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Academic emotions from a social-cognitive perspective: Antecedents and domain specificity of students' affect in the context of Latin instruction

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This study concentrates on two assumptions of a social-cognitive model outlining the development of academic emotions (emotions directly linked to learning, classroom instruction, and achievement), namely on their antecedents and domain-specific organization. Our sample consisted of 200 students from Grades 7 to 10. Proposed relationships concerning the antecedents of academic emotions were tested in the context of Latin language instruction. Correlational analyses substantiated our assumptions concerning the relationships between academic emotions, students' cognitions, and aspects of the social environment. The mediating mechanisms proposed in the model were also confirmed using linear structural equation modelling. Subjective control- and value-related cognitions were found to mediate the relationship between aspects of the social environment and students' emotional experience. Our results further suggest that academic emotions are largely organized along domain-specific lines, with the degree of domain specificity varying according to the emotion in question. Implications for research and practice are discussed.

It is no overstatement to describe academic emotions as a still largely unexplored area of psychological research. With the exceptions of research on test anxiety, which has been studied extensively since the 1970s (Zeidner, 1998), and research on attribution-based emotions in achievement settings (cf. Weiner, 1985, 2001), there is a dearth of empirical research on students' emotional experiences (Goetz, 2004; Pekrun & Frese, 1992). We consider student emotions to be worthy of investigation for four main reasons. First, students' emotional experiences are directly related to their subjective well-being (Diener, 2000; Ekman & Davidson, 1994) and are thus an important topic of research

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in their own right (cf. subjective well-being in the context of positive psychology; Seligman & Csikszentmihalyi, 2000). Second, emotions impact on the quality of students' learning and achievement and are as such a critical topic of investigation in modern, performance-oriented societies (for more information on the impact of emotions on motivation, activation of learning resources, choice of learning strategies, and achievement outcomes, see Pekrun, Goetz, Titz, & Perry, 2002a). Research from an achievement motivation perspective has long stressed the importance of examining the antecedents and consequences of academic emotions (Boekaerts, 1997; Weiner, 1985; for empirical research, see Olafson & Ferraro, 2001; Turner & Schallert, 2001). Third, student emotions have a substantial effect on the quality of communication in the classroom, which in turn, influences the effectiveness of instruction and student–instructor interactions (Andersen & Guerrero, 1998; Meyer & Turner, 2002). Finally, our focus on academic emotions is also based on new insights into the origins of student emotions which make it possible to design theory-driven intervention and evaluation programmes toward fostering academic emotions, learning, and achievement (Astleitner, 2000).

Although academic emotions represent important outcomes in their own right due to their impact on well-being, quality of learning, achievement, and social interaction in the classroom, little is known about the antecedents of these emotions and their occurrence in specific academic subject areas. Further, the antecedents and domain-specificity of academic emotions are likely to play an important role in the evaluation and development of educational practices with respect to the effects that students' academic environment has on their emotional experiences and consequent learning and achievement outcomes. In order to fill this knowledge gap in emotion research, the present study examines school students' academic emotions (Goetz, Zirngibl, Pekrun, & Hall, 2003), that is, emotions that are directly linked to learning, classroom instruction, and achievement (e.g. enjoying solving a mathematics problem or looking forward to getting a good grade). More specifically, we focused our attention on two key assumptions of a social-cognitive model outlining the development of academic emotions proposed by Pekrun (2000; see below) which we consider relevant to both research and practice, namely concerning the antecedents and domain specificity of students' emotional experiences.

Antecedents of academic emotions

We tested the proposed relationships in Pekrun's social-cognitive model of academic emotions in the context of Latin language instruction. Given that performance in Latin is of particular relevance to students' academic careers in Germany, and that students are thus likely to value the subject highly, the learning of Latin can be assumed to induce intense emotions (Haag & Stern, 2000). For the present study, two specific research questions were addressed. First, this study examined how students' emotions experienced in the context of Latin instruction related to the causal antecedents outlined in Pekrun's theoretical model, that is, students' cognitions and social factors involving the school and family environment. The second topic of investigation concerned whether students' cognitions (subjective control and value appraisals) mediated the relationship between their social (school/family) environment and their emotional experiences in the classroom. We hypothesized that the empirical data would substantiate the relationships and mediating mechanisms proposed in the theoretical model.

Domain specificity of academic emotions

According to Pekrun's social-cognitive model of academic emotions, control- and value-related cognitions are proposed as key antecedents of students' emotional experiences.

As both control- and value-related cognitions are considered to be largely domain specific, we expected to find a domain-specific organization of emotions in our data. Our two main research goals in this respect were: (a) to determine if the intensity of students' emotional experiences is specific to particular domains of study and (b) if students' academic emotions correlate across different academic domains.

Theoretical background

Development of academic emotions: A social-cognitive model

The model presented (see Fig. 1, adapted from Pekrun, 2000) integrates assumptions from causal attribution theories of achievement-related emotions (Weiner, 1985) and expectancy-value approaches to the study of emotions (Pekrun, 1992; Turner & Schallert, 2001). Within this control-value theory, two categories of cognitive appraisals are proposed as central to the development of academic emotions: *subjective control* and *subjective values* of achievement-related actions, topics, and outcomes. Control-related cognitions may focus directly on cause-effect relations (e.g. action-outcome expectancies, see Heckhausen & Schulz, 1995) and indirectly refer to conditional relations between personal characteristics and contingent outcomes. One important type of cognition in this latter type of control-related perceptions is self-appraisal of one's own competencies, also referred to as perceived competence (e.g. self-concepts of abilities, self-efficacy expectancies). With respect to the nature of subjective values involved in self-appraisal, they can be intrinsic or extrinsic in nature (see Goetz, Zirngibl, *et al.*, 2003; Pekrun *et al.*, 2002a). For example, good grades may be highly valued by a student who is intrinsically motivated to achieve, and may also be of considerable importance to another student who is motivated by extrinsic goals such as how this grade will help to eventually get a good job.

Both subjective control and subjective values are proposed to mediate the relations between emotional experiences and aspects of the environment specifically with respect to (a) competence support, (b) autonomy support versus control, (c) achievement

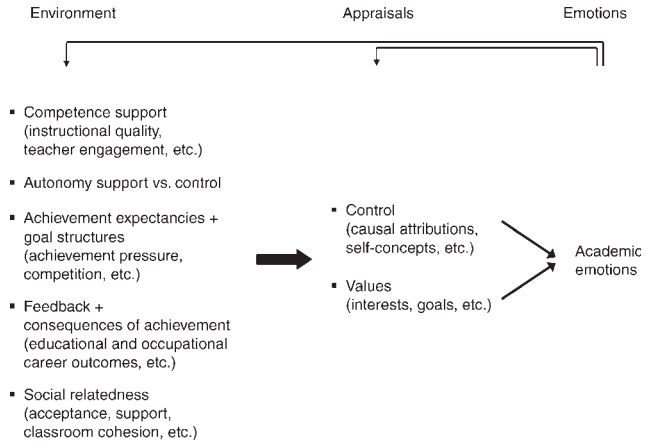

Figure 1. Social-cognitive model of the development of academic emotions (adapted from Pekrun, 2000).

expectations and goal structures, (d) achievement outcomes and feedback, and (e) social relatedness (see Fig. 1; for a detailed descriptions of the relationships between aspects of the environment, appraisals, and emotions see Pekrun, 2000).

This model does not assume unidirectional effects exclusively. Rather, aspects of the environment, cognitive appraisals and emotions are assumed to be linked by reciprocal causation. For example, students' emotions may influence their cognitive appraisals such that they judge their own competencies more favourably when they experience positive academic emotions. Furthermore, enthusiastic students may enhance the instructional quality of their lessons by motivating their instructor to engage in teaching. In this case, emotions could be considered antecedents of aspects in students' social environment. Previous correlative, multi-level, and confirmatory analyses (structural equation models) were shown to be compatible with the relationships postulated in Pekrun's theoretical model (Goetz, 2004; Goetz *et al.*, 2004).

Domain specificity of students' emotions

In the social-cognitive model of students' emotional experiences presented above, control- and value-related cognitions are main antecedents of academic emotions. As both of these constructs are primarily domain specific (Stevenson & Newman, 1986), we reasoned that emotions which follow may also be domain specific. Although the question of domain specificity is relevant to theory, research, practice, and educational interventions, it has rarely been explicitly addressed. In fact, with the exception of research on mathematics anxiety (cf. Miller & Mitchell, 1994), the bulk of studies and intervention programmes conducted in the context of test anxiety research have been based on the implicit assumption that emotions are *not* domain specific, and thus, have employed domain-general designs (Zeidner, 1998). In response to mounting evidence that motivation and self-concepts are, in fact, domain specific, some studies in related areas have utilized domain-specific designs (e.g. Abu-Hilal & Bahri, 2000; Bong, 1998; Möller & Köller, 2001; Pekrun, Goetz, Titz, & Perry, 2002b). As well, findings on the domain specificity of psychosocial constructs (e.g. self-efficacy; Bandura, 1997) further suggest that emotional experiences are also likely to be domain specific.

Some studies, particularly in the context of test anxiety research, have reported incidental findings suggesting that students' emotions are domain specific, however, these studies have not addressed this issue explicitly (e.g. Everson, Tobias, Hartman, & Gourgey, 1993; Goetz, 2004; Marsh & Yeung, 1996; Stipek & Mason, 1987). In the school context, this means that students' anxiety can vary greatly from subject to subject, and as such, it can be very difficult to infer or predict a student's anxiety in one subject based on knowledge of his or her anxiety in another. Beyond this research on test anxiety, research is lacking concerning the domain specificity of emotional experiences.

Present research questions

We set out to test the relationships proposed in Pekrun's (2000) social-cognitive model of the development of academic emotions (see above) in the domain of Latin instruction, and to address the two following research questions: how are the emotions experienced in the context of a Latin course related to the antecedents proposed in this theoretical model (students' cognitions, social environment)? Do students' cognitions (subjective control and value appraisals) mediate the relationship between the social (family) environment and their academic emotional experiences? Consistent with previous findings in the context of Mathematics instruction in support of the mediational factors proposed in Pekrun's model (Goetz, Pekrun, & Zirngibl, 2003; Pekrun *et al.*,

2002b), our hypothesis was that our data from students in a language course, namely Latin, would further substantiate the relationships and mediating mechanisms outlined in this theoretical model.

In view of the lack of empirical data on the domain specificity of academic emotions, the present study also set out to investigate the extent to which students' emotional experiences are organized along subject-specific lines. Our main research questions in this respect were as follows: are students' emotional experiences specific to particular subjects? In other words, is it possible to infer how students feel in one subject from their emotional experiences in other subjects? As both control- and value-related cognitions as main antecedents of academic emotions (Fig. 1) are generally considered to be domain specific, we assumed that academic emotions would also be specific to academic domains. Thus, we expected to find some, albeit weak, subject-specific consistency in the intensity of academic emotions experienced in different subject areas.

Method

Participants

The sample consisted of 200 students ($N = 121$ female, $N = 79$ male) from Grades 7 to 10 enrolled in the top track of the German three-track education system (Grade 7: $N = 67$; Grade 8: $N = 57$; Grade 9: $N = 38$; Grade 10: $N = 38$). In the German school system, students are separated after Grade 4 into three achievement tracks (upper, middle, and lower track) according to their level of achievement. Students' mean age was 14.00 years ($SD = 1.64$).

Measures

Latin-specific emotions and emotional antecedents

All scales assessing emotions and their antecedents were summative in nature (number of items: $2 \leq N \leq 15$) and, except for general self-esteem, were specific to Latin instruction. All measures except general self-esteem were adaptations of reliable, mathematics-specific scales developed for the PALMA Project (Project for the Analysis of Learning and Achievement in Mathematics; Pekrun *et al.*, 2004). Response format consisted of a 5-point Likert scale ranging from (1) *strongly disagree* to (5) *strongly agree*. Table 1 presents the number of items and reliabilities of the scales.

The emotion scales were based on a four-component model assessing the affective, cognitive, motivational, and physiological aspects of academic emotions, and assessed students' emotional experiences when in class, studying at home, and taking tests (Pekrun *et al.*, 2004; see Goetz, Zirngibl, *et al.*, 2003, for further information on the operationalization of the scales). In the process of choosing which emotions to be assessed, two selection criteria were used. First, we wanted to assess emotions which were conceptually distinct on a phenomenological level. There exist numerous models for categorizing emotions along underlying dimensions such as activation, valence, intensity, and duration. We based our selection of emotions on Watson and Tellegen's (1985) circumplex model which categorizes emotions according to aspects relevant to our study, namely activation and valence (cf. Russel, 1980 for a similar model). Second, we searched the research literature for emotions which are particularly salient in academic settings (see Goetz, 2004; Pekrun *et al.*, 2002a). As a result of these two selection strategies, we chose to assess the emotions of enjoyment, pride (both positive

Table 1. Summative scales

Scale	Sample item	No.	α
Emotions			
Enjoyment	I look forward to Latin lessons	9	.87
Pride	I'm proud of myself when I've done my Latin homework	8	.87
Anxiety	When a Latin test is coming up I get very nervous	15	.90
Anger	I get annoyed in Latin lessons	8	.86
Boredom	Latin homework bores me to death	6	.89
Cognitions			
General self-esteem	On the whole, I am satisfied with myself	4	.77
Academic self-concept	I am a talented student in Latin	6	.83
Intrinsic value	Whatever grade I get, Latin is very important to me	7	.82
Value of achievement	It is very important to me to get good grades in Latin	5	.84
Peer influence			
Peer regard	Most of the students in my class think Latin is cool	3	.80
Family variables			
Pos. reinforcement of achievement	When I do well in Latin, I am praised by my parents	2	.85
Achievement pressure	My parents expect me to do better than I am able to in Latin	6	.81
Family esteem	In my family, we regard the subject of Latin as very important	2	.70
Instructional variables			
Pos. reinforcement of achievement	When I do well in Latin, I am praised by my Latin teacher	3	.87
Achievement pressure	My Latin teacher expects me to do better than I am able to in Latin	3	.81
Teacher enthusiasm	Our Latin teacher is enthusiastic about the material	4	.92
Elaborative instruction	My Latin teacher relates new material to things I've learned in other language courses	6	.83

Note. All measures except general self-esteem are Latin-specific. Reliabilities were computed using Cronbach's alpha. Sample size: $N = 200$.

and activating), anxiety, anger (both negative and activating), and boredom (negative and deactivating), which can be distinguished based on activation and valence, and further, are particularly salient in academic achievement settings (e.g. Pekrun *et al.*, 2002a). We did not integrate a positive deactivating emotion (e.g. relief, relaxation) because these emotions occur after as opposed to during academic achievement striving (see Pekrun *et al.*, 2002a).

Rosenberg's (1965) *general self-esteem* scale, including 4 of the 10 original items, assesses the domain-general, affective-evaluative attitude of a person toward him- or herself. A lower-order self-concept involving students' perceptions of academic

competence was also examined in this study using a scale assessing their *academic self-concept in Latin* (for academic self-concept as an aspect of perceived competence and consequently of control, see Pekrun, 2000). Students' *intrinsic and extrinsic values* specifically concerning their Latin course were measured in terms of value of Latin as a subject (intrinsic) and value of one's performance in the Latin course (extrinsic).

With respect to students' social environment (left part of the model, see Fig. 1), measures addressing the social influence of peers, family, and instruction were included in our study. Concerning the influence of other students, *peer regard for Latin* was assessed with respect to how students believed their Latin course was viewed by other students in terms of it being useful, fun, or generally positive in nature. To assess academic feedback, we used parallel scales examining both the family and instructional environment. *Positive reinforcement of achievement in Latin* refers to our self-report measure of praise received from parents and teachers when doing well or getting good grades in Latin. A scale measuring *achievement pressure in Latin* was also included to assess students' perceived pressure from parents or teachers to improve their current level of course performance. To examine competence support from the students' family, we also measured the *family esteem of Latin* as perceived by the student. This scale refers to the perceived familial importance of learning the language and using this language for learning other ones. Competence support from the teacher was assessed using a scale concerning *teacher enthusiasm in Latin* which assessed the degree of enthusiasm and enjoyment expressed by their course instructor as perceived by the student. In addition, a scale addressing teaching behaviours related to *elaborative instruction in Latin* was included which referred to giving helpful examples and relating the subject matter with earlier course material and everyday life (i.e. mathematical modelling in the context of mathematical literacy; OECD, 1999; see also Schunk, 1998).

Latin-specific measures in structural equation model

For testing the proposed mediational mechanism depicted in Fig. 1, we minimized the number of variables assessed because the small sample size limited the number of parameters that could be reliably estimated. Thus, we decided to use a subset of items from the scales described above (see Table 1) using the following selection criteria. First, two items for each of the latent variables for social environment, appraisals, and emotions should be included. Second, beyond emotional experiences, only achievement-related constructs should be integrated. Finally, in order to make the model more parsimonious, only one social environment domain (peer influence, family variables, or instructional variables) should be assessed.

In view of the mounting evidence for their relevance to academic learning and achievement (Goetz *et al.*, 2004; Pekrun *et al.*, 2002a), the emotions of enjoyment and anxiety were chosen for our test of the mediating mechanisms proposed in the social-cognitive model of students' emotions. Furthermore, in emotion research, enjoyment and anxiety are considered 'basic emotions' (Izard, 1977; Ortony & Turner, 1990), that is, 'pure' emotions which comprised other emotional experiences.

Students' control- and value-related cognitions were incorporated into our model specifically concerning their academic self-concept in Latin (a component of perceived competence or control; see above) and perceived value of achievement in Latin. As we concentrate in our model on achievement-related constructs, we decided to integrate value of achievement in Latin in our analyses rather than intrinsic value of Latin. In line with the mediation model presented above (Pekrun, 2000), students' academic

self-concept with respect to their Latin course and their reported value for performing well in Latin served as mediators of the relationship between social environment variables and emotional experiences.

The selection of the social environment variable was based on previous research (Pekrun *et al.*, 2002a; see Goetz, 2004, concerning the assessment of social context variables in the context of mathematics) showing parental positive reinforcement of achievement in Latin and family-based judgments concerning the importance of Latin to have a particularly strong influence on students' cognitions (for the importance of parental behaviour in the development of school-related emotions, see Pekrun, 1999). The 'family esteem' and 'positive reinforcement of achievement in Latin' scales were each composed of two items (see Table 1) which were used as indicators of the respective latent variables (F1 and F2 for family esteem; R1 and R2 for positive reinforcement of achievement; see Fig. 2). For all other latent variables, two item parcels were used as indicators of latent variable including parcels S1 (3 items) and S2 (3 items) for academic self-concept, parcels V1 (3 items) and V2 (2 items) for value of achievement, parcels E1 (5 items) and E2 (4 items) for enjoyment, and parcels A1 (8 items) and A2 (7 items) for anxiety.

Domain-specific academic emotions and achievement

For reasons of parsimony, and to keep the research questionnaire at a reasonable length, we had to limit both the number of emotions examined and the number of items used to assess each emotion in testing the domain specificity of these academic emotions. Thus, one emotion representing each of three categories in Watson and Tellegen's (1985) circumplex model were included: enjoyment (positive and activating), anxiety (negative and activating), and boredom (negative and deactivating). A positive deactivating emotion (e.g. relief, relaxation) was not integrated in the present study because these emotions occur following as opposed to during the academic achievement process.

A set of six core and subsidiary school subjects was chosen for our study including Latin, English, German, mathematics, music, and sports. Emotional experiences in these different subjects was assessed using single-item measures, the wording of which was changed only with respect to the subject in question, thus allowing for direct comparison of the intensity of emotional experiences in the various subjects (sample items: 'How much do you enjoy mathematics?'; 'How much are you bored in music?'; see Goetz, 2004). Response format consisted of a 5-point Likert scale ranging from (1) *not at all* to (5) *very much*. In order to investigate whether emotions are more or less domain-specific than achievement outcomes, students' self-reported final grades for each course subject were also obtained. In the German school system, grades vary between 1 (very good) and 6 (insufficient). Means and standard deviations for the grades measures are as follows: Latin ($M = 3.10$, $SD = 1.11$), English ($M = 3.04$, $SD = 0.90$), German ($M = 2.96$, $SD = 0.76$), mathematics ($M = 3.23$, $SD = 0.96$), music ($M = 1.79$, $SD = 0.80$), and sports ($M = 1.88$, $SD = 0.86$).

Procedure

Data were collected at the beginning of the school year (October 2002) by external test administrators by using a standardized questionnaire (self-report scales). As the data assessment was at the beginning of the year, year-end grades reported by the students are from the previous academic year. However, because students' grades were integrated in our analysis solely for the purpose of comparing the domain-specificity of achievement outcomes with that of emotional experiences, the timing of the

achievement measure is not critical to the hypotheses of this study. Instructions were given verbally by the experimenters and were also written on the test material. Student participation was on a voluntary basis and students received neither financial rewards nor feedback of results in exchange for their participation.

Analyses

Results will be presented in two sections. First, we describe our test of the theoretical model within the domain of Latin (antecedents of academic emotions, mediational mechanism); second, we report our findings on the domain specificity of academic emotions. Concerning the proposed relationships in our model, correlations between students' emotions related to their Latin course and the other scales are depicted in Table 2, that is, the other measures concerning students' cognitions, peer influence, family-related measures, and instructional variables (except for general self-esteem, all of these scales are Latin-specific). Because aspects of the environment, cognitive appraisals, and emotions are assumed to be linked by reciprocal causation, correlational analyses were used to assess the interrelationships between these constructs.

The results of structural equation modelling (SEM) are presented in Fig. 2 which shows our mediation model outlining the relationships between aspects of the students' environment, their appraisals, and their emotions. As outlined above, only specific variables representative of these three categories were selected for this analysis in order to create a more parsimonious model (for the strategy of selecting variables, see above). Model testing also consisted of testing this mediation model competitively against a model in which direct relationships between the environment variables and academic emotions were included in addition to the indirect paths assessed in the mediation model. More specifically, fit indices for both the mediational model (indirect paths) and the saturated model (direct and indirect paths) were compared. Fit indices assessed included Chi-square/degrees of freedom, goodness of fit index (GFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA).

Concerning the domain specificity of emotions, we first outline in Table 3 the intensity of the emotions enjoyment, anxiety, and boredom for six different school subjects (Latin, English, German, mathematics, music, sports; for the selection of emotions and subjects, see above). Second, we used SEM analyses to examine whether the emotion items were best fit by a six-factor model in which each emotion item loads on one of six latent academic subject variables, or by a three-factor model in which the items load on one of three latent emotion variables. Similar to the procedure described above for the Latin-specific model, fit indices for both models were compared (see Table 4). A significantly better fit for the six-factor model would show that the academic emotions under investigation are best classified based on their domain specificity (e.g. Latin- vs. mathematics-specific enjoyment) as opposed to the more general class of emotional experiences to which they belong (e.g. enjoyment vs. anxiety).

Intercorrelations between the subject-specific emotion scales are presented in Table 5. In order to assess whether these emotions were more or less domain specific than the academic achievement outcomes, intercorrelations between the year-end grades for each of the six subjects under investigation were also conducted. For each academic emotion (e.g. enjoyment), the correlations for that emotion between the different course subjects (e.g. correlations between enjoyment in math, enjoyment in sports, etc.) were averaged, resulting in three mean correlations corresponding to the three academic emotions assessed (enjoyment, boredom, and anxiety). The same was done for students' year-end course grades in the different subject areas (see Table 6). These mean correlation scores

were then used to assess the relative domain specificity of the respective emotions and academic achievement.

Results

Antecedents of emotional experiences

Table 2 presents the correlations between the emotions under investigation and key antecedents of these emotions as specified in our social-cognitive model of academic emotions (Pekrun, 2000; see Fig. 1). As depicted in our model, students' cognitions and social environment were found to significantly impact students' emotions, and vice versa. Clear relationships can be discerned between students' cognitions and their emotional experiences. Consistent with the hierarchical conceptualization of self-concepts (Shavelson *et al.*, 1976), the domain-transcending construct of general self-esteem was less strongly associated with Latin-related emotions than the Latin-specific *academic self-concept* measure. Both the *intrinsic* and the *extrinsic value of Latin* scales (value of Latin as a subject, value of achievement in Latin, respectively), showed strong correlations with students' emotional experiences.

Table 2. Correlations between students' emotions, cognitions, and their social environment

	Enjoyment	Pride	Anxiety	Anger	Boredom
Cognitions					
General self-esteem	.33	.51	−.32	−.13	−.05
Academic self-concept	.59	.54	−.57	−.45	−.25
Intrinsic value	.58	.48	−.26	−.54	−.50
Value of achievement	.42	.40	−.07	−.28	−.30
Peer influence					
Peer regard	.54	.39	−.25	−.46	−.47
Family variables					
Pos. reinforcement of achievement	.29	.29	−.13	−.23	−.25
Achievement pressure	−.27	−.21	.35	.29	.24
Family esteem	.39	.31	−.25	−.29	−.26
Instructional variables					
Pos. reinforcement of achievement	.32	.31	−.12	−.29	−.27
Achievement pressure	−.37	−.35	.44	.37	.18
Teacher enthusiasm	.36	.33	−.11	−.34	−.35
Elaborative instruction	.48	.44	−.21	−.40	−.37

Note. All measures except general self-esteem are Latin-specific. Bivariate Pearson correlations. Sample size: $N = 200$. $|r| \geq .14$: $p < .05$; $|r| \geq .18$: $p < .01$; $|r| \geq .23$: $p < .001$.

As for the relationship between the two value-oriented constructs and anxiety, the negative correlation between intrinsic value of Latin and anxiety was anticipated ($r = -.26$, $p < .001$), however, the non-significant correlation between anxiety and extrinsic value of Latin was not ($r = -.07$, *ns*). According to our model, the extrinsic value of Latin should positively correlate with anxiety (Pekrun *et al.*, 2002; see also Abela & Seligman, 2000; Hembree, 1988). Nonetheless, the positive relationship found between these constructs using structural equation modelling suggests that there may be more complex relationships between these constructs which cannot be revealed through correlational analyses.

The high correlations between the scale assessing *peer regard for Latin* and the academic emotion measures are also interesting, particularly because the role played by a student's peers is often neglected in educational research on emotions. The impact of the classroom climate (i.e. school classes in the sense of peer subgroups) has, however, been investigated in research studying the effects of instructional climate on academic performance and achievement-striving behaviours (Jerusalem, 1997). Although most of the observed relationships between peer variables and academic outcomes in this research area are relatively weak (Wang, Haertel, & Walberg, 1993), our results suggest that peer variables may be of greater relevance to students' emotional experiences than to their motivation or academic performance. However, according to the feedback loops proposed in our social-cognitive theoretical model (Fig. 1), it is likely that although peers might influence students' emotional experiences, the positive and negative emotions of individual students during Latin instruction might also have an impact on their peers' regard for Latin by influencing the quality of social interactions in the classroom setting.

The correlations between the students' emotions and the features of their social environment are in line with our social-cognitive model. Both for the family variables and the instructional variables, positive reinforcement of achievement in Latin showed positive relationships with enjoyment and pride, whereas the relationships with anxiety, anger, and boredom were all negative. Conversely, the opposite pattern of results was found for the relationships between achievement pressure in Latin and the emotion measures.

The correlations between students' emotions and aspects of competence support for both the family and instructional variables were also in line with our assumptions. Clear positive relationships between family esteem of Latin (family variable) and positive emotions were observed, whereas the correlations with negative emotions were all negative. Teacher enthusiasm in Latin (instructional variable) was also found to be an important factor related to students' emotional experiences. Elaborative instruction in Latin, in which the instructor encourages conceptual links between new information and previously learned information, was particularly strongly related to positive emotional experiences ($r = .48$, $p < .001$ for enjoyment; $r = .44$, $p < .001$ for pride). Further, elaborative instruction also showed negative relationships with anxiety, anger, and boredom (see Helmke & Weinert, 1997, and Stark, Mandl, Gruber, & Renkel, 2002, for more information on the promotion of elaboration strategies in the classroom).

Figure 2 shows the path coefficients of the mediation model using SEM (LISREL 8.53, Jöreskog & Sörbom, 2002; intercorrelations for all parcels are provided in the Appendix; for the number of items in each parcel, see Method section). In this model, the relationships between family variables (esteem of Latin and positive reinforcement of achievement) and emotions are mediated by students' cognitions (academic self-concept in Latin, value of achievement in Latin). No direct paths from family variables to the emotions were included in this model.

We tested the mediation model (see Fig. 2) competitively against a saturated model in which four *additional* direct paths from the parent to the emotion variables were included. The goodness-of-fit indicators for the mediation model were acceptable: $\chi^2(45) = 84.18$; $\chi^2/df = 1.87$; GFI = .92; CFI = .95; RMSEA = 0.072. Upon integrating the four additional direct paths into the mediation model, all of the goodness-of-fit indicators remained nearly the same (saturated model: $\chi^2(41) = 84.07$; $\chi^2/df = 2.05$; GFI = .92; CFI = .95; RMSEA = 0.079) and there was no significant difference between the two models concerning the Chi-squared statistics ($p = .99$). It is important to note that all of the direct paths from the parent variables to students' emotions added to the

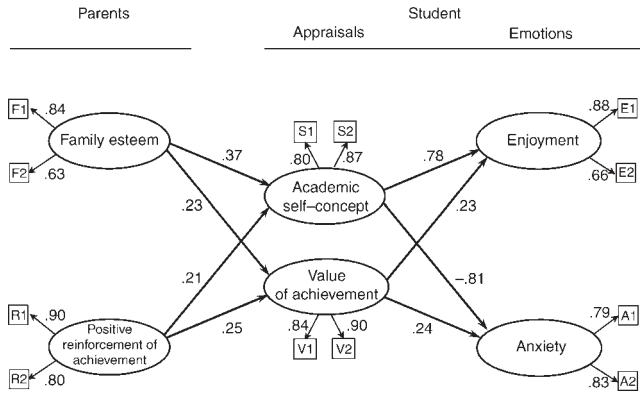

Figure 2. Structural equation model of mediating mechanisms.

mediational model were not significant and either zero or close to zero ($\beta s = 0.00 - 0.04$). Thus, by integrating direct paths into the mediation model, none of which was statistically significant, almost no change in the fit indices was observed. This result confirms our assumption that parent variables do not directly influence emotions. Rather, these findings suggest that students' cognitions mediate the relationship between parental influence and students' emotional experiences and provide empirical support for the mediating mechanisms hypothesized in our theoretical model.

Concerning the valence of the observed relationships, the path coefficient from academic self-concept to enjoyment was positive (.78) whereas the path coefficient from self-concept to anxiety in Latin was negative (− .81). The path coefficients from value of achievement to both enjoyment and anxiety were positive (.23 for enjoyment, .24 for anxiety). These results are in line with our theory in which control-related cognitions correspond with more positive (and less negative) emotional experiences in the classroom. These findings are also consistent with previous research showing that a high value for academic achievement leads to increased achievement-related emotionality, which entails higher levels of both positive and negative emotions (see Lazarus, 1984, and Pekrun, 2000 for a detailed discussion and empirical data on the value-emotionality relationship).

Consistent with our theoretical model, control- and value-related cognitions were both related to the family variables. The path coefficients from reinforcement of achievement in Latin to academic self-concept and value of achievement were both positive (.21 to self-concept, .25 to value). Thus, praise from parents when students do well or get good grades in Latin may enhance both students' control- and value-related cognitions concerning their course. Similar results were found for perceived family esteem of Latin, with positive paths observed from this variable to both the academic self-concept (.37) and value of achievement measures (.23). As such, these results further suggest that when parents make clear the general importance of Latin and its use for learning other languages, this may enhance both control- and value-oriented cognitions in their children with respect to this academic subject.

Domain specificity of academic emotions

Table 3 presents the means and standard deviations of the single-item emotion measures by school subject. As measures of dispersion, we report the range in the means of each emotion across the six subjects (vertical range R_V), and the range in the means of the three emotions in each subject (horizontal range R_H).

Table 3. Intensity of emotions in six school subjects

	Emotion						
	Enjoyment		Anxiety		Boredom		
Subject	*M*	*SD*	*M*	*SD*	*M*	*SD*	Range R_H (*M*)
Latin	2.99	1.03	2.58	1.12	2.49	1.04	0.50
English	3.22	0.83	1.91	0.76	2.48	1.00	1.31
German	2.81	0.97	1.80	0.90	2.83	1.15	1.03
Mathematics	2.65	1.13	2.38	1.14	2.73	1.18	0.35
Music	3.41	1.14	1.30	0.61	2.36	1.20	2.11
Sports	4.17	0.94	1.24	0.57	1.58	0.97	2.93
Range R_V(*M*)	1.52		1.34		1.25		

Note. Item wordings: 'How much do you enjoy. . .?', 'How much anxiety do you feel in. . .?' and 'How much does. . . bore you?'; response categories: (1) *none/not at all*, (2) *a little*, (3) *moderately*, (4) *quite a lot*, (5) *very much/a great deal*. R_V: vertical range, R_H: horizontal range. Sample size: $N = 200$.

The high ranges in the means for the emotions of enjoyment, anxiety, and boredom across the six subjects (i.e. the three vertical ranges R_H) indicate a relatively high level of variation in the intensity of these emotions from subject to subject. ANOVA showed that this variation based on course subject to be significant for each of the three emotions assessed; enjoyment: $F(5, 191) = 63.39$, $p < .001$; anxiety: $F(5, 192) = 65.29$, $p < .001$; boredom: $F(5, 188) = 37.54$, $p < .001$. This difference is particularly pronounced between core and subsidiary subjects, for example, enjoyment of mathematics ($M = 2.65$) versus enjoyment of sport ($M = 4.17$). The horizontal ranges (R_V) indicate much larger differences in the intensity of the three emotions in the subsidiary subjects ($2.11 \leq R_H \leq 2.93$) than in the core subjects ($0.35 \leq R_H \leq 1.31$). In other words, these results suggest a greater degree of polarization of emotions in subsidiary subjects such that students report higher levels of enjoyment, lower levels of boredom, and much lower levels of anxiety concerning their minor courses than with respect to their major courses.

Table 4 presents the fit indices for the three-factor emotion model (where each emotion item loads only on one of three latent emotion variables) and the six-factor academic subject model (where each emotion item loads on one of six latent variables representing different course subjects). As these models are not nested, it is not possible to test whether the difference in the fit is significant. Nonetheless, these results clearly show that the fit indices for the six-factor model are considerably better than those for the three-factor model, indicating a domain-specific organization of the emotions assessed. Consequently, these findings suggest that it might be easier to infer one emotional experience in a specific subject from another emotional experience in that

Table 4. Fit indices for competing models of subject-specific emotion dimensionality

Models	χ^2	*df*	χ^2/df	GFI	CFI	RMSEA
Three-subject emotional model	841.55	132	6.38	.21	.57	.21
Six-factor subject model	415.15	120	3.46	.73	.73	.14

subject, rather than to generalize from one emotional experience in a specific subject to the same emotional experience in another subject.

Table 5 presents the correlations between each of the subject-specific measures separately for each of the academic emotions, namely enjoyment, anxiety, and boredom. The correlations between the subject-specific, end-of-year course grades are also provided. Overall, the correlation coefficients between the academic emotions were

Table 5. Correlations between single-item emotion measures by emotion and achievement

	Enjoyment				
	Latin	English	German	Mathematics	Music
English	.27				
German	.09	.24			
Mathematics	.21	.04	−.04		
Music	.18	.15	.30	.14	
Sports	−.15	−.10	.03	−.11	−.13
	Anxiety				
English	.30				
German	.18	.51			
Mathematics	.29	.35	.26		
Music	.05	.33	.31	.24	
Sports	−.08	.14	.26	.00	.11
	Boredom				
English	.20				
German	.14	.36			
Mathematics	.37	.19	.19		
Music	.20	.02	.38	.19	
Sports	−.08	.05	.21	−.08	.04
	Final course grades				
English	.59				
German	.36	.52			
Mathematics	.58	.41	.24		
Music	.25	.23	.29	.19	
Sports	.03	.03	.10	.04	.27

Note. Item wording: 'How much do you enjoy. . .?', 'How much anxiety do you feel in. . .?' and 'How much does. . . bore you?'; response categories: (1) *none/not at all*, (2) *a little*, (3) *moderately*, (4) *quite a lot*, (5) *very much/a great deal*. Sample size: $N = 200$. $|r| \geq .14$: $p < .05$; $|r| \geq .18$: $p < .01$; $|r| \geq .23$: $p < .001$.

relatively low, with most being lower than those observed between the end-of-year grades measures. Only in related subjects did the correlation coefficients reach a moderate magnitude (e.g. languages: English and German).

These findings give rise to other questions concerning how much variation in the three academic emotions under investigation is due to domain specificity, and to what extent the domain specificity of these emotions differs from those of course grades. As correlation coefficients do not represent interval scale, all of the correlation coefficients in Table 6 were subjected to Fisher's *z*-transformation (Cohen, 1988) in order to calculate mean correlations. Means of the *z*-transformed correlation coefficients (M_z) were then computed for each of the three emotions and for the course performance measure averaging across the different subject areas. However, because the intercorrelations between the emotion measures for the minor subjects were so low, the means of the Fisher's *z*-transformed correlation coefficients were first calculated for all six subjects and then recalculated for the core subjects only. The results are presented in Table 6.

Table 6. Means of the Fisher's z-transformed correlation coefficients

	Means of the Fisher's z-transformed correlation coefficients	
	All subjects	Core subjects only
Enjoyment	.08	.14
Anxiety	.23	.33
Boredom	.14	.18
Year-end grades	.30	.50

Note. For raw data (correlation coefficients), see Table 5. Sample size: $N = 200$.

As shown in Table 6, the *z*-transformed mean correlations (M_z) of the emotions were found to be lower than those for year-end grades, whether based on all six subjects or just the major courses. In other words, students' emotions were more domain specific than their year-end grades. Nonetheless, the results for anxiety suggest that this emotion may be less domain specific than either enjoyment or boredom. Indeed, in the case of anxiety, results suggest a domain-general, if relatively weak, general factor (mean correlations: $M_z = .23$ and $M_z = .33$ for all and core subjects, respectively).

Summary and implications

Antecedents of academic emotions

On the whole, our results confirm the relationships and mediating mechanisms proposed in Pekrun's social-cognitive model concerning the development of academic emotions (Pekrun, 2000). Because this study is cross-sectional in design, however, its findings are primarily of heuristic value. Nonetheless, correlational analyses revealed strong relationships between students' emotional experiences and the antecedents of these emotions as specified in our theoretical model. Relationships consistent with our theoretical approach were also found between students' cognitions, peers, family, instructional variables, and the emotional experiences of students. Results of structural equation modelling provided further empirical support for our conceptual model of

students' emotions, indicating that students' control and value appraisals do play an important role in mediating the impact of family characteristics on emotional experiences. In line with our theoretical model, students' academic self-concept was found to increase enjoyment and reduce feelings of anxiety, whereas a high performance-related (extrinsic) value of Latin seemed to strengthen both emotions.

In sum, our findings demonstrated the central role played by students' appraisals of control and value in mediating the influence of environmental factors on their emotional experiences in academic settings. These results further suggest that these cognitive mechanisms may also serve to mediate the influence of other social environments involving both peers and instructional behaviour of teachers. As such, this study highlights the potential positive influence of parents and educators alike with respect to students' emotions not only directly, for example, by emotional contagion (Hatfield, Cacioppo, & Rapson, 1993) and vicarious experiences (Bandura, 1992), but also indirectly by enhancing these students' perceptions of control and value concerning their experiences in the classroom. Thus, by encouraging parents and teachers to become more aware of how to foster competencies, autonomy, and social relatedness in students, as well their own achievement expectations, goal structures, and performance feedback (see Fig. 1), it may be possible to have a positive influence on students' control and value appraisals, and consequently, their emotional experiences.

Domain specificity in students' emotions

Our research question concerning the domain specificity in students' emotions asked whether it was possible to infer how students feel in one subject from similar emotional experiences in other subjects. The findings of the present study provide little evidence to support this assertion, and instead, suggest that it may be easier to infer a students' emotional experience in one subject from another emotional experience in that same subject. In keeping with previous findings on the domain specificity of psychosocial constructs, our results indicate that academic emotions are, to a great extent, organized along domain-specific lines. However, some relationships of moderate magnitude between emotional experiences in related subjects were observed (e.g. English and German). Our findings further suggest that the degree of domain specificity varies according to the emotion in question, with anxiety being less domain specific than either enjoyment or boredom. Nonetheless, although there does seem to be a general factor in the case of anxiety (see Tables 5 and 6), similar results were only found for related subjects and were not strong enough to suggest that academic anxiety should be considered a domain-general as opposed to subject-specific emotion. As such, it follows that it may be more accurate to discuss students' experiences of academic anxiety in terms of 'domain-specific academic anxiety' rather than the more conventional construct of 'general performance anxiety' (cf. Helmke, 1983).

These findings also demonstrated that all of the academic emotions assessed varied based on the specific academic domain under consideration to a greater extent than did students' end-of-year grades in these courses. This is consistent with previous self-concept research in which students' self-concept concerning their mathematical and verbal competencies are largely independent, despite a considerably higher correspondence between their performance outcomes in these respective areas. Perhaps the most plausible model for explaining this surprising pattern of results is the internal/external frame of reference model (I/E-model, Marsh, 1986), in which inter-individual (social) and intra-individual (dimensional) comparisons contribute

concurrently to the development of academic self-concepts. Although borne out of self-concept research, the principles of the I/E-model could also be effectively applied in future research on the development of academic emotions.

Four key implications of our findings concern the domain specificity of academic emotions. First, from a methodological perspective, these results suggest that future research on students' emotional experiences would be well-advised to take a domain-specific approach. Second, and following from the first, is the need to develop domain-specific instruments to measure such academic emotional experiences. Third, from an applied perspective, counselling or intervention programmes could also be designed along domain-specific lines, for example, to improve students' perceptions of control, value, and emotions in particular courses or subjects. Although domain-general interventions may have an influence on domain-specific outcomes, subject-specific programmes may be more effective in this respect. Fourth, to enhance the effectiveness of instruction (e.g. by adapting teaching to individual differences; see Corno & Snow, 1986; Snow & Swanson, 1992), teachers and educators should also be made aware of the domain specificity of emotions. Previous studies have shown that teachers tend to perceive individual student characteristics as habitual, domain-general attributes rather than more localized, domain-specific phenomena (cf. Marsh, 1993). In conclusion, the findings of the present study suggest that by recognizing the importance of causal antecedents and cognitive mediators of students' academic emotions, researchers may be better able to learn more about students' specific emotional experiences in various school subjects, and further, design effective educational environments as well as treatment methods which foster students' psychological well-being and learning.

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Appendix

Intercorrelations of the parcels of the structural equation model

	Pos. reinforcement		Family esteem		Academic self-concept		Value of achievement		Enjoyment		Anxiety	
	R1	R2	F1	F2	S1	S2	V1	V2	E1	E2	A1	A2
R1	–											
R2	.75	–										
F1	.27	.25	–									
F2	.22	.23	.52	–								
S1	.22	.22	.27	.27	–							
S2	.26	.22	.30	.26	.73	–						
V1	.24	.17	.22	.06	.24	.35	–					
V2	.25	.24	.26	.09	.22	.31	.74	–				
E1	.17	.18	.29	.26	.46	.39	.36	.32	–			
E2	.27	.21	.29	.19	.57	.66	.40	.36	.59	–		
A1	−.19	−.10	−.29	−.25	−.46	−.50	−.11	−.07	−.32	−.47	–	
A2	−.15	−.03	−.14	−.17	−.41	−.46	−.04	.04	−.31	−.52	.64	–

Note. Bivariate Pearson correlations. $N = 200$. $|r| \geq .14$: $p < .05$; $|r| \geq .18$: $p < .01$; $|r| \geq .23$: $p < .001$.