychological theories, mood and emotions are often seen as distinct entities, the boundaries being defined by intensity (high vs. low), duration (short vs. long), and object focus (emotions having a clear focus, mood having a less clear or no focus). Since both of these differences seem to imply dimensional distinctions rather than categorical differentiation, it might be more fruitful to see mood versus emotion as bipolar ends of a conceptual continuum, rather than as a categorical distinction between qualitatively different phenomena. This view has been used in the present chapter, but to date this issue seems far from being settled in mood and emotion research.

Furthermore, there is disagreement regarding how students' emotions, and emotions more generally, should best be classified. Dimensional approaches focus on the common denominators of emotions and distinguish emotions along common dimensions. A prototypical example is the circumplex model of affect using the dimensions of activation and valence (Feldman et al., 1998). In contrast, categorical approaches focus on the specific, discrete qualities of different emotions. Among

the many specific implications of this debate is whether the emotional consequences of students' achievement goals should be defined in terms of positive versus negative affect (e.g., Linnenbrink & Pintrich, 2002), or in terms of discrete achievement emotions like enjoyment, hope, anger, anxiety, etc. (e.g., Pekrun et al., 2006, 2009).

Integrating theoretical approaches and research traditions. To date, many disciplines within education and psychology are characterized by a prevalence of mini-theories addressing isolated phenomena, and by related research traditions working in relative isolation. Emotion research is no exception to this rule. For example, experimental research addressing the effects of positive and negative mood on cognitive performance is in a disintegrated state to date that makes if difficult, for researchers and practitioners alike, to draw any generalizable conclusions. In order to build cumulative knowledge and lay the foundations for integrating empirical findings, it seems necessary to construct more integrative theories by identifying common assumptions of existing approaches, combining these assumptions, and extending assumptions so that gaps between emotion research and neighboring fields (like motivation) can be bridged. The control-value theory of achievement emotions outlined above represents one attempt to do so.

Mixed-method research strategies: I. Analyzing emotions from idiographic and nomothetic perspectives. In field-based educational research on emotion, inferences about the within-person functions and antecedents of college students' emotions are often derived from interindividual correlations of variables. For example, inferences on the causal role of test anxiety for performance are often deduced from correlations of test anxiety scores with subsequent academic performance. Such inferences may be quite misleading, since it may happen that an interindividual correlation between two variables does not represent the intraindividual relation between these two variables in any single person under study. Generally, interindividual and intraindividual correlations of variables are statistically independent, such that any inferences of this type may be unwarranted (see Robinson, 1950; Schmitz & Skinner, 1993).

Rather than relying on interindividual correlations, future research should take care to make use of strategies analyzing the psychological functions of emotions within individuals first, before drawing any population-oriented conclusions. Such an approach would imply first using *idiographic,* intraindividual analysis, then analyzing the distributions of intraindividual functions across individuals, and finally, drawing *nomothetic* conclusions about more general mechanisms of functioning, on condition that there is sufficient homogeneity of idiographic findings across individuals (for empirical examples in the field of student emotion and motivation, see Pekrun & Hofmann, 1996; Schmitz & Perels, 2006; Schmitz & Skinner, 1993).

Mixed-method research strategies: II. Integrating qualitative and quantitative methodology. Educational research on emotion uses both qualitative and quantitative approaches (Schutz & Pekrun, 2007). However, rarely are both approaches combined such that the benefits of each of them are maximized. Also, the limitations of both types of approaches are rarely fully acknowledged. For example, while qualitative evidence may well be used to generate hypotheses on college students' emotions, it is less suited to test these hypotheses in more precise ways.

Conversely, while quantitative evidence is needed to test a priori hypotheses, it often needs added qualitative insights to explain findings, especially in the case of anomalies. Future investigations of college students' emotions should make use of systematically combining both types of approaches.

Baserates, phenomenology, and components of student emotions. As noted at the outset of this chapter, there is a clear lack of exploratory research into the occurrence and phenomenology of college students' emotions. Such research seems necessary to judge the relative importance of different emotions as experienced by different students, and in different types of academic situations. Also, it would be important to explore if there are differences between the emotions found in college classrooms and the emotions experienced by students in other educational settings, such as K-12 classrooms or settings of business education. In addition, phenomenological evidence is needed in order to generate more comprehensive conceptions of the contents and functions of student emotions, beyond hypotheses that can deductively be derived from existing theories. Finally, we also need more qualitative and quantitative evidence on the structural relations between the different components of student emotions. To date, it is clear that different component processes of emotions are, typically, loosely coupled instead of showing deterministic relations, but the precise mechanisms of reciprocal relations between components, and the degree to which components can be predicted from information about other components, are still largely unclear.

Evidence on baserates and structures can have far-reaching consequences for assessment, treatment, and educational practice. For example, if components of emotions strongly influence each other, modifying one component can produce spill-over effects such that the other component is changed as well. If influences are weak, effects of treatments or educational practice would be more circumscribed. For example, if cognitive treatment additionally changes physiological emotion components, it might well be suited to foster students' emotion-dependent health. If the effects are confined to cognitive components of emotions, other methods would have to be used instead of, or in addition to, cognitive therapy.

Assessment and modelling of student emotions. As noted in the section on assessment, different methodologies to assess human emotions are available to date, but most of these methodologies have not yet systematically been applied to college students' emotions. Specifically, this pertains to neuropsychological methods of mental imaging, and to observational procedures of assessing emotions in academic situations like classroom interaction. As to self-report methods, many instruments are available to assess students' test anxiety, but there is a clear lack of multidimensional instruments measuring a broader range of emotions (the Achievement Emotions Questionnaire discussed above being an exception). A specific, important deficit is the lack of real-time indicators of emotions being able to assess their dynamics over time (EEG methods are an exception; e.g., Meinhardt & Pekrun, 2003). Since instruments are lacking, it also is open to question which types of indicators (self-report, physiological, observational, etc.) might be best suited to assess specific aspects of college students' emotions.

Emotions are processes that unfold over time. Therefore, beyond static measures of students' trait or state emotions, methods to assess and model the dynamics of these emotions, and the multidirectional linkages between the implied component processes, would be needed to develop more fine-grained descriptions of emotions and their functional properties. Experiments can deliver evidence on no more than isolated segments of these dynamical, multidirectional relationships. Many non-experimental approaches (e.g., structural equations modelling based on field studies), on the other hand, have difficulties disentangling the multiplicity of causal effects often operating simultaneously in the dynamics of emotions. It is a challenge for future research on student emotions to develop or adapt dynamic modelling procedures that are better suited to model real-time emotional processes.

Effects of student emotions on achievement, social relations, personality development, and health. As outlined in the preceding sections, evidence on the consequences of college students' emotions is largely lacking, except knowledge about the performance effects of test anxiety. However, even for test anxiety, two research deficits should be noted. First, the bulk of test anxiety research focused on the effects of anxiety on academic learning and performance. Far less evidence has been accumulated as to the consequences of students' anxiety for their social relationships, long-term identity formation, and health. Second, as noted, most empirical studies have used unidirectional designs analyzing the performance effects of students' anxiety. There is a clear need for more longitudinal investigations addressing the reciprocal linkages between emotions (including anxiety), on the one hand, and students' academic learning and performance, on the other (e.g., Folkman & Lazarus, 1985).

Determinants, development, and regulation of student emotions. As with the effects of college students' emotions, evidence on individual determinants, social and classroom antecedents, development, and regulation of these emotions is largely confined to test anxiety to date, with the exception of studies on the attributional antecedents of emotions following success and failure. More research on cognitive as well as non-cognitive individual determinants is needed, including research on the precise mechanisms linking appraisals and emotions (Reisenzein, 2001), on the genetic and physiological foundations of achievement emotions, and on the interactions between different types of determinants. Similarly, research should systematically analyze how different learning environments, academic tasks, and behaviors of important others influence students' emotions. Finally, coping research should address emotions other than anxiety as well, and students' regulation of their emotions, as well as the role of their emotional competences and emotional intelligence, should be analyzed.

The role of higher education systems and institutions. Higher education institutions are among the oldest institutions in our societies. To our knowledge, however, no attempt has yet been made to situate perspectives on college students' emotions in the larger socio-cultural and historical context that shapes higher education institutions and the learning environments these institutions provide. Also, in contrast to international assessments of K-12 education (e.g., Organization for Economic Cooperation and Development, 2004), empirical evidence implying international and

cross-cultural comparisons of students' emotional situation across higher education systems of different countries seems to be largely lacking to date. Contextual knowledge on cross-cultural differences and similarities across the centuries, and across different nations, might prove helpful for planning long-term institutional transformation such that it takes retrospective accounts of possible change into account, while at the same being embedded in future-oriented perspectives.

Intervention research: Need for evidence-based knowledge on therapy, prevention, and "emotionally sound" college environments. To date, we lack knowledge about effective treatment for college students' problems with negative academic emotions, with the exception of test anxiety therapy. Furthermore, there also is a lack of knowledge on ways to prevent maladaptive emotions, even for test anxiety (Zeidner, 1998). Finally, evidence is needed how higher education institutions and their learning environments can be shaped such that college students' emotions are fostered and influenced in "emotionally sound" (Astleitner, 2000) ways. Researchers should conduct intervention studies exploring ways to do so. This may not be an easy task, as can be seen from the obstacles that recent K-12 intervention studies targeting students' emotions have encountered (e.g., Glaeser-Zikuda, Fuss, Laukenmann, Metz, & Randler, 2005). However, in order to lay the foundations for transferring the insights of emotion research into educational practice, and to do so in empirically based ways, there is no alternative to intervention research directly addressing the impact of change.

Conclusion

In the concluding chapter of their 2000 *Handbook of Self-Regulation* covering the state of the art in research on self-regulation, Boekaerts, Pintrich, and Zeidner (2000) posed the question, "How should we deal with emotions or affect?" (p. 754). The review provided by the present chapter has shown that research on college students' academic agency is still grappling with this question. It seems that higher education research has not even begun to search for systematical, evidence-based answers to questions about college students' emotions, research on students' test anxiety being an exception.

Theoretical considerations and the little evidence available, however, suggest that the achievement emotions experienced in academic settings are critical to college students' academic development. This pertains to students' motivation to learn, use of learning strategies, and self-regulation of learning underlying their acquisition of knowledge. Furthermore, beyond their functional relevance for knowledge acquisition and performance, emotions likely are no less important for college students' long-term persistence and dropout behavior in pursuing their academic careers, and for their overall personality development, social behavior, and physical and psychological health.

By implication, higher education research would be well advised to pay more attention to the affective sides of students' academic development. With the

advent of broader conceptions of human psychological functioning replacing an exclusive focus on cognitive processes by including neuropsychological, emotion-oriented, and socio-cultural perspectives as well, chances may in fact have increased that researchers start analyzing the emotional aspects of students' learning and achievement, and of their personality development and well-being more generally.

In conclusion, it should be noted that similar arguments can be made for the emotions experienced by instructors, professors, and administrators in higher education institutions. To date, next to nothing is known about professors' emotions experienced in classroom teaching, and the role these emotions play in the quality of their teaching, their professional development, and their well-being, burnout, and physical health (for emotions in K-12 teachers, see Frenzel et al., 2009; Schutz & Pekrun, 2007). Future research should analyze college students' emotions, but it should also extend perspectives to include the emotions experienced by professors and administrators.

Notes

1. The Achievement Emotions Questionnaire was first published under the name "Academic Emotions Questionnaire" (Pekrun et al., 2002b).
2. The test emotions section of the instrument has been published under the name "Test Emotions Questionnaire" (TEQ; Pekrun et al., 2004). The Test Emotions Questionnaire is an integral part of the AEQ.
3. Whereas enjoyment of learning should focus attention on the learning task, the situation may be more difficult for other positive achievement emotions like hope or pride having both task-related and task-irrelevant reference objects. For example, social-comparison pride may focus attention on having defeated others, thus distracting attention. Mastery pride, on the other hand, may focus attention on task-related progress, thus preserving task-focused attention. For different kinds of hope, similar arguments can be made.

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