Perceived control and emotions: interactive effects on performance in achievement settings

Joelle C. Ruthig · Raymond P. Perry · Steven Hladkyj · Nathan C. Hall · Reinhard Pekrun · Judith G. Chipperfield

Abstract Individual differences in cognitions and emotions play a critical role in difficult academic situations, such as the transition into college, a period infused with uncertainty. Perceived academic control (low vs. high) and emotions (course boredom, anxiety, and enjoyment) were examined to determine how they jointly predicted 620 first-year students' achievement and attrition over an entire academic year. It was expected that students' emotions would moderate the effects of high perceived control on achievement (final psychology grade, cumulative GPA) and attrition (overall course credits dropped). Regression results revealed several Perceived Control × Emotion interactions that supported this moderation hypothesis: negative emotions impeded the benefits of high control (i.e., boredom and anxiety predicted worse performance in high-control students); positive emotions enhanced the benefits of high control (i.e., enjoyment predicted better performance in high-control students). Conversely, achievement emotions did not predict performance among low-control students. Together, these findings indicate that for a high level of perceived control to enhance students' academic achievement and inhibit attrition, "adaptive" levels of emotions (lower boredom, lower anxiety, or higher enjoyment) are required. Implications for maximizing academic success among both low- and high-control students are discussed.

Keywords Achievement emotions · Perceived control · Achievement · Attrition · College students

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Perceived control, the belief in one's capacity to influence and predict outcomes (Rothbaum et al. 1982; Skinner 1996), plays an important role in human adaptation. Having perceived control, for example, relates to better health and well-being (e.g., Chipperfield and Greenslade 1999), as well as better academic development among students (Perry et al. 2001). Likewise, ample research has demonstrated the critical role of emotions in individuals' responses to various outcomes and events. Negative emotions can be problematic, having been linked to poorer performance (Zeidner 1998) and poorer health (Chipperfield et al. 2003). Conversely, positive emotions have clear benefits (Fredrickson and Losada 2005), predicting superior work performance and evaluation, as well as better health (Lyubomirsky et al. 2005). Moreover, control perceptions may interact with emotions to predict individuals' responses. The current study examines the interplay between perceived control and emotions within the achievement domain.

Few investigators have systematically explored the linkages of perceived control with students' achievement emotions, two exceptions being Weiner's (1985, 1995, 2006) pivotal work on causal attributions and Perkin's (1992, 2000, 2006) control-value theory of achievement emotions. In these two lines of research, control appraisals are considered antecedents of emotions. In the present research, however, we are interested in the joint effects of both control and emotions on subsequent outcomes. Of particular interest is whether the adaptiveness of high perceived control on individuals' responses in a situation depends upon their emotions.

Consider, for example, two job candidates who are both high in perceived control, yet differ in their emotional intensity during a job interview. Having high perceived control, the first candidate feels confident that he can get the job but is overwhelmed with anxiety during the interview. He believes that getting the job is within his control, yet his strong negative emotional reaction prevents him from portraying that assurance during the interview. In contrast, a second candidate, who also has high perceptions of control, experiences considerably less anxiety during her interview and is able to successfully communicate her job competence. This example illustrates a sharp contrast in responses and outcomes due to differing levels of emotion in conjunction with similar control perceptions (i.e., the latter candidate is more likely to get the job because she portrayed confidence, whereas the former candidate portrayed anxiety). As such, this cognitive/affective combination can have critical implications in performance settings such as the workplace, athletic competitions, or college. Discordance between perceived control and certain emotions can have deleterious consequences such as an unsuccessful job interview, losing an important game, or poor academic performance.

Accordingly, it is not sufficient to examine individual differences in low vs. high perceived control, without also considering how those control perceptions may be moderated by certain emotions (e.g., anxiety) in accounting for individuals' responses to challenges presented in achievement settings. The current study explores the joint effects of perceived control and emotions as predictors of college students' academic performance. Specifically, college students' course-related emotions (boredom, anxiety, and enjoyment) were examined as moderators of perceived control in predicting subsequent achievement and attrition over an academic year.

1 Perceived control and discrete emotions

The first year of college can be emotionally-charged and perceived as a low-control environment. The transition from high school into college is marked by many achievement events that can undermine students' efforts to gain a sense of control by repeatedly exposing them to novel and unexpected experiences such as increased emphasis on performance, pres-

sure to excel, more frequent failure, and unfamiliar academic tasks (Perry 2003). These challenges prove to be too much for some students, as illustrated by a survey of US post-secondary institutions which revealed that at the end of their first year of college, 27–33% of entering students drop out (Feldman 2005; Geraghty 1996). Thus, although the freshman year represents a potentially high-control achievement setting, poor performance at the start of the academic year may be incorrectly perceived by many first-year students as a low-control experience. As such, perceptions of control are particularly salient for these individuals (Perry, Hall et al. 2005).

From an attributional perspective (e.g., Peterson et al. 1993; Weiner 1985, 1995), control perceptions are a product of a person's belief in the contingency between his or her actions and an outcome, with the contingency belief being shaped by the person's causal attributions. A student who attributes academic failure to uncontrollable causes, such as lack of ability, will experience anxiety, hopelessness, and decreased expectancies of success. This student can suffer a loss of control and, as a result, may no longer strive toward academic goals. In contrast, a student who attributes academic failure to lack of effort (a controllable cause) will experience motivation and his or her success expectations will be maintained. The student will likely have high perceived control over academic outcomes, and thus, remain committed to trying to avoid future failure. This theoretical reasoning is supported by prior research showing that higher levels of perceived control benefit students' academic development (e.g., Perry et al. 2001; Ross and Broh 2000).

Research has repeatedly shown that individuals with different *levels* of perceived control also differ in other cognitive and performance-related ways (Skinner 1996; Thompson et al. 1994). Both laboratory (Perry and Dickens 1984; Schönwetter et al. 1993) and field research (Hall et al. 2006; Perry et al. 2001; Struthers et al. 1996) suggests that students with high perceived control are *distinct* from those with low perceived control in cognitive elaboration, motivation, attribution style, creativity, achievement, and attrition. Low-control students tend to be failure-prone and helpless-oriented and differ considerably in their academic trajectories compared to high-control students, who tend to be academically successful and mastery-oriented (Hall et al. 2006; Perry et al. 1993; Perry, Hladkyj et al. 2005). Thus, differences in perceived academic control among students may be conceptualized as a continuum anchored by two distinct groupings: low-control students and high-control students (Perry, Hall et al. 2005). Our study acknowledges this distinction by examining emotional experiences and academic outcomes among groups of low- and high-control first-year college students.

In addition to perceived control, students' *emotional experiences* influence how they respond to academic challenges by enhancing or impeding their learning and achievement (Pekrun et al. 2002a). According to Pekrun's control-value theory of achievement emotions (Pekrun 1992; Pekrun et al. 2002a), specific emotions can be classified along two distinct dimensions: a positive/negative dimension and an activating/deactivating dimension. *Activating* emotions, such as enjoyment or anger, heighten physiological arousal and tend to result in students taking positive action, as a result of enjoyment, or negative action, as a result of anger. *Deactivating* emotions such as relief or boredom lead to decreased arousal and action, often in the form of cognitive or behavioral disengagement (Pekrun 1992, 2006).

Negative deactivating emotions may hinder students' performance (Turner et al. 1998). For instance, studying may be reduced by academic boredom, which has been linked to task avoidance, attrition, and underachievement (Barr and Knowles 1986; Davis 1984; Martinez 1986). Conversely, positive activating emotions facilitate students' academic pursuits (Lao and Krashen 2000; Yasutake and Bryan 1995). For example, academic enjoyment has been shown to enhance motivation and task concentration (Pekrun 1992). Whereas boredom and enjoyment are diametrically opposed in terms of valence and activation dimensions,

academic anxiety is a negative activating emotion. Past research (Pekrun 1988) shows that high course anxiety predicts both task avoidance and reduced intrinsic motivation.

2 Emotions as moderators of perceived control: predicting achievement and attrition

We explored three achievement emotions (boredom, anxiety, and enjoyment) as potential moderators of perceived academic control (low/high) in predicting subsequent performance of college students, reflected in their year-end introductory psychology course grade, cumulative GPA, and voluntary course withdrawal across all courses enrolled in during that academic year. In the extant research, control has been studied as an antecedent of achievement emotions (Pekrun 2006; Weiner 1985) and academic attainment (Perry et al. 2001), but there is a lack of research focusing on the joint effects of perceived control and emotions on attainment. Academic *boredom* is a common negative emotion experienced among students, yet it has not been examined in combination with academic control as predictors of scholastic performance. *Anxiety* was included in our study as a reference point concerning previous research on the effects of anxiety on students' performance (e.g., Hembree 1988; Zeidner 1998). Finally, we included academic *enjoyment* in the study because the impact of positive emotions is often neglected in educational research (Pekrun et al. 2002b).

Although prior college attrition research has focused on academic self-concept, financial resources, personality, educational background, and institutional characteristics (Barrineau 2005; House 1992; Hyers and Joslin 1998; Metz 2004), perceived academic control (PAC) predicting attrition as a function of different achievement emotions has not been considered. We examined the possibility that emotions moderate the effects of PAC in predicting achievement and attrition over time, thus providing further insight into students' first-year experiences.

Because negative emotions tend to inhibit academic performance and positive emotions tend to benefit performance (Pekrun 1992), we expected course-related boredom and anxiety to negatively predict achievement and positively predict attrition, and enjoyment to positively predict achievement and negatively predict attrition. That is, lower levels of boredom, lower levels of anxiety, or higher levels of enjoyment should predict better psychology course grades, higher cumulative GPAs, and fewer courses dropped relative to higher anxiety or boredom, or lower enjoyment. Based on past findings that PAC benefits academic development (Perry 1991; Perry et al. 2001; Perry, Hladkyj et al. 2005), we also expected that high-control students would have better final course grades, higher GPAs, and withdraw from fewer courses than low-control students.

These hypothesized main effects for perceived control may be moderated by students' emotions. The potential achievement benefits of high PAC may be facilitated by course enjoyment: if high-control students believe that their academic outcomes are within their control, greater course enjoyment should make acting on those control perceptions seem worthwhile. This hypothesis is in line with assumptions of expectancy-value theories implying that outcome-related expectancies induce motivation if the outcomes are valued (see Graham and Weiner 1996, for a review). In contrast, high-control students with little academic enjoyment may not view acting on their control perceptions as worthwhile. Moreover, using the expectancy-value framework (Pekrun 1993; Weiner and Sierad 1975), high PAC paired with strong negative emotions such as boredom or anxiety would likely predict poorer academic performance. High-control students experiencing boredom or anxiety may fail to engage their control perceptions because they are overwhelmed with negative affect associated with the academic task at hand.

We examined the interactive effects of perceived control and emotions, with a specific interest in whether negative emotions inhibit the achievement benefits of high PAC and positive emotions facilitate the benefits of high PAC. Accordingly, low- and high-control students' boredom, anxiety, and enjoyment were examined as predictors of their psychology course grades, GPA, and course withdrawal rates. Boredom, anxiety, and enjoyment were expected to moderate the effect of high perceived control on performance so that lower, relative to higher, boredom or anxiety should predict significantly better final grades, higher GPA, and less attrition among high-control students. Higher, relative to lower, enjoyment should predict significantly better final grades, higher GPA, and less overall course attrition among high-control students.

3 Method

3.1 Participants & procedure

Early in the academic year, 620 first-year students from a large, mid-western research-1 university were recruited from several sections of an introductory psychology course to participate in the study in exchange for experimental credit. The sample included 386 women and 228 men (6 did not specify gender) whose average age was 18 years.

The study was conducted in two phases. During the first semester (October), all participants signed up for a session to complete a survey that was administered to groups of 25–50 students at a time. The survey included measures of academic control and emotions, as well as other academic constructs. For the second phase of the study, students' final grades (percentages) in their introductory psychology course were obtained with their permission from the instructor upon completion of the course. Cumulative GPA and voluntary course withdrawal information was obtained from institutional records after the completion of the academic year.

3.2 Measures

3.2.1 Perceived academic control

A 10-item Likert-style scale based on Perry et al.'s (2001) Academic Control Scale ($\alpha = .80$; 5-month test–retest reliability: $r = .59$, $p < .01$; Perry, Hladkyj et al. 2005) was used to measure students' perceptions of academic control (PAC). An example of a PAC item is "I have a great deal of control over my academic performance in my psychology course." After reverse coding the negatively expressed items, responses (1 = *Strongly disagree*; 5 = *Strongly agree*) were summed so that high scores indicate high PAC and low scores indicate low PAC ($M = 42.24$, $SD = 5.15$, $Range = 13$–50). Students were designated as either "low" or "high" in PAC on the basis of a median split (low control: $n = 271$, $M = 37.80$, $SD = 4.44$; high control: $n = 343$, $M = 45.80$, $SD = 2.01$). This median-split procedure is consistent with the technique commonly used to distinguish low from high perceived control individuals (Bailis et al. 2005; Chipperfield et al. 1999; Perry et al. 2001; Thompson et al. 1994; Weisz et al. 1994).

3.2.2 Achievement emotions

Students' boredom, anxiety, and enjoyment were assessed using three 6-item scales adopted from the Achievement Emotions Questionnaire (Pekrun et al. 2002a; Pekrun et al. 2005). An

example of a *boredom* item is "The content is so boring that I often find myself daydreaming." Responses ranging from 1 *(not at all true)* through 5 *(completely true)* were summed so that a high score indicated a high level of boredom ($M = 12.79$, $SD = 5.09$, $Range = 6–30$, $\alpha = .89$). An item measuring *anxiety* is "I get nervous when I have problems studying," with the same response range and summing procedure as boredom ($M = 15.68$, $SD = 4.96$, $Range = 6–30$, $\alpha = .82$). The 5-month test–retest reliabilities of the boredom and anxiety measures are $r = .68$, $p < .01$; and $r = .62$, $p < .01$, respectively (Perry et al. 2001). An example of an *enjoyment* item is "I enjoy learning new things," with the same response range and summing procedure as the two negative emotions ($M = 19.29$, $SD = 3.98$, $Range = 8–30$, $\alpha = .71$). A 5-month test–retest reliability of enjoyment based on a separate sample is $r = .66$, $p < .01$.

3.2.3 Psychology course grade (percentage)

As a measure of course-specific academic achievement, and upon students' written consent, final percentages in their introductory psychology course were obtained from course instructors ($M = 76.61$, $SD = 15.79$, $Range = 5.50–116.40$; some instructors gave "bonus marks" which resulted in some students achieving more than 100%).

3.2.4 Cumulative grade point average (GPA)

Overall academic achievement was measured using participants' cumulative grade point average (GPA) at the end of the academic year (i.e., A+=4.5, A=4.0, B+=3.5, B=3.0, etc.; $M = 2.72$, $SD = 0.90$, $Range = 0.14–4.50$). By using cumulative GPA as an additional measure of achievement, we were able to obtain a comprehensive estimate of students' academic success based on various forms of performance assessments within each course (e.g., essays, assignments, exams). This variety of assessments is multiplied across several courses that the students are enrolled in during the academic year (approx. 8 to 10 1-semester courses per academic year).

3.2.5 Voluntary course withdrawal (VW)

Attrition was measured by the overall number of credit hours participants voluntarily withdrew from during the academic year, with three credit hours being equivalent to a 1-semester course ($M = 2.19$, $SD = 3.71$). The minimum number of credit hours dropped was 0 and the maximum dropped was 27 (or nine 1-semester courses).

4 Results

4.1 Rationale for analyses

Consistent with past research (e.g., Hall et al. 2006; Perry et al. 2001; Perry, Hladkyj et al. 2005), a median split was used to classify students as either "low" or "high" in perceived academic control (PAC) because we were primarily interested in the distinct groupings of control in students that have the most important scholastic implications. For instance, low vs. high control has been shown to significantly influence academic development among college students in terms of effort exerted, motivation, self-monitoring, perceived success, and final

course grades (Perry et al. 2001; Perry, Hladkyj et al. 2005). Mean comparisons in our study confirmed that low- and high-control groups differed significantly in our measure of PAC, $t(612) = 29.55$, $p < .001$.

Hierarchical regression analyses were used to test the expectation that students' achievement emotions would moderate the associations between their high perceived control and subsequent performance. Separate regression models were computed to examine PAC (low/high) and an achievement emotion (boredom, anxiety, or enjoyment) as predictors of students' psychology course grade, GPA, and VW. Step 1 of each regression model included PAC (low/high) and an emotion as predictors to test their main effects on the dependent measure. In Step 2, a PAC (low/high) × Emotion interaction term was added into the model to test the moderating effects of each emotion. Because of this study's exploratory nature, and due to the difficulty of detecting moderator effects in regression analysis of field research (McClelland and Judd 1993), a significance level (p) of .10 was adopted for the PAC × Emotion interaction analyses. Our purpose was to address the concern that a more conservative significance level would result in committing Type II errors, thus obscuring important moderator effects.

4.2 PAC × Boredom

Regression results for students' PAC and boredom predicting their achievement (course grade, GPA) and attrition (courses dropped) are presented in Table 1. As expected, high (relative to low) PAC predicted significantly better final psychology course grades ($\beta = .115$, $p < .01$) and GPAs ($\beta = .111$, $p < .01$). Also as expected, boredom negatively predicted performance: greater boredom was associated with significantly lower final grades ($\beta = -.241$, $p < .001$), lower GPAs ($\beta = -.174$, $p < .001$), and marginally higher course attrition ($\beta = .074$, $p = .08$).

The hypothesized PAC × Boredom interactions were also significant for all dependent measures. For *final grade*, the PAC × Boredom interaction was significant ($\beta = -.324$, $p < .05$) and the addition of this interaction term in Step 2 of the regression model resulted in a significant increment to R^2: $F_{inc}(1, 576) = 4.62$, $p < .05$. For *GPA*, the PAC × Boredom interaction was marginally significant ($\beta = -.259$, $p = .085$) and the addition of this interaction term in Step 2 resulted in a marginal increment to R^2: $F_{inc}(1, 589) = 2.97$, $p = .08$. For course attrition, the PAC × Boredom interaction was again significant ($\beta = .355$, $p < .05$) and the addition of this interaction term resulted in a significant increment to R^2: $F_{inc}(1, 607) = 5.58$, $p < .05$.

Table 1 Perceived Academic Control (PAC) × Boredom Predicting College Students' Achievement and Attrition

Predictors	Final Psych Grade (%)			Cumulative GPA			VW		
	B	SE	β	B	SE	β	B	SE	β
Step 1									
PAC (low/high)	3.624	1.298	.115***	.201	.075	.111***	−.169	.359	−.020
Course Boredom	−0.747	.128	−.241****	−.031	.007	−.174****	.062	.035	.074*
Step 2									
Boredom × PAC (low/high)	−0.551	.256	−.324**	−.025	.015	−.259*	.166	.070	.355**

* $p < .09$. ** $p < .05$. *** $p < .01$. **** $p < .001$.
Note. VW = voluntary course withdrawal. For final psychology grade (%): Step 1 $R^2 = .09$, $p < .001$; Step 2 $R^2 = .09$, $p < .001$. For cumulative GPA: Step 1 $R^2 = .05$, $p < .001$; Step 2 $R^2 = .06$, $p < .001$. For VW: Step 1 $R^2 = .01$, *ns*; Step 2 $R^2 = .02$, $p < .05$

In order to clarify the PAC × Boredom interaction effect on final grade and for illustrative purposes, we dichotomized the boredom measure based on a median split and plotted the means for the four possible combinations of PAC (low, high) and boredom (low, high) in Fig. 1. As shown in the figure, our moderating hypothesis appears to be supported. High levels of boredom (represented by the broken line in Fig. 1) inhibit the achievement benefits of high PAC, yet low levels of boredom (represented by the solid line) facilitate high PAC in predicting better final course grades. To check this interpretation of the interaction, we computed post hoc t-tests to assess the group mean differences. These post hoc comparisons further support our moderating hypothesis. Among students with high PAC, those with lower levels of boredom had significantly better final grades ($M = 83.03$) than both their high-boredom counterparts ($M = 73.59$), $t(329) = 6.00$, $p < .001$; and those with low boredom but low PAC ($M = 73.74$), $t(277) = -4.86$, $p < .001$. Additional support for the moderation hypothesis is evident in the lack of difference in final grades between low and high PAC students with high levels of boredom ($Ms = 73.51$ vs. 73.59, respectively), $t(299) = -0.04$, ns.

As with final grade, post hoc t-tests of group mean differences for the PAC × Boredom interactions on GPA and VW revealed consistent results. Students with high PAC and lower boredom obtained better GPAs ($M = 3.02$) than both high PAC students with higher boredom ($M = 2.59$), $t(322) = 4.56$, $p < .001$; and low PAC students with lower boredom ($M = 2.60$), $t = (278) = -3.73$, $p < .001$. Again, having high control did not benefit GPA when students were experiencing high levels of boredom (low PAC: $M = 2.54$ vs. high PAC: $M = 2.59$), $t(311) = 0.80$, ns. Likewise, high-PAC/low-boredom students dropped fewer course credits ($M = 1.86$) than both high PAC students with high boredom ($M = 2.96$), $t(340) = -2.54$, $p < .05$; and low PAC students with low boredom ($M = 3.26$), $t(287) = 2.73$, $p < .01$. Again, high PAC did not predict less attrition when students were experiencing high boredom (low PAC: $M = 2.34$ vs. high PAC: $M = 2.96$), $t(320) = -1.24$, ns. Findings among these three performance measures consistently show that boredom moderates the beneficial effects of high PAC on performance: experiencing lower (compared to higher) boredom predicted significantly better achievement and less attrition among high PAC students.
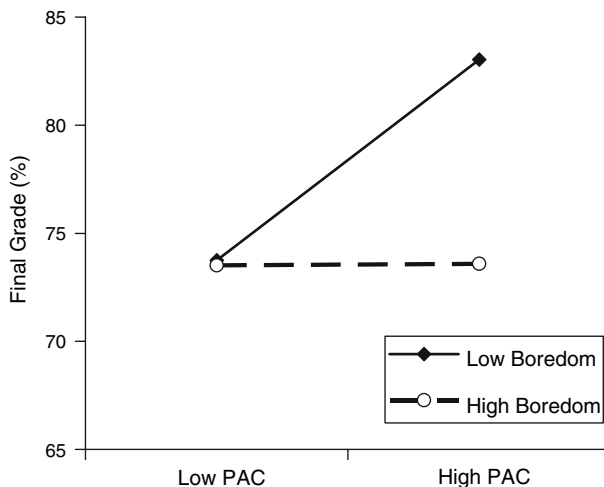

Fig. 1 Academic boredom predicting final psychology grade among low- and high-control students

Table 2 Perceived Academic Control (PAC) × Anxiety Predicting College Students' Achievement and Attrition

	Final Psych Grade (%)			Cumulative GPA			VW		
Predictors	B	SE	β	B	SE	β	B	SE	β
Step 1									
PAC (low/high)	4.259	1.312	.135***	0.232	.075	.129***	−0.183	.356	−.021
Course Anxiety	−0.535	.131	−.169****	−0.024	.007	−.131***	0.076	.036	.089**
Step 2									
Anxiety × PAC (low/high)	−0.643	.270	−.418**	−0.027	.015	−.307*	0.005	.073	.013

$^*p = .08.$ $^{**}p < .05.$ $^{***}p < .01.$ $^{****}p < .001.$
Note. VW = voluntary course withdrawal. For Final psychology grade (%): Step 1 $R^2 = .06$, $p < .001$; Step 2 $R^2 = .07$, $p < .001$. For Cumulative GPA: Step 1 $R^2 = .04$, $p < .001$; Step 2 $R^2 = .05$, $p < .001$ For VW: Step 1 $R^2 = .01$, *ns*; Step 2 $R^2 = .01$, *ns*

4.3 PAC × Anxiety

Table 2 shows the results of the regression analyses for students' PAC and anxiety on their achievement and attrition. Again, high, relative to low, PAC predicted significantly better final course grades ($\beta = .135$, $p < .01$) and GPAs ($\beta = .129$, $p < .01$). Similar to boredom, anxiety also negatively predicted performance: greater anxiety was associated with significantly lower course grades ($\beta = −.169$, $p < .001$) and GPAs ($\beta = −.131$, $p < .01$), and greater course attrition: ($\beta = .089$, $p < .05$).

The expected PAC × Anxiety interactions were also significant for both achievement measures. For *final grade*, the PAC × Anxiety interaction was significant ($\beta = −.418$, $p < .05$) and the addition of this interaction term in Step 2 of the regression resulted in a significant increment to R^2: $F_{inc}(1, 576) = 5.70$, $p < .05$. Likewise, the interaction was marginally significant for *GPA* ($\beta = −.307$, $p = .08$) and the addition of this interaction term resulted in a marginal increment to R^2: $F_{inc}(1, 589) = 3.09$, $p = .08$. To again clarify the interaction effect on final grade, we dichotomized the anxiety measure based on a median split and plotted the means for the four combinations of PAC (low, high) and anxiety (low, high) in Fig. 2. Consistent with our moderating hypothesis, high levels of anxiety inhibited the achievement benefits of high PAC, whereas low levels of anxiety facilitated high PAC in predicting better final course grades. Post hoc *t*-tests showed that among high PAC students, those with lower anxiety had significantly better final grades ($M = 82.76$) than their high anxiety counterparts ($M = 74.44$), $t(330) = 5.27$, $p < .001$; and those with low anxiety but low PAC ($M = 74.66$), $t(273) = −4.32$, $p < .001$. Consistent with the boredom findings, there was a non-significant difference in final grades between low and high PAC students with high anxiety ($M = 73.06$ vs. 74.44, respectively), $t(303) = −0.77$, *ns*.

Similar to those for final grade, post hoc results for the PAC × Anxiety interaction on GPA were consistent with our moderating hypothesis. High PAC students with lower anxiety obtained better GPAs ($M = 3.04$) than both high PAC students with high anxiety ($M = 2.59$), $t(333) = 4.73$, $p < .001$; and low PAC students with low anxiety ($M = 2.07$), $t = (277) = −3.90$, $p < .001$. Again, having high control did not enhance GPA when students were experiencing high levels of anxiety (low PAC: $M = 2.53$ vs. high PAC: $M = 2.59$), $t(312) = −0.65$, *ns*. Thus, results were consistent with those for boredom: anxiety moderated the effects of PAC in that PAC benefited achievement only in the presence of lower anxiety. Because the PAC × Anxiety interaction was non-significant for VW, no post hoc comparisons were made.
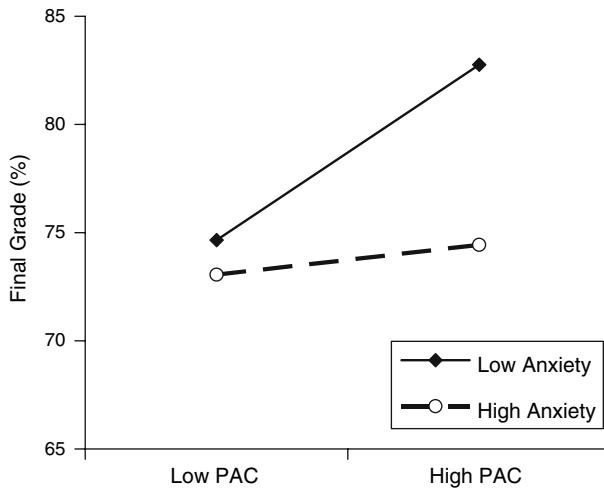
Fig. 2 Academic anxiety predicting final psychology grade among low- and high-control students

4.4 PAC × Enjoyment

Regression results for students' PAC and enjoyment on their achievement and attrition are presented in Table 3. As hypothesized, high relative to low PAC predicted significantly better final grades ($\beta = .153$, $p < .001$) and GPAs ($\beta = .154$, $p < .001$). Also as expected, enjoyment predicted significantly better final course grades ($\beta = .107$, $p = .01$).

The hypothesized PAC × Enjoyment interaction for *final grade* was not significant but it was in the predicted direction ($\beta = .362$, $p = .16$) and the addition of this interaction term in Step 2 resulted in a marginal increment to R^2: $F_{inc}(1, 576) = 1.90$, $p = .10$. Likewise, the interaction was marginally significant for *GPA* ($\beta = .425$, $p = .105$) and the addition of this interaction term resulted in a marginal increment to R^2: $F_{inc}(1, 589) = 2.64$, $p = .10$.

Although these interaction effects on achievement were not below the significance level of .10, we again dichotomized the emotion measure based on a median split and for illustrative purposes, plotted the final grade means for the four combinations of PAC (low, high) and

Table 3 Perceived Academic Control (PAC) × Enjoyment Predicting College Students' Achievement and Attrition

Predictors	Final Psych Grade (%)			Cumulative GPA			VW		
	B	SE	β	B	SE	β	B	SE	β
Step 1									
PAC (low/high)	4.840	1.313	.153**	.278	.075	.154**	−.322	.355	−.038
Course Enjoyment	0.422	.164	.107*	.007	.009	.029	−.001	.044	−.001
Step 2									
Enjoyment × PAC (low/high)	0.455	.330	.362	.031	.019	.426	−.094	.089	−.279

$^*p < .05.$ $^{**}p < .001.$

Note. VW = voluntary course withdrawal; For Final psychology grade (%): Step 1 $R^2 = .04$, $p < .001$; Step 2 $R^2 = .05$, $p < .001$. For Cumulative GPA: Step 1 $R^2 = .03$, $p < .001$; Step 2 $R^2 = .03$, $p < .001$. For VW: Step 1 $R^2 = .01$, *ns*; Step 2 $R^2 = .01$, *ns*
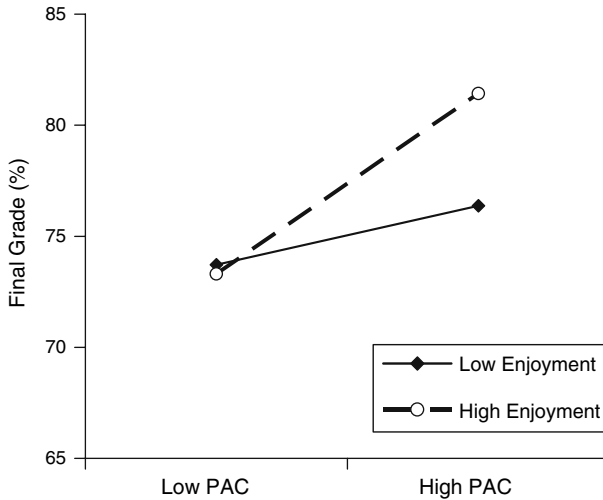
Fig. 3 Academic enjoyment predicting final psychology grade among low- and high-control students

enjoyment (low, high) in Fig. 3. The pattern of results in Fig. 3 is the inverse of those found for the negative emotions, and supports our moderating hypothesis. Low enjoyment inhibited the achievement benefits of high PAC, yet higher enjoyment facilitated high PAC in predicting better final course grades. Post hoc comparisons further support our hypothesis. Among students with high PAC, those with higher levels of enjoyment had significantly better final grades ($M = 81.43$) than both those with low enjoyment ($M = 76.37$), $t(328) = -3.13$, $p < .01$; and those with high enjoyment but low PAC ($M = 73.34$), $t(281) = -4.34$, $p < .001$. Additional support for the moderation hypothesis is evident in the non-significant difference in final grades between low and high PAC students with low enjoyment ($M = 73.72$ vs. 76.37, respectively), $t(295) = -1.47$, ns. Post hoc comparisons for GPA mirror those for final grade. High PAC students with high enjoyment had significantly better GPAs ($M = 2.94$) than both those with lower enjoyment ($M = 2.74$), $t(331) = -2.06$, $p < .05$; and those with high enjoyment but low PAC ($M = 2.46$), $t(292) = -4.52$, $p < .001$. The difference in GPA between low and high PAC students with low enjoyment was non-significant (low PAC: $M = 2.63$ vs. high PAC $M = 2.74$), $t(297) = -1.04$, ns.

Overall, lower boredom, lower anxiety, or greater enjoyment facilitated high PAC in predicting better achievement (higher final course grades and cumulative GPAs), and in the case of boredom, less attrition (fewer courses dropped).[1] Together, the results support our hypotheses by showing that among high PAC students, lower negative or higher positive emotions benefit their academic performance. Conversely, the achievement benefits of high PAC were inhibited among students with higher negative or lower positive emotions, resulting in performance levels that are comparable to those of students with low PAC (see Figs. 1–3;[2]).

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[1] We recomputed each hierarchical regression examining the PAC × Emotion interactions, adding the two other emotions into Step 1 of the analysis to determine whether results differed when all three emotions were accounted for. Effects were replicated for PAC, boredom, anxiety, and their corresponding interactions. The main and interaction effects for enjoyment, however, were greatly reduced when the two negative emotions were included in the model, suggesting that negative emotions may be more important than positive emotions in predicting college performance.

[2] To alleviate concern that overall ability may be a third variable contributing to the PAC × Emotion interaction effects in predicting final grade, cumulative GPA, and course attrition, we recomputed each regression analyses

5 Discussion

Perceived academic control (PAC) was positively associated with first-year students' performance in college over an entire academic year. These results support previous findings (Perry 1991; Ross and Broh 2000) that high control benefits students' academic development. Significant main effects for perceived control on final psychology course grade and cumulative GPA indicate that high-control students outperformed low-control students in their first year of college. Achievement emotions were also associated with students' performance. Boredom and anxiety negatively predicted performance; enjoyment positively predicted performance.

Moreover, the performance benefits of PAC were moderated by achievement emotions (boredom, anxiety, and enjoyment). That is, among high-control students, lower relative to higher boredom or anxiety and higher relative to lower enjoyment predicted better final psychology grades and cumulative GPAs, as well as less course attrition. Among low-control students, having higher positive or lower negative emotions failed to enhance their college performance.

The distinct academic realities of low- and high-control students, as demonstrated both in the current study and past research (Hall et al. 2006; Perry et al. 1993; Perry, Hall et al. 2005), have critical implications for college instructors asking "How can I facilitate academic success among my first-year students?" (Perry 2003). Following this initial, rather broad question, many instructors contemplate strategies for making their classes more enjoyable so that students are engaged in the course material and boredom is minimal. Instructors may also think of ways to minimize course anxiety, which can reduce students' likelihood of success. Our findings suggest that these instructional issues are especially relevant when considering how to enhance academic success among *high-control* students. For *low-control* students, it may be helpful to first focus on bolstering their perceptions of control.

5.1 Implications for high-control & low-control students

Lower negative or higher positive emotions facilitated high PAC in predicting better achievement and less attrition. Thus, knowing their students have strong perceptions of control over academic outcomes, instructors should strive to maximize the desirable level of emotions among their students. For instance, instructors could facilitate course enjoyment and minimize boredom by expressing enthusiasm, involving students in class discussions, relating course material directly to students' own lives, etc. (see Pekrun 2006, 2007 for more suggestions). Instructors could also make the course predictable in attempt to reduce course anxiety (Zeidner 1998). These suggestions aim to reduce course boredom and anxiety and enhance enjoyment, which based on the current findings, should predict better academic performance among high-control students.

Moreover, expectancy-value theory suggests that both control-related expectancies and value are necessary for sufficient motivation to achieve an outcome (see Graham and Weiner 1996 for a review). Thus, value is necessary to make acting upon control perceptions worthwhile. Assuming that higher positive emotions are associated with greater value, high-control students who are experiencing a strong positive emotion (i.e., course enjoyment) will likely do what is required to attain a desired outcome because their emotion makes doing so seem worthwhile. Such students may reason "I can succeed in this course if I work hard and I do

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Footnote 2 continued

including a measure of prior high school achievement as a covariate to account for potential differences in prior aptitude. Result showed the PAC × Emotion interactions were replicated when statistically accounting for any preexisting aptitude differences.

not mind studying because I really enjoy the course." In this case, high control and value are present, resulting in sufficient motivation to attain academic success. Therefore, positive emotions encourage students to use their control perceptions to work hard on academic tasks because doing so is rewarding. Conversely, a high-control student with less enjoyment may think "I can succeed in this course, but studying is a chore." For this student, it is unappealing to put sufficient effort into the course.

Having low levels of boredom or anxiety is also relevant to students' course grades and cumulative GPAs. For instance, high-control students with relatively strong negative emotions such as boredom may reason "I know that succeeding is within my control but studying for this course is very boring and I often get distracted." These students realize that the onus is on them to do well in their college courses but their boredom prevents them from engaging their control perceptions and doing what is necessary to succeed. As such, reducing boredom among these students would likely facilitate their achievement. In sum, our findings support the premise that minimizing negative emotions and enhancing positive emotions among high-control students will benefit their academic performance.

Conversely, optimizing achievement emotions appears to be less relevant to academic attainment among low-control students. That is, low-control students with lower boredom, lower anxiety, or higher enjoyment did not perform any better than those with higher boredom, higher anxiety, or lower enjoyment. Thus, instructors should first focus on boosting academic control perceptions among these students when wanting to optimize students' performance.

Fortunately, a cognitive intervention has repeatedly been shown to enhance perceived control among first-year college students. Based on attribution theory (Weiner 1985, 1995), attributional retraining (AR) is a cognitive treatment aimed at increasing students' propensity to use adaptive causal attributions that are conducive to achievement motivation, while reducing students' use of maladaptive causal attributions to explain academic outcomes (Perry, Hall et al. 2005). That is, AR replaces *maladaptive* attributions such as lack of ability or test difficulty, with *adaptive* attributions such as effort and strategy, thereby enhancing students' perceived control over their academic performance.

Extensive research has demonstrated that AR increases PAC among low-control students. Hall et al. (2004), for example, found that students who received AR early in the academic year had significantly greater PAC at the end of the year, compared to their no-AR counterparts. Similarly, other research (Hall et al. 2006; Perry et al. 2003) showed that students who received AR subsequently made fewer uncontrollable attributions for poor performance. Moreover, first-year students who receive AR early in the academic year have been found to experience a significant increase in both their use of controllable attributions and their overall control perceptions by the end of the year (Haynes et al. 2006; Ruthig et al. 2003).

In addition to increasing control perceptions, AR also benefits academic outcomes among low-control students. Within a laboratory setting, both Perry and Penner (1990) and Menec et al. (1994) found that low-control students who were given AR significantly outperformed their no-AR counterparts on homework assignments and achievement tests and experienced better academic adjustment. The benefits of AR have been replicated within actual classroom settings in terms of enhancing students' final course grades (Perry and Struthers 1994; Struthers and Perry 1996) and cumulative GPAs, as well as reducing academic attrition (Ruthig et al. 2004).

Together, the current findings point to different recommendations for instructors wanting to facilitate academic success among high- and low-control students. For high-control students, various strategies were suggested for reducing negative emotions and increasing positive emotions in order to maximize students' academic performance. Conversely, for low-control students, instructors' initial focus should be on increasing students' PAC via attributional

retraining. Once these students gain a sense of control over their academic outcomes, the focus can shift to reducing their negative achievement emotions and enhancing their positive emotions.

5.2 Strengths and limitations

Our results must be viewed within the overarching strengths and limitations of the study. A major strength of this study is that it highlights the importance of emotions in achievement motivation and performance. With the exception of test anxiety studies (Zeidner 1998, 2007) and Weiner's (1985, 1995) attributional research on achievement emotions, students' emotions have generally been neglected until recently in research on motivation and academic performance (Schutz and Pekrun 2007). This omission has been underscored by researchers suggesting that other emotions must be considered to more fully comprehend students' academic experiences (Pekrun et al. 2002a; Schutz and DeCuir 2002; Turner et al. 2002). We found three emotions predicted students' academic experiences in different ways. Not surprisingly, high-control students who had relatively lower academic anxiety performed better than those with higher anxiety. More importantly, boredom and enjoyment, in addition to anxiety, predicted students' academic performance. That is, high-control students with lower levels of boredom performed significantly better and dropped fewer courses than their high-boredom counterparts. The opposite pattern was found for enjoyment: high-control students with higher enjoyment performed better than those who had lower enjoyment.

Interestingly, boredom was the only emotion to predict attrition among high-control students. A plausible explanation for this finding is that high levels of boredom make remaining in a course seem unbearable. Because these students have high PAC, they view themselves as able to directly influence the situation by removing themselves from the course to alleviate their boredom. In contrast, high levels of anxiety may overwhelm high PAC students' sense of control in the course, leaving them feeling somewhat trapped and unable to withdraw. Alternatively, students' high control may temporarily quell their anxiety enough to remain in the course, but not enough to facilitate achievement. This reasoning is supported by the fact that anxiety predicted achievement but not attrition among high-control students. Finally, it appears that low positive emotions do not warrant attrition. It is possible that while high-control students may not especially enjoy a course, they remain in it to avoid lost tuition or having to repeat the course. Admittedly, these are speculations for why only boredom predicted attrition among high-control students and we cannot be certain without having questioned students who withdrew from their courses. However, our study represents an important first step in identifying which achievement emotions predict attrition among high-control students and research following up with students who withdraw from courses would provide valuable insight into this issue.

Another contribution of our study is its extension of the limited research on positive emotions (Fredrickson and Branigan 2001). As Bonanno and Mayne (2001) explain, psychology tends to focus on negative emotions instead of exploring the benefits of positive emotions. Existing research indicates that positive emotions can increase cognitive flexibility and learning, as well as improve psychological and physical health (e.g., Isen 2002; Lyubomirsky et al. 2005). Our study shows the benefits of positive emotions also include better academic performance.

This study also improves upon prior academic achievement research that typically focuses on course grades or class tests, by including measures of cumulative performance (overall GPA) and attrition (courses dropped over an entire academic year). These cumulative, longitudinal outcome measures provide a more complete representation of students' first-year

college experience and are thus more ecologically valid than a single course grade. Including cumulative GPA as an achievement measure extends prior perceived control research by showing that benefits of high academic control extend beyond single courses into various academic contexts.

Our participants were recruited from a subject area that attracts students from many different disciplines. Introductory Psychology is popular among first-year students and serves as a core course for several undergraduate programs. In our sample, many participants ($n = 308$) were from the Faculty of Arts, a large number ($n = 191$) were from the Faculty of Science, and still others were from the Faculties of Human Ecology, Management, Engineering, Physical Education, and Nursing. Aside from incorporating students from several faculties, another advantage is that participants came from several different sections of an introductory psychology course consisting of over 3,000 students taught by different instructors in various class sizes. Thus, using this sample allowed us to incorporate a mixture of classroom teaching and learning dynamics, making it representative of a typical first-year course.

Although the study provides insight into the linkages among perceived control, achievement emotions, and college performance, there are limitations. First, our measures of PAC and achievement emotions pertain specifically to students' introductory psychology course experiences. Students' responses were then used to predict their GPA and course withdrawal across all of the courses they were enrolled in for the academic year. Although students may experience different emotions in very distinct courses (i.e., they may enjoy psychology, but dislike biology), their experience in this single course significantly predicted their overall academic performance (GPA) and attrition (VW) in a variety of courses taken during the year. Moreover, the results for course-specific achievement (psychology course grade) were replicated for overall achievement (i.e., cumulative GPA). This suggests that PAC and achievement emotions, although specific to the academic domain, are likely generalizable across courses with similar subject areas or classroom experiences. For instance, a sense of control in one course may lead students to see themselves as having control in other courses. Alternatively, having high control and positive emotions in one course may motivate students to persist in their less desirable courses, whereas experiencing negative emotions in a course or feeling out of control may discourage students and jeopardize their entire year's academic performance. Thus, although global measures of academic control and emotions may have been preferable to predict general indicators of achievement, our method yielded key findings regarding single course experiences as significant predictors of both course-specific achievement and overall achievement and attrition among first-year students.

A second limitation concerns the negative skew of our PAC measure. The possible range for this scale was 10 to 50, yet the overall mean was 42.24, a relatively high level of control. Consequently, our low-control group had a fairly moderate level of control ($M = 37.80$). Although the low- and high-control groups differed significantly, our results do not represent individuals who have truly low academic control, as such low-control individuals are unlikely to enter college (Stipek and Weisz 1981). Relatedly, dichotomizing this PAC measure may have limited our results in terms of potentially losing some information on students who scored toward the midpoint, suggesting that statistically, our findings may have been somewhat conservative. The rationale for dichotomizing this measure was conceptually based, namely to capture the distinct realities of low and high-control students (Hall et al. 2006; Perry, Hladkyj et al. 2005; Skinner 1996).

Another limitation of the current study concerns the relatively small incremental changes in R^2 representing the PAC $\times$ Emotion interactions. Larger R^2 changes between the main and interaction effects would have provided stronger support for the moderating role of PAC

on emotions in predicting college performance. However, such strong interaction effects are uncommon in field-based regression analysis (McClelland and Judd 1993). R^2 changes in the present regression results *are* statistically significant despite being based on field research. Moreover, the effect sizes (betas) of these interaction effects are substantial and comparatively larger than those for the main effects, which supports the validity of our hypotheses. Due to enlarged standard errors the significance of some interaction effects was marginal, but this does not diminish the importance of their effect sizes. Thus, the fairly small but significant R^2 increments highlight emotions as important moderators of the effects of PAC on achievement and attrition and warrant further consideration in future research.

6 Conclusion: academic achievement and attrition

Together, our results suggest that the adaptiveness of perceived academic control can be either facilitated or inhibited by students' emotions, so that unless a student is experiencing low levels of negative emotions or high levels of positive emotions, perceived control will have little impact on their performance in their courses in terms of enhancing achievement and preventing attrition. Alternatively, minimizing students' course boredom or anxiety and boosting their enjoyment may significantly benefit performance *if* the students feel they have personal control and responsibility for their achievement. Thus, it is not enough to minimize students' boredom and anxiety and foster enjoyment without facilitating PAC.

These academic control perceptions and emotions are largely malleable by both instructors and students. Instructors can strive to make their lectures emotionally engaging, while emphasizing students' control and responsibility involved in the course. For instance, material included on an academic test is not directly controllable by students, yet this does not necessarily mean that they will feel out of control. An organized instructor who informs students about how to prepare for a test allows the event (the test) to be *predictable*. Thus, students' perceived control over the outcome (test performance) is maintained even though they cannot directly determine the test questions. These students know that if they do not study, they will perform poorly, but if they study, they will likely succeed. In this simplified situation, students can predict and thus successfully influence the outcome (i.e., their test performance; Perry et al. 1996).

In addition, students can strive to become more involved in their courses, which may increase their enjoyment and reduce boredom and anxiety. However, students must first realize that only *they* can control the amount of effort they put into a course. This personal responsibility for the course and active participation in their own learning can then facilitate students with high control and positive achievement emotions in excelling and persisting in their college courses. The benefits of this adaptive approach to college performance may carry over into students' future careers, where occupational achievement may also be enhanced by an optimum combination of perceived control and positive emotion.

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