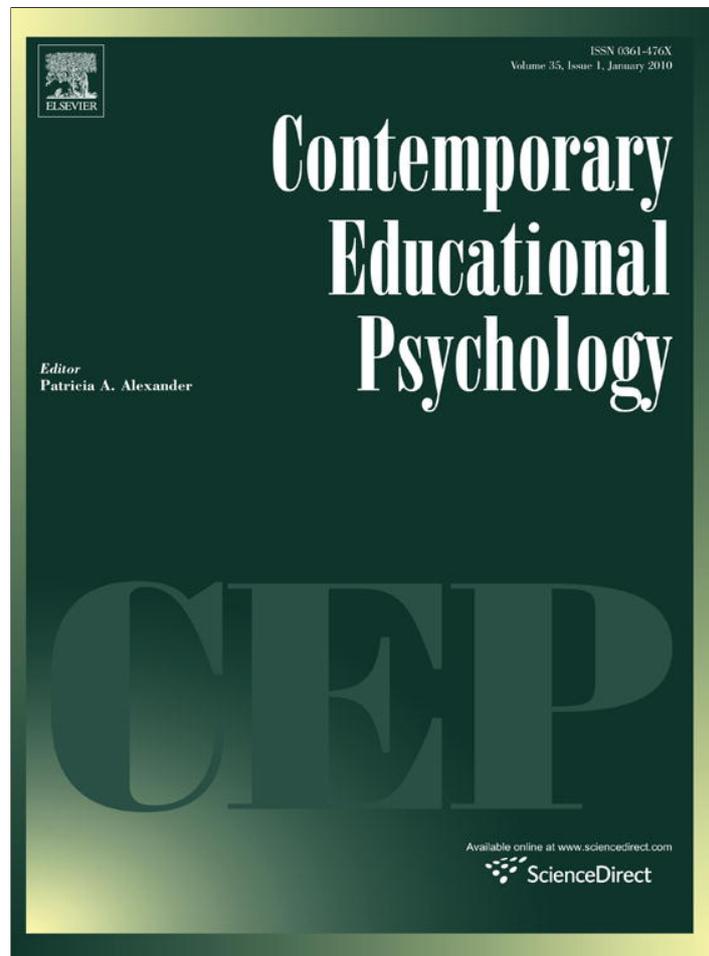


**Exhibit Materials for Taylor W. Acee:
First-Authored Journal Article**

Acee, T. W., Kim, H., Kim, H.-J., Kim, J.-I., Chu, H.-N. R., Kim, M., . . . The Boredom Research Group (2010). Academic boredom in under- and over-challenging situations. *Contemporary Educational Psychology*, 35, 17-27. doi:10.1016/j.cedpsych.2009.08.002

Summary: This scholarly publication on academic boredom is an example of my individually-driven line of original research on student motivation and self-regulation. This manuscript was published in a respectable journal with an impact factor of 1.928.

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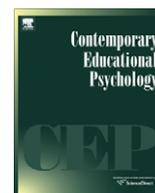
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Academic boredom in under- and over-challenging situations

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ABSTRACT

This project explored students' perceptions of academic boredom in under- and over-challenging situations with the hypothesis that boredom is a multidimensional and situation-dependent construct. In Study 1, college students were asked to think of an under- and over-challenging situation and for each situation complete the 36-item Academic Boredom Scale (ABS-36). Study 2 was a replication of Study 1 but also included Pekrun, Goetz, and Perry's (2005) Academic Emotions Questionnaire (AEQ). CFA results from both studies suggested one general boredom factor in situations students recalled as being under-challenging but two boredom factors in situations students remembered as being over-challenging. Task-focused boredom was characterized by the tediousness and meaninglessness of a task, whereas self-focused boredom was characterized by feeling dissatisfied and frustrated. A 10-item Academic Boredom Scale (ABS-10) was derived and strong reliability and validity coefficients were obtained. This research helps to provide a clearer picture of different meanings students might have in mind when they say they are bored.

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1. Introduction

While the study of academic motivation has long been a major focus among educational psychologists, only more recently has the study of academic emotions become a strong interest (e.g., Schutz & DeCuir, 2002). Pekrun and his colleagues' cognitive-motivational model (Pekrun, 1992; Pekrun, Goetz, Titz, & Perry, 2002), which is in line with other two-dimensional models of emotions (see Barrett, 2006; Feldman, 1995; Russell, 1980; Russell, 2003), uses two dimensions, valence and activation, to categorize academic emotions and predict their effects on cognition, motivation, and achievement. Valence refers to whether an emotion is experienced as positive or negative. Activation refers to whether an emotion has an engaging or disengaging effect on motivation. Using these two dimensions, Pekrun and his colleagues categorized emotions into four groups: positive-activating emotions (e.g., enjoyment, hope, and pride), positive-deactivating emotions (e.g., relief and contentment), negative-activating emotions (e.g., anger, anxiety, and shame), and negative-deactivating emotions (e.g., boredom and hopelessness). Of the four categories, positive-activating emotions have been found to be positively related to academic out-

comes such as use of deep-level cognitive learning strategies, attention, motivation, and achievement (Pekrun et al., 2002). On the other hand, negative-deactivating emotions, such as boredom, can be a serious motivational barrier that interferes with students' learning in academic settings (Pekrun, 1992; Pekrun et al., 2002).

Research on boredom in academic settings has found negative correlations between boredom and motivation (study interest and effort), use of elaboration strategies, self-regulation, and academic achievement; and, positive correlations between boredom and irrelevant thinking and perceived external regulation by others (see Pekrun et al., 2002). Accordingly, academic boredom has been associated with high dropout rates and low academic achievement (Maroldo, 1986; Robinson, 1975). In a recent study on 467 high school dropouts, boredom was most often identified as a reason for leaving school (Bridgeland, Dilulio, & Morison, 2006).

Boredom has been described "... as a feeling of tedium, monotony, ennui, apathy, meaninglessness, emptiness, wearisomeness and lack of interest or connection with the current environment" and can be contrasted with emotions or states such as "... interest, enthusiasm, involvement, engagement, flow, and optimal stimulation" (Sundberg, 1994, p. 178). The APA Dictionary of Psychology defines boredom as "a state of weariness or ennui resulting from a lack of engagement with stimuli in the environment" (Vanden-Bos, 2007, p. 130).

A variety of boredom instruments have been developed and operational definitions of boredom vary. Some instruments were developed to assess boredom as a general trait (Farmer &

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Sundberg, 1986; Zuckerman, 1979). Other instruments were developed to measure boredom related to specific situations such as: leisure/free-time boredom (Iso-Ahola & Weissinger, 1990; Lee, 1986; Ragheb & Merydith, 2001), sexual boredom (Watt & Ewing, 1996), job-related boredom (Lee, 1986), and academic boredom (Pekrun et al., 2005). General boredom coping strategies have also been identified and measured (Hamilton, Haier, & Buchsbaum, 1984). In this study, academic boredom is conceived of as a state emotion that can vary across different academic situations.

Pekrun (2006) made a strong link between boredom and incentive value suggesting that if an "...activity lacks any incentive value (positive or negative), boredom is induced" (p. 324). It is unclear, however, whether or not boredom has a polar opposite. Researchers studying academic emotions have created separate scales for boredom and enjoyment, thus conceptualizing them as being on separate yet interrelated dimensions, and correlations between them tend to be medium (Pekrun et al., 2002; Pekrun et al., 2005).

While researchers have most often measured boredom as a unidimensional construct (e.g., Iso-Ahola & Weissinger, 1990; Lee, 1986; Pekrun et al., 2005; Ragheb & Merydith, 2001; Zuckerman, 1979), other researchers have suggested that the concept of boredom might be multidimensional (Ahmed, 1990; Vodanovich & Kass, 1990; Vodanovich, Wallace, & Kass, 2005). Research examining the dimensionality of boredom has primarily been conducted using the Boredom Proneness Scale (BPS) (Farmer & Sundberg, 1986). Vodanovich et al. (2005) conducted a confirmatory factor analysis of the BPS and their results suggested two different boredom factors. These two factors were identified as lack of internal stimulation and lack of external stimulation, and both factors were theorized to measure two different causes of a person's boredom proneness. Lack of internal stimulation was referred to as a "...perceived inability to generate sufficient stimulation for oneself", while lack of external stimulation was reported to "...reflect a need for variety and change (Vodanovich et al., 2005, p. 300)". These findings raise the possibility that academic boredom may also be a multidimensional construct, even though we could not find any research that has investigated this issue. Examining the dimensionality of academic boredom may be important because, supposing boredom is found to be multidimensional, the antecedents, consequences, and strategies used to cope with boredom may vary depending on which type of boredom a person is experiencing.

Previous research has also suggested that academic boredom may be situation dependent. In particular, Csikszentmihalyi (1990) proposed that boredom for a task is experienced when a person's skills exceed the difficulty of a task (referred to here as under-challenging), while anxiety is experienced when the difficulty of a task exceeds a person's skills (referred to here as over-challenging). Furthermore, when task difficulty and skill are balanced (optimally challenging), flow, interest, and enjoyment were posited to be experienced. This suggests that boredom may be evoked in under-challenging situations but not in over-challenging situations. More recent research, however, found that students reported feeling boredom both when they perceived task demands as too high and when they perceived task demands as too low (Pekrun et al., 2002). Pekrun (2006) explained these findings in terms of incentive value, perceived controllability, and task demands.

The incentive value of an activity determining the amount of boredom experienced may, in part, depend on perceived controllability. Specifically, the value of an activity can be reduced, and boredom be experienced, when there is a lack of control over the activity because demands exceed individual capabilities. Alternatively, boredom can result from high control/low-

demands conditions implying no sufficient challenge, thus also reducing the incentive value of the activity... (p. 324).

In sum, these findings call for a deeper investigation into the dimensionality and situation dependency of boredom. It is possible that students might use the word "boredom" to describe more than one emotion in the academic setting, or to describe a multidimensional construct – with the possibility that different dimensions of that construct may be more or less emphasized in different academic situations, such as under- and over-challenging situations. If students report feeling bored in both under- and over-challenging situations, their experience of boredom, or even the dimensionality of boredom, may differ depending on the situation.

1.1. Overview of Study 1 and Study 2

The current research focuses on the emotion of boredom which has special relevance to academic motivation and achievement but has primarily been studied outside of educational contexts. In the two studies presented here, students' perceptions of academic boredom were investigated in situations students recalled as being under-challenging and in situations they recalled as being over-challenging. It was hypothesized that students' perceptions of boredom would differ depending on the situation. For example, in situations recalled as being under-challenging, students' perceptions of boredom might be driven by tedious aspects of the task (repetitiveness and dullness). On the other hand, in situations recalled as being over-challenging, students' perceptions of boredom might be driven by dissatisfaction (frustration and ennui) that could result from being repelled by a task that is too difficult to accomplish.

In Study 1, students were asked to complete the 36-item Academic Boredom Scale (ABS-36) for both situations recalled as being under-challenging and situations recalled as being over-challenging. Study 2 was a replication of Study 1 but also included the Academic Emotions Questionnaire (AEQ) (Pekrun et al., 2005) to examine how boredom might relate to an array of emotions that students had experienced simultaneously in under- and over-challenging academic situations.

2. Study 1

2.1. Methods

2.1.1. Participants

Participants were 170 male and female undergraduate students enrolled in 11 sections of an applied course in learning and cognition offered through the educational psychology department of a large public university in the South Central United States. The course surveys theory on student learning, cognition, self-regulation, and motivation and guides students in applying these ideas to their own learning. Of the students enrolled in this course, approximately 80% completed the study. Data collected by the course instructors suggested that students enrolled in this course were: 52% female, 48% male; 10% African American, 20% Asian, 44% Caucasian, 22% Hispanic, 4% Native American; 29% First-years, 39% Sophomores, 20% Juniors, 12% Seniors.

2.1.2. The 36-item Academic Boredom Scale (ABS-36)

The ABS-36 was developed by the Boredom Research Group in two different ways; first, definitions of boredom were pulled from dictionaries, encyclopedias of psychology, and peer-reviewed journal articles. Second, in a qualitative pilot study, 12 undergraduate students were asked to define boredom, describe an academic situation in which they were bored, and report their accompanying thoughts and feeling in that situation. They were also asked to

describe how they felt when completing academic activities that were under-challenging and over-challenging. Based on these definitions of boredom and pilot data, items were developed and chosen for use in this study. The ABS-36 contained 36 items including one item which asked directly about students' experience of boredom ("In that situation, to what extent did you get bored with the activity?") and 35 items that were believed to represent various facets of boredom and related emotions (e.g. "In that situation, to what extent did you feel it was repetitive?", "In that situation, to what extent did you become frustrated or annoyed?" See Table 1 for a list of abbreviated items). A nine-point Likert-type rating scale ranging from 1 "Not at all" to 9 "Extremely" was used.

2.1.3. Procedures

With the instructors' permission, an experimenter administered the ABS-36 to students at the beginning of class. Students were told about the purpose of the study, voluntary nature of their participation, and confidentiality of their responses. The ABS-36 instructed students to think of two academic situations – one that was under-challenging and one that was over-challenging. The specific instructions for the under-challenging situation were: "Think of a situation in which you found academic activities too easy and not challenging, in that it was easy to understand and not much work". For the over-challenging situation, the instructions were: "Think of a situation in which you found academic

activities too difficult and too challenging, in that it was hard to understand or too much work". Students completed the ABS-36 for each situation (72 ratings in all). To counterbalance order effects, half of the participants completed the ABS-36 for the under-challenging situation first, and the other half completed the ABS-36 for the over-challenging situation first.

2.2. Results

2.2.1. Exploratory factor analysis (EFA)

To examine possible differences in students' perceptions of boredom in under- and over-challenging situations, separate exploratory factor analyses (EFA) (conducted with SPSS 15.0 for Windows) were conducted using principal axis factoring (PAF) with oblique rotation on the ABS-36 for each situation. Oblique rotation was used because we hypothesized that the underlying factors would be correlated with each other. Inspection of the Scree plots and item loadings on each factor suggested a 3-factor solution for situations students recalled as being under-challenging and a 4-factor solution for situations students recalled as being over-challenging. Then, we used the single boredom item ("In that situation, to what extent did you get bored with the activity?") to help identify which factor(s) we should label as boredom. For the 3-factor solution in situations students recalled as being under-challenging, the boredom item had a high loading on the first factor (.70) and no loadings on the second and third factors (–.04 and .06, respectively), suggesting one "general boredom" factor (see Table 1). The other two factors that were found in situations recalled as being under-challenging appeared not to be related to students' perceptions of boredom because the single boredom item did not load on these factors, but they seemed to loosely measure negative and positive affect respectively. Alternatively, for the 4-factor solution in situations recalled as being over-challenging, the boredom item loaded moderately on the first factor (.48) as well as the fourth factor (.41) but did not load on the second and third factors (–.05 and –.04, respectively) (see Table 2). Upon closer inspection of the items for these two boredom factors, we decided to label the first factor as "task-focused boredom" and the fourth factor as "self-focused boredom". Here again, the second and third factors appeared not to be related to students' perceptions of boredom but seemed to be associated with negative and positive affect respectively.

2.2.2. Confirmatory factor analysis (CFA)

Using EFA results and a conceptual analysis of the items, we derived a 10-item boredom scale designed to measure task- and self-focused boredom and examined this scale using confirmatory factor analysis (CFA). First, based on EFA results for situations recalled as being over-challenging, we selected items that loaded above .5 on task- and self-focused boredom (six items per scale). For task-focused boredom the six abbreviated items were: repetitive, useless/unimportant, monotonous, activity dull, wonder why doing this, and nothing to do. For self-focused boredom the six abbreviated items were: tired of activity, impatient, want something else, distracted, frustrated/annoyed, and apathetic. Then, each item was examined for conceptual coherence with the other items that loaded on the same factor. Furthermore, because high correlations between items can be problematic in CFA, items were also inspected for high conceptual overlap with one another. For task-focused boredom, the items "monotonous" and "repetitive" were identified as being highly similar conceptually, and we decided to remove one of those items. "Monotonous" was chosen to be removed because, in both under- and over-challenging situations, the factor loadings for "monotonous" (.61 for both situations) were lower than those of "repetitive" for both situations (.71 and .69, respectively). Another reason was that "repetitive" was thought

Table 1
Study 1 under-challenging situation exploratory factor analysis with oblique rotation for the ABS-36.

Abbreviated items (N = 170)	Factors		
	General boredom	Negative affect	Positive affect
Tired of activity	0.82	–0.04	0.05
Activity dull	0.80	0.02	0.01
Want something else	0.77	–0.02	0.10
Impatient	0.71	0.16	–0.09
Repetitive	0.71	0.01	–0.01
Bored	0.70	–0.04	0.06
Restless	0.69	0.20	0.07
Time pass slowly	0.66	0.12	–0.09
Frustrated/annoyed	0.66	0.24	–0.03
Wonder why doing this	0.62	0.03	–0.13
Apathetic	0.62	0.33	0.00
Distracted	0.61	–0.02	0.01
Monotonous	0.61	–0.09	0.09
Useless/unimportant	0.56	0.09	–0.31
Drowsy	0.55	0.36	–0.03
Interesting/entertaining	–0.54	0.50	0.25
Nothing to do	0.52	–0.01	0.05
Exciting	–0.52	0.37	0.29
Sluggish	0.52	0.39	–0.05
Ambivalent/conflicted	0.06	0.83	0.04
Long to change yourself	0.05	0.77	0.04
Sad	0.07	0.74	0.10
Ashamed	0.06	0.73	0.05
Alienated	0.08	0.72	0.01
Unexpected	–0.03	0.70	0.13
Afraid/anxious	0.03	0.67	0.03
Controlled by others	0.03	0.48	–0.16
Require a lot of activity	0.15	0.36	–0.08
No goals or plans	0.02	0.33	–0.21
Familiar	0.22	–0.05	0.55
High self confidence	0.05	–0.34	0.55
Ordinary	0.47	–0.08	0.54
Easy to concentrate	–0.34	0.05	0.48
Stimulated/aroused	–0.21	0.20	0.47
Relevant	–0.17	0.15	0.38
Hopeful	–0.19	0.14	0.34

Note. Eigenvalues and percent of variance for each factor are as follows: general boredom (9.98, 27.72%); negative affect (5.52, 15.32%); and positive affect (2.45, 6.81%).

Table 2
Study 1 over-challenging situation exploratory factor analysis with oblique rotation for ABS-36.

Abbreviated items (N = 170)	Factors			
	Task-focused	Negative affect	Positive affect	Self-focused
Repetitive	0.69	0.19	0.15	0.00
Useless/unimportant	0.67	0.08	-0.18	0.00
Monotonous	0.61	0.11	0.02	0.14
Activity dull	0.59	0.08	0.00	0.37
Wonder why doing this	0.57	0.12	-0.07	0.09
Nothing to do	0.52	0.03	0.05	0.14
Bored	0.48	-0.05	-0.04	0.41
Relevant	-0.44	0.05	0.42	0.02
Time pass slowly	0.40	0.00	-0.03	0.29
Ambivalent/conflicted	0.03	0.79	0.00	-0.04
Ashamed	-0.12	0.76	-0.07	0.00
Sad	-0.19	0.75	-0.10	0.05
Long to change yourself	-0.08	0.69	0.10	0.11
Alienated	0.21	0.60	-0.20	-0.08
Controlled by others	0.03	0.59	0.01	-0.08
Restless	0.15	0.51	0.08	0.19
Sluggish	0.23	0.50	0.09	0.31
Afraid/anxious	-0.38	0.46	-0.18	0.27
Unexpected	0.10	0.26	0.03	-0.04
No goals or plans	0.17	0.26	-0.07	0.19
High self confidence	0.23	-0.27	0.69	0.02
Easy to concentrate	-0.01	-0.11	0.63	-0.20
Hopeful	-0.20	0.09	0.61	0.04
Exciting	-0.33	0.10	0.60	-0.24
Stimulated/aroused	-0.02	0.04	0.55	-0.01
Interesting/entertaining	-0.43	0.11	0.52	-0.19
Familiar	0.14	-0.09	0.51	0.00
Ordinary	0.42	-0.05	0.47	-0.10
Tired of activity	0.21	-0.12	-0.05	0.79
Impatient	0.00	0.04	-0.06	0.78
Want something else	0.18	-0.05	-0.11	0.70
Distracted	0.21	0.08	0.00	0.63
Frustrated/annoyed	-0.12	0.07	-0.18	0.58
Apathetic	0.09	0.18	-0.20	0.56
Drowsy	0.15	0.30	-0.01	0.40
Require a lot of activity	-0.34	0.07	0.19	0.39

Note. Eigenvalues and percent of variance for each factor are as follows: task-focused (9.57, 26.57%); negative affect (4.16, 11.54%); positive affect (3.05, 8.48%); and self-focused (2.12, 5.90%).

to have a better chance of being understood by college students. For self-focused boredom, “distracted”, which refers to a cognitive variable, was identified as not fitting as well conceptually with the other items that loaded on the self-focused boredom factor, which seemed to be affective variables. Furthermore, distraction/attention is often viewed as an outcome variable in emotion research (Pekrun et al., 2002). In sum, five items were selected to measure task-focused boredom and five items were selected to measure self-focused boredom. This shortened scale was named the 10-item Academic Boredom Scale (ABS-10) (see Study 2 methods section for the non-abbreviated list of ABS-10 items).

CFA was used to further investigate the factor structure and validity of the ABS-10 in both under- and over-challenging situations. It is important to acknowledge that the results from this CFA are limited because the same data used in the EFA to derive the ABS-10 were also used in this CFA. Using the same data like this can raise Type I error. This is because spurious findings from EFA can more easily be confirmed in CFA when the same data is being used. Therefore, more weight should be given to the CFA results from Study 2. Mplus Version 5 (Muthen & Muthen, 1998–2007) was used to conduct all CFA analyses. Based on the EFA results, it was hypothesized that a one-factor model would be supported in

situations students recalled as being under-challenging, and thus all items of the ABS-10 were expected to load on one general boredom factor. On the other hand, for situations students recalled as being over-challenging, it was hypothesized that a correlated two-factor model would be supported, and items would load on their respective task- and self-focused boredom scales. Therefore, for each situation, we tested both a one-factor model and a correlated two-factor model. Based on Hu and Bentler's (1999) recommendation, a cutoff value near .95 for the Comparative Fit Index (CFI) in combination with a cutoff value near .09 for the Standardized Root Mean-Square Residual (SRMR) were used to evaluate model fit. If both models had sufficient fit, the one-factor and correlated two-factor models were compared using a chi-square difference test to determine which model was more appropriate to adopt. In addition, when building the one-factor and correlated two-factor models, modification indices were used to identify item residuals with high correlations between each other. If two item residuals were highly correlated and the correlation made sense theoretically, the item residuals were specified to be correlated in the model in order to increase model fit. This was done using an iterative process where one item-residual correlation was specified at a time and the modification indices from the most recent model were used to decide whether additional item residuals should be specified in the model.

For situations students recalled as being under-challenging, the one-factor model ($\chi^2(32) = 54.54, p < .01, CFI = .97, SRMR = .04, RMSEA = .07$ (90% CI = .03–.09)) and correlated two-factor model ($\chi^2(31) = 50.85, p < .05, CFI = .98, SRMR = .05, RMSEA = .06$ (90% CI = .03–.09)) both had acceptable fit. Since there was not a significant difference in χ^2 between the two models ($\chi^2_{diff} = 3.72, df_{diff} = 1, p > .05$), this suggested that the fit of the correlated two-factor model was not better than the fit of the one-factor model, thus the one-factor model was chosen. As expected, all of the items from the ABS-10 loaded on this one general boredom factor (see Fig. 1). Three pairs of item residuals were specified to be correlated.

For situations students recalled as being over-challenging, the fit of the one-factor model was not sufficient ($\chi^2(32) = 140.34, p < .01, CFI = .85, SRMR = .10, RMSEA = .14$ (90% CI = .12–.17)), but the fit for the correlated two-factor model was sufficient ($\chi^2(31) = 62.01, p < .01, CFI = .96, SRMR = .06, RMSEA = .08$ (90% CI = .05–.11)). All items of the ABS-10 loaded as expected on the task- and self-focused boredom factors (see Fig. 1). Furthermore, as hypothesized, these two factors were significantly correlated ($r = .63, p < .01$). The same three pairs of item-residual correlations that were specified in the one-factor model examined for situations students recalled as being under-challenging were also used in the correlated two-factor model for situations students recalled as being over-challenging.

2.2.3. Correlations and paired *t*-tests for task- and self-focused boredom

We wanted to further investigate the usefulness of combining task- and self-focused boredom into one general boredom scale for under-challenging situations, and creating separate scales for over-challenging situations. It was expected that in situations students recalled as being under-challenging, correlations between task- and self-focused boredom would be high and mean differences would be small; thus, further supporting the usefulness of combining these scales. Whereas, in situations recalled as being over-challenging, it was expected that correlations between task- and self-focused boredom would be relatively smaller and mean differences relatively larger. For situations students recalled as being under-challenging, correlations between task- and self-focused boredom were high ($r = .76, p < .01$). In addition, paired *t*-tests suggested that students tended to feel slightly higher levels of task-focused boredom ($M = 6.07, SD = 1.65$) compared to self-focused

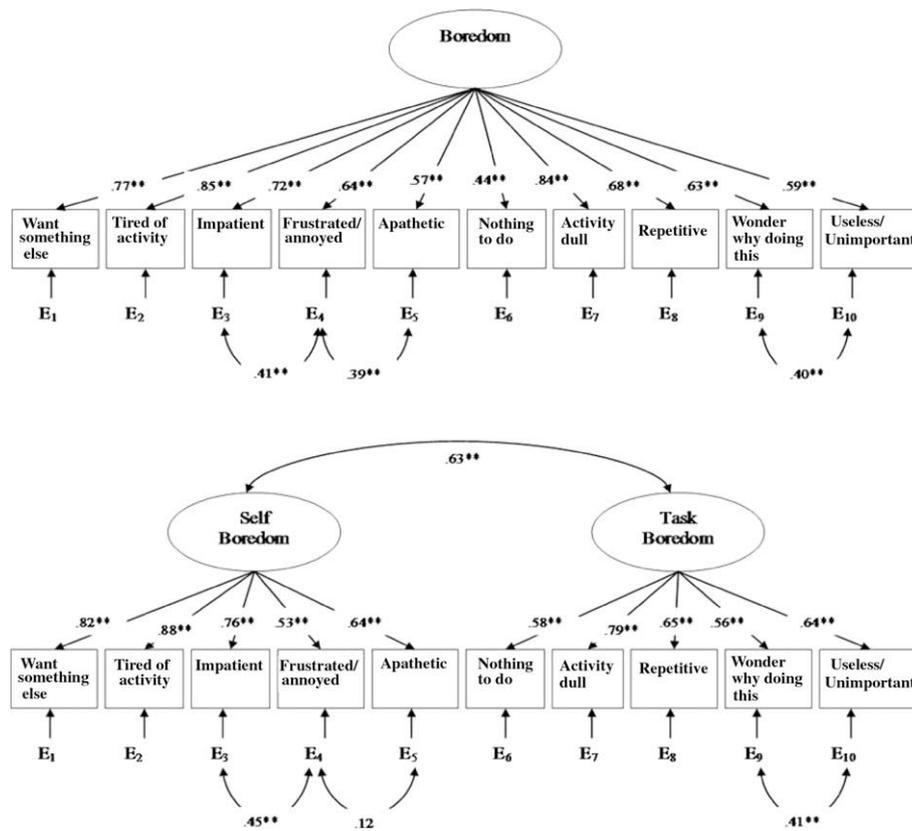


Fig. 1. Study 1 one-factor model structure for situations students recalled as being under-challenging (top) and correlated two-factor model structure for situations students recalled as being over-challenging (bottom). A circle indicates a factor (latent variable); a rectangle indicates an item (observed variable). *E* = error variable. *N* = 170.

boredom ($M = 5.78, SD = 1.85$) in the situations they recalled as being under-challenging (M -difference = .30, $t = 3.15, p < .01, d = .17$). However, this difference had a low effect size. In situations students recalled as being over-challenging, correlations between task- and self-focused boredom were moderate ($r = .47, p < .01$) (Note that this correlation, which shows the relationship between two averaged scales, is different from the correlation reported in the CFA results above that used the covariance among scale items). Furthermore, paired t -test results showed that students reported higher levels of self-focused boredom ($M = 6.84, SD = 1.65$) compared to task-focused boredom ($M = 5.03, SD = 1.77$) in situations they recalled as being over-challenging (M -difference = 1.80, $t = 13.27, p < .01, d = 1.05$) and this difference had a high effect size.

2.2.4. Descriptive and reliability statistics for the ABS-10

The means, standard deviations, and Cronbach alpha reliability coefficients for general boredom, task-focused boredom, and self-focused boredom are presented in Table 3. Strong reliability coefficients greater than or equal to .8 were found for each scale. Each scale was also found to have moderate correlations with the single boredom item. In situations students recalled as being under-chal-

lenging, the single boredom item ($M = 6.18, SD = 2.17$) was positively related to general boredom ($r = .61, p < .01$). In situations students recalled as being over-challenging, the single boredom item ($M = 5.49, SD = 2.42$) was positively related to task-focused boredom ($r = .60, p < .01$) and self-focused boredom ($r = .49, p < .01$).

2.3. Discussion

The findings of Study 1 appear significant in their implication that students' experience of academic boredom might vary depending on whether they are in under-challenging or over-challenging situations. In situations students recalled as being under-challenging, the χ^2 difference test of the CFA results showed that the correlated two-factor model was not significantly better than the one-factor model. Results from the one-factor model showed that items from both the task- and self-focused boredom scales loaded positively on one general boredom factor. These findings suggested that students were not differentiating between task- and self-focused boredom in situations they recalled as being under-challenging.

Table 3
Studies 1 and 2 descriptive and reliability statistics of the ABS-10.

	Under-challenging			Over-challenging					
	General boredom			Task-focused boredom			Self-focused boredom		
	Mean	SD	α	Mean	SD	α	Mean	SD	α
Study1 (<i>N</i> = 170)	5.93	1.64	0.90	5.03 _a	1.77	0.80	6.84 _a	1.65	0.86
Study 2 (<i>N</i> = 178)	5.75	1.71	0.91	4.78 _b	1.62	0.78	6.66 _b	1.57	0.83

Note. Means sharing the same subscript differ at $p < .01$ based on pair-wise t -test results.

However, in situations students recalled as being over-challenging, CFA results supported a correlated two-factor model. We labeled these two boredom factors task-focused boredom and self-focused boredom. Task-focused boredom was characterized by feeling the task was repetitive, useless/unimportant, dull, wondering why they were doing it and having nothing to do. The label “task-focused boredom” was chosen because the items loading on this factor seemed to refer to the tediousness and meaninglessness of a task. We also considered other labels such as “emptiness boredom” and “tedium”. Self-focused boredom was characterized by feeling frustrated/annoyed, impatient, apathetic, tired of the activity, and wanting to do something else. Items loading on self-focused boredom seemed to represent feelings of dissatisfaction, frustration, and restlessness which are indicative of being bored. We also considered labels such as “dissatisfaction boredom” and “ennui” for this factor. In sum, task-focused boredom may refer to one’s focus on the boring features of a task, whereas self-focused boredom may refer to one’s focus on negative feelings associated with being bored.

Theoretically, these results provide tentative support for the hypothesis that academic boredom is multidimensional and situation dependent. Findings from this study also suggest that students’ experience of boredom may be more straightforward in situations they perceive as under-challenging and more complicated in situations they judge to be over-challenging.

3. Study 2

Study 2 was designed to test if the major findings from Study 1 are replicable, to examine whether the ABS-10 is related to other academic emotions, and to gather validity data on the ABS-10. We expected that the ABS-10 boredom scales would have strong positive correlations with the AEQ measure of boredom. In addition, given previous theory and research on the interrelations among academic emotions (Pekrun et al., 2002; Pekrun et al., 2005), we expected boredom to be positively correlated with negative emotions and negatively correlated with positive emotions. Furthermore, based on interrelationships reported in the AEQ User’s Manual (Pekrun et al., 2005), we expected anger and enjoyment, in particular, to be significantly related to boredom. It was difficult to predict how these relationships might vary for task- and self-focused boredom. However, because self-focused boredom was characterized by dissatisfaction and frustration, it seemed as if it might have stronger relationships with anger compared to task-focused boredom. The methods used in Study 2 were identical to those of Study 1, with the exception of administering Pekrun et al.’s (2005) Academic Emotions Questionnaire (AEQ), collecting additional demographic data, and asking students to describe the over- and under-challenging situations they recalled – all of which were gathered after Study 1 procedures were replicated.

3.1. Methods

3.1.1. Participants

Participants were 178 male and female undergraduate students enrolled in 10 sections of an applied course in learning and cognition offered through the educational psychology department of a large public university in the South Central United States. Of the students enrolled in this course, approximately 84% completed the study. The sample was 42% male and 58% female with an average age of 19.7 years. Our sample was approximately: 10% African American, 20% Asian, 41% Caucasian, 23% Hispanic, 5% Multi-racial, 1% Native American; 36% First-years, 34% Sophomores, 21% Juniors, 9% Seniors.

3.1.2. Measures

3.1.2.1. 10-item Academic Boredom Survey (ABS-10). For consistency, the same version of the ABS-36 was administered; however, the results presented here will only concern the 10 items that make up the ABS-10 from Study 1. Items were preceded by an item stem that read “In that situation, to what extent did you:” The five items for task-focused boredom were: “Have nothing to do or think about?”, “Find the activity dull?”, “Feel it was repetitive?”, “Wonder why you were doing this?”, and “Feel it was useless and unimportant, that you were wasting your time?” The five items for self-focused boredom were: “Want to do something else?”, “Get tired of the activity?”, “Become impatient?”, “Become frustrated or annoyed?”, and “Feel apathetic, not wanting to do anything?”.

3.1.2.2. Academic Emotions Questionnaire (AEQ). The AEQ is a self-report instrument designed to measure students’ emotions in three different categories of academic settings: class-related, learning-related, and test-related situations (Pekrun et al., 2005). There are eight class-related emotions scales (class-related enjoyment, hope, pride, anger, anxiety, shame, hopelessness, and boredom) that are measured with 80 items. As recommended in the manual by Pekrun et al. (2005), the class-related emotions scales were shortened and adapted for use in this study. Three items were used from each scale comprising a total of 24 items. The word “class” was replaced with the word “activity” in order to direct students to rate the under- or over-challenging situation that was the focus of the survey.

3.1.3. Procedures

First, the procedures of Study 1 were repeated. After students finished completing the ABS-36 for both the under- and over-challenging situation (counterbalanced), they completed the AEQ. Students only completed the AEQ in reference to the last situation they had rated. That is, if students completed the ABS-36 for the over-challenging situation first and the under-challenging situation last, then they would complete the AEQ for the under-challenging situation only and vice versa. Of the 178 participants, 90 completed the AEQ for the under-challenging situation and 85 completed the AEQ for the over-challenging situation (three participants had missing data on the AEQ). Lastly, students were asked to complete a short demographic questionnaire and answer the following two open-ended questions: (1) “Please briefly describe the situation that you thought of that was too difficult and too challenging” and (2) “Please briefly describe the situation that you thought of that was too easy and not challenging”.

3.2. Results

3.2.1. Confirmatory factor analysis (CFA)

CFA was used to investigate the ABS-10 in both under- and over-challenging situations. Based on Study 1 results it was hypothesized that a one-factor model would be supported in situations students recalled as being under-challenging and all items of the ABS-10 would load on one general boredom factor. On the other hand, for situations students recalled as being over-challenging, it was hypothesized that a correlated two-factor model would be supported, and items would load on either their respective task- or self-focused boredom scale. The same CFA cutoff recommendations (Hu & Bentler, 1999) and iterative procedures to allow item residuals to correlate were used here as were used in Study 1.

For situations students recalled as being under-challenging, the one-factor model ($\chi^2(32) = 67.69, p < .01, CFI = .96, SRMR = .04, RMSEA = .08$ (90% CI = .05–.11)) and correlated two-factor model ($\chi^2(31) = 57.55, p < .01, CFI = .97, SRMR = .04, RMSEA = .07$ (90% CI = .04–.10)) both had acceptable fit. The chi-square difference test showed that there was a significant difference between the

two models, ($\chi^2_{diff} = 11.57$, $df_{diff} = 1$, $p < .01$) suggesting that the correlated-two-factor model, the more parameterized model, might be more appropriate to adopt. However, the correlations between the task- and self-focused boredom factors were very high ($r = .92$). Brown (2006) suggested that when two factors are highly correlated it can indicate potentially problematic discriminant validity (a common cutoff score used in applied research is $\geq .85$), and it may be advisable "...to combine factors to acquire a more parsimonious solution (p. 166)". For this reason, the one-factor model was chosen over the correlated-two-factor model. All of the items from the ABS-10 loaded on one general boredom factor. The same three pairs of items were specified to be correlated as in the models from Study 1 (see Fig. 2).

For situations students recalled as being over-challenging, the fit of the one-factor model was not acceptable ($\chi^2(32) = 128.51$, $p < .01$, CFI = .85, SRMR = .09, RMSEA = .14 (90% CI = .11–.16)), but the fit for the correlated two-factor model was acceptable ($\chi^2(31) = 63.84$, $p < .01$, CFI = .95, SRMR = .07, RMSEA = .08 (90% CI = .05–.11)). Items of the ABS-10 loaded as expected on two separate factors: task- and self-focused boredom (see Fig. 2). As expected, these two factors were positively correlated ($r = .68$, $p < .01$). The same three pairs of item residuals were specified to be correlated as in the previous models.

3.2.2. Correlations and paired t-tests for task- and self-focused boredom

As in Study 1, we wanted to further investigate the usefulness of combining task- and self-focused boredom into one general boredom scale for under-challenging situations, and creating separate scales for over-challenging situations. Again, it was expected that

in situations students recalled as being under-challenging, correlations between task- and self-focused boredom would be high and mean differences would be small; whereas, the opposite was expected to be observed for situations students recalled as being over-challenging. Also, note that the correlations being conducted in this analysis are between two averaged scales, and will therefore be different from the correlations reported in the CFA results above that used the covariance among items. For situations students recalled as being under-challenging correlations between task- and self-focused boredom were high ($r = .76$, $p < .01$). In addition, paired t-tests showed that students reported slightly higher levels of task-focused boredom ($M = 5.90$, $SD = 1.79$) compared to self-focused boredom ($M = 5.61$, $SD = 1.86$) in situations students recalled as being under-challenging (M -difference = .29, $t = 3.05$, $p < .01$, $d = .16$); however, this difference had a low effect size. In situations students recalled as being over-challenging, correlations between task- and self-focused boredom were moderate ($r = .47$, $p < .01$). Furthermore, students tended to report higher degrees of self-focused boredom ($M = 6.67$, $SD = 1.57$) compared to task-focused boredom ($M = 4.78$, $SD = 1.62$) in situations they recalled as being over-challenging (M -difference = 1.87, $t = 15.20$, $p < .01$, $d = 1.17$) and this difference had a high effect size.

3.2.3. Descriptive statistics for the ABS-10

The means, standard deviations, and Cronbach alpha reliability coefficients for general boredom, task-focused boredom, and self-focused boredom are presented in Table 3. Strong reliability coefficients greater than or equal to .78 were found for each scale. Each scale was also found to have moderate correlations with the single boredom item. In situations students recalled as being under-

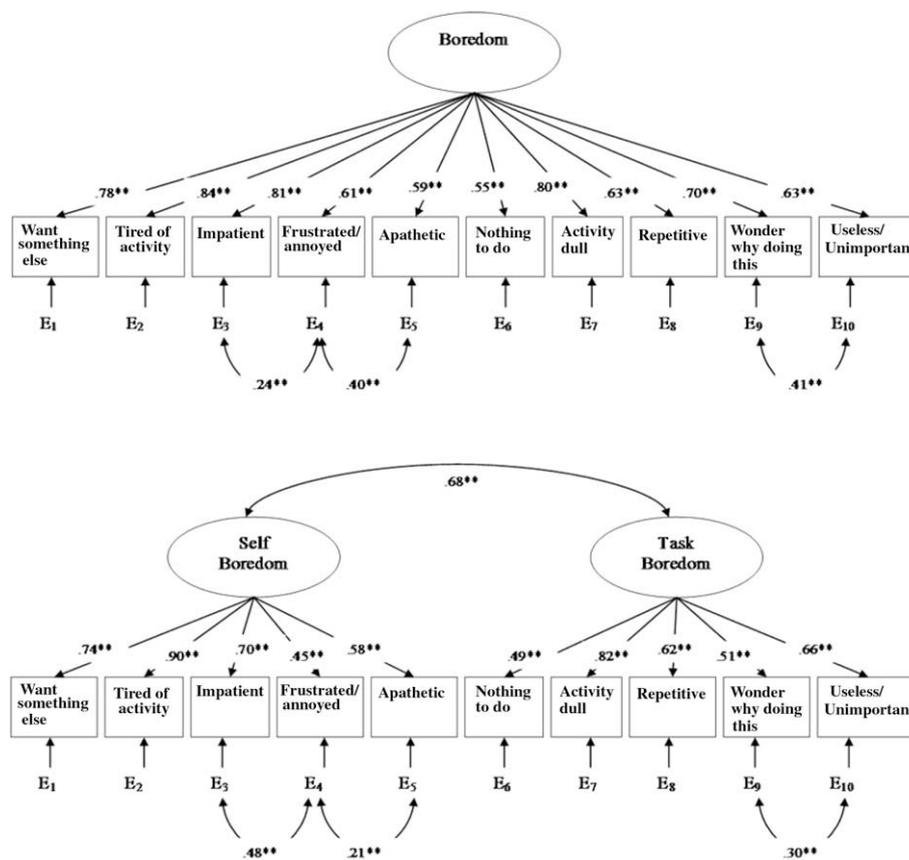


Fig. 2. Study 2 one-factor model structure for the under-challenging situation (top) and correlated two-factor model structure for the over-challenging situation (bottom). A circle indicates a factor (latent variable); a rectangle indicates an item (observed variable). E = error variable. N = 178.

challenging, the single boredom item ($M = 6.17, SD = 2.27$) was positively related to general boredom ($r = .67, p < .01$). In situations students recalled as being over-challenging, the single boredom item ($M = 5.26, SD = 2.36$) was positively related to task-focused boredom ($r = .63, p < .01$) and self-focused boredom ($r = .47, p < .01$).

3.2.4. Correlations with the AEQ

Correlations between the ABS-10 boredom scales and the AEQ academic emotion scales are presented in Table 4. All significant correlations were in the expected direction, that is, ABS-10 boredom scales were positively correlated with negative AEQ emotion scales and negatively correlated with positive AEQ emotion scales. General boredom in situations students recalled as being under-challenging and task- and self-focused boredom in situations students recalled as being over-challenging were commonly correlated with AEQ measures of boredom, anger, and hope. Only in situations students recalled as being over-challenging were the ABS-10 boredom scales significantly correlated with AEQ measures of anxiety, hopelessness, and shame. The AEQ measure of enjoyment was not correlated with task-focused boredom in situations students recalled as being over-challenging, but it was correlated with self-focused boredom in situations recalled as being over-challenging and general boredom in situations recalled as being under-challenging.

3.2.5. Independent samples mean-difference tests with the AEQ

We also wanted to examine possible differences in the strength of emotions measured by the AEQ in under- and over-challenging. We conducted independent samples *t*-tests to compare the means of each AEQ scale between students who rated the AEQ for the under-challenging situation ($n = 90$) and students who rated the AEQ for the over-challenging situation ($n = 85$). Anger, pride and shame did not meet the homogeneity of variance assumption (tested with Levene's equality of variance test), and a Mann-Whitney *U* independent samples test was used to compare means for these variables because it does not make this assumption. AEQ scale means, standard deviation, and mean-difference tests between under- and over-challenging situations are presented in Table 4. Findings suggested that students report experiencing higher levels of anger (M -difference = 1.09, Mann-Whitney $U = 2635, p < .01, d = .57$), anxiety (M -difference = 2.31, $t = 8.36, p < .01, d = 1.26$), hopelessness (M -difference = 1.54, $t = 5.91, p < .01, d = .87$), and shame (M -difference = 1.04, Mann-Whitney $U = 2742, p < .01, d = .54$) in over-challenging situations.

Table 4
Study 2 descriptive statistics for the AEQ and correlations between the ABS-10 and the AEQ.

AEQ scales	Under-challenging ($n = 90$)			Over-challenging ($n = 85$)			
	<i>M</i>	<i>SD</i>	<i>r</i> General boredom	<i>M</i>	<i>SD</i>	<i>r</i> Task- focused boredom	<i>r</i> Self- focused boredom
Anger	4.40 _a	1.66	.23*	5.49 _a	2.13	.36**	.59**
Anxiety	3.48 _b	1.81	-.06	5.79 _b	1.85	.22*	.28*
Boredom	5.78	1.91	.64**	5.28	1.87	.48**	.45**
Enjoyment	5.07	1.58	-.33**	4.71	1.55	-.03	-.33**
Hope	6.26	1.63	-.26*	5.89	1.63	-.23*	-.40**
Hopelessness	3.17 _c	1.56	.13	4.70 _c	1.97	.32**	.52**
Pride	6.02	1.85	-.08	5.62	1.50	.02	-.16
Shame	3.38 _d	1.62	-.03	4.42 _d	2.22	.28**	.30**

Note. Means sharing the same subscript differ at $p < .01$ based on independent samples *t*-tests. Mann-Whitney *U* mean-difference tests were used for anger, pride, and shame because the homogeneity of variance assumption was not met for those variables.

* $p < .05$.

** $p < .01$.

3.2.6. Descriptions of under- and over-challenging situations

Students were asked to describe the under- and over-challenging situations that they thought of for this study so as to document characteristics of these situations. Four researchers examined students' descriptions and generated categories of the types of academic activities students referred to in their descriptions: (1) completing specific course assignments (e.g., homework, papers, projects); (2) studying for exams/quizzes or learning course material; (3) taking exams or quizzes; (4) reference to a course or subject area but without indication of a specific task; (5) listening to lectures or participating in class; (6) completing multiple tasks or courses at the same time; (7) student response fit in more than one category; (8) other; and (9) no indication. Using these categories, one pair of researchers coded students' descriptions of the under-challenging situations, and another pair of researchers coded students' descriptions of the over-challenging situations. Interrater reliabilities were above .80 for both under- and over-challenging situations. Of the 178 students, 160 provided a description of the under-challenging situation they recalled and 164 provided a description of the over-challenging situation they recalled. Table 5 shows the number and percent of students' responses that fell in each category for under- and over-challenging situations as well as sample responses.

4. General discussion

While some researchers have measured boredom as unidimensional (Iso-Ahola & Weissinger, 1990; Lee, 1986; Pekrun et al., 2005; Ragheb & Merydith, 2001; Zuckerman, 1979), other researchers have measured boredom as multidimensional (Ahmed, 1990; Vodanovich & Kass, 1990; Vodanovich et al., 2005). The findings from our research suggest that the dimensionality of academic boredom might depend on the type of situation in which boredom was induced. In both Study 1 and Study 2, it was found that students tended to view boredom in one dimension for situations they recalled as being under-challenging and in two dimensions for situations they recalled as being over-challenging. In situations students recalled as being under-challenging, items from the ABS-10 task- and self-focused boredom scales loaded on one general boredom factor. However, in situations students recalled as being over-challenging, they differentiated between task-focused boredom and self-focused boredom. Task-focused boredom was characterized by students' focus on the tediousness and meaninglessness of the task, whereas self-focused boredom was characterized by students' focus on their feelings of dissatisfaction and frustration.

Csikszentmihalyi (1990) proposed that boredom for a task is experienced when a person is under-challenged but that anxiety is experienced when a person is over-challenged. More recent research, however, found that students reported feeling boredom both when they perceived task demands as too low and when they perceived task demands as too high (Pekrun et al., 2002). The findings from the present research help to integrate these seemingly contradicting results. Our research supports Pekrun et al.'s (2002) finding because in our studies boredom was reported as being experienced in both under- and over-challenging situations. Means for ABS-10 boredom scales, the single boredom item, and the AEQ boredom scale, were near the mid-point of the 9-point rating scale for both under- and over-challenging situations. However, in keeping with Csikszentmihalyi's (1990) theory, our findings also suggest that students' emotional experiences in under-challenging and over-challenging situations are quite different. For example, for situations students recalled as being over-challenging, they reported experiencing heightened levels of self-focused boredom, whereas for situations they recalled as being under-challenging, they did not differentiate between task- and self-focused boredom.

Table 5
Categorization of students' descriptions of under- and over-challenging situations.

Activity type	Under-challenging situation (N = 160)			Over-challenging situation (N = 164)		
	Freq	(%)	Sample responses	Freq	(%)	Sample responses
Completing specific course assignments	81	50.6	"In my EDP classes, we do activity modules once a week and they require 2–3 h of your time and they are very repetitive. Boring"	47	28.7	"My calculus homework seems to hard for me to do and I always give up because I'm not motivated to do it"
Studying for exams/quizzes or learning course material	3	1.9	"Studying for my intellectual communications test after attending the review session"	27	16.5	"Studying for my finance test. Understanding all the concepts"
Taking exams or quizzes	9	5.6	"Taking a multiple choice exam, I really get bored if the work is too easy"	22	13.4	"When I take a biology exam and none of the material looks familiar it becomes very difficult to concentrate and stay positive"
Reference to a course or subject area but without indication of a specific task	48	30.0	"Psych class freshman year"	47	28.7	"Government class"
Listening to lectures or participating in class	5	3.1	"Reading lecture slides in Biology. Our professor would stand in front of class and read his lecture slides"	2	1.2	"I was in my politics of Eastern Europe class, and we were talking about a subject that I was unfamiliar with"
Completing multiple tasks or courses at the same time	0	0		7	4.3	"In October during a two week period I had 2 tests, a paper, journal, and several assignments due before taking a trip. It was very stressful and difficult to figure out how to manage all of it together"
Student response fit in more than one category	5	3.1	"EDP modules or class time"	6	3.7	"My astronomy homework and tests. I don't enjoy or understand the material"
Other	9	5.6	"Running a camera at a TV station"	4	2.4	"Well comins to college from a small town"
No indication	0	0		2	1.2	"I was really bored and I did not want to do it at all. But since it was important I had to"
Total	160	100		164	100	

Additionally, in situations recalled as being over-challenging, task- and self-focused boredom were positively related to anxiety, but in situations recalled as being under-challenging general boredom was not related to anxiety. Furthermore, students reported experiencing higher levels of anger, anxiety, hopelessness, and shame as measured by the AEQ in over-challenging situations. These findings related to anxiety are in line with research on flow (Csikszentmihalyi, 1990).

In situations recalled as being over-challenging, students' experience of boredom seemed to have a stronger focus on the self. Paired *t*-tests from both studies suggested that students reported significantly higher levels of self-focused boredom compared to task-focused boredom, and the size of that effect was large in both Study 1 and Study 2. Perhaps, when students find that they do not enjoy, or easily become bored with, difficult or complicated tasks, this may threaten their sense of identity as intelligent and shift their focus from the task to the self. It is also plausible that students who reported that they were bored in over-challenging situations did so in order to protect themselves from attributing the difficulty they had with a task to their ability, a self-serving strategy used to protect their self-worth (Covington, 1984). While students differentiated between task- and self-focused boredom in situations they recalled as being over-challenging, these two types of boredom were also found to be positively correlated with each other. Possibly, both kinds of boredom register an absence of meaning (Barbalet, 1999).

Findings also supported the reliability and validity of the ABS-10. In both studies Cronbach alpha reliability coefficients were above .78, suggesting strong reliability for general boredom in under-challenging situations and task- and self-focused boredom in over-challenging situations. Strong validity evidence was also found for the ABS-10. In both studies and in both under- and over-challenging situations, the ABS-10 scales were positively related to the single boredom item. This suggested that the ABS-10 scales were related to students' perceptions and use of the word "boredom." In Study 2, the ABS-10 was further validated using the AEQ. General boredom in situations students recalled as being under-challenging and task- and self-focused boredom in

situations students recalled as being over-challenging were found to be positively related to the academic boredom scale of the AEQ. Furthermore, significant correlations between the ABS-10 scales and the other AEQ emotion scales were in the expected direction. That is, ABS-10 scales were positively associated with negative emotions and negatively associated with positive emotions.

Correlations with enjoyment were low for both general boredom and self-focused boredom and zero for task-focused boredom. These correlations were not strong enough or consistent enough to suggest that enjoyment is the polar opposite of boredom. Correlations with anger were significant and positive for each of the ABS-10 scales; however, the correlation between anger and self-focused boredom was by far the strongest. This may be because self-focused boredom is characterized by dissatisfaction and frustration. Pekrun et al. (2002) also found that academic boredom and anger were related and suggested that this relationship could be because both emotions have a negative valence and share a similar antecedent of high subjective academic control.

In addition to providing validity data, correlations between the ABS-10 scales and AEQ scales also helped us to better understand students' emotional experiences in under- and over-challenging situations. In situations students recalled as being over-challenging, the ABS-10 was correlated with a greater number of AEQ negative emotions (anger, anxiety, boredom, hopelessness, and shame) compared to situations students recalled as being under-challenging (anger and boredom). Furthermore, in situations recalled as being over-challenging, relationships with AEQ emotion scales tended to be stronger for self-focused boredom compared to those for task-focused boredom. For some students, over-challenging situations may threaten their sense of self-worth and induce a blend of interrelated negative emotions (e.g., self-focused boredom, anger, anxiety, hopelessness, and shame), whereas, under-challenging situations may not threaten students' self-worth but the lack of challenge may induce boredom. These results may suggest that task- and self-focused boredom, particularly self-focused boredom, in over-challenging situations might represent a more agitated and aroused emotion composite, whereas general

boredom in under-challenging situations might represent a simpler state of low enjoyment.

5. Limitations

This research was conducted on university male and female students sampled from an applied course in learning cognition and these students were, for the most part, in their late teens/early twenties and tended to be Caucasian. Further studies are needed to support the generalizability of these findings to students in other college settings, courses, and academic domains; and, to students of other ethnicities, cultural backgrounds, and ages. Furthermore, because these findings were based on correlational data, conclusions about the causal effect of under-challenging and over-challenging situations on students' perceptions of academic boredom cannot be made. Experimental studies using under- and over-challenging academic tasks that are both robust and authentic are needed. Additional research, particularly qualitative research, is also needed to help identify defining attributes of under- and over-challenging tasks.

The development of the ABS-10 is still in its early stages. Particularly, more research needs to be conducted on the validity of the ABS-10 by examining relationships with other self-report and behavioral measures as well as with diverse student populations.

The methodological approach used in both Study 1 and Study 2 relied on students' retrospective reports of how they felt during over- and under-challenging academic situations. One limitation of this approach is that students' memories of how they felt during these situations could potentially be distorted. Research has suggested that although recall of emotions can be fairly accurate (Barrett, 1997), people tend to exaggerate the intensity of their emotions (Bryant, 1993; Parkinson, Briner, Reynolds, & Totterdell, 1995). For example, Keuler and Safer (1998) found that although students' initial and recalled ratings of pre-exam anxiety were highly correlated ($r = .92$), students tended to overestimate their level of anxiety.

However, research has also suggested that using retrospective reports may not severely bias results in all situations. Reed, Hagen, Wicker, and Schallert (1996) were concerned with the validity of findings from previous research that they conducted on students' level of involvement during academic tasks because it relied on retrospective reports and ratings of hypothetical simulations (see Reed & Schallert, 1993; Wicker, Brown, Hagen, Boring, & Wiehe, 1991). In order to address this concern, they conducted two studies that used different methodological approaches to study students' emotion, cognition, and motivation during different phases of studying for an exam. The first study asked students to recall different phases of their exam preparation and rate questionnaire items, whereas the second study asked students to rate questionnaire items during different phases of an independent study session for an upcoming exam. Reed et al., 1996 found that the results from both studies were comparable and suggested that students' memory limitations may not be a major source of distortion for the phenomena being studied. In addition, the results from these studies were similar to findings from research that used students' imagined simulations of hypothetical events. Future research needs to be conducted on the ABS-10 that does not rely on retrospective reports so that comparisons can be made with findings from this study.

6. Future research

Future research could investigate the activating/deactivating effects of the different types of boredom found in this study. Perhaps the experience of task-focused boredom could focus students on

the tediousness and meaninglessness of their academic tasks and make them want to disengage from these tasks. The experience of self-focused boredom, on the other hand, might arouse and frustrate students to the point of wanting something else and seeking something new. In addition, it would be interesting to examine possible differences in coping strategies that students might use to mitigate task- and self-focused boredom. For example, coping strategies for task-focused boredom might involve convincing oneself that the task is important and worthwhile. On the other hand, coping strategies for self-focused boredom might involve calming oneself down and refocusing on the task. Future research should also investigate the role boredom attributions play in protecting students' self-worth during over-challenging tasks, and whether using boredom attributions to protect self-worth could lead students to report being bored without actually experiencing boredom.

Pekrun (2006) suggested that incentive value for a task is reduced and boredom is experienced when task demands are high and perceived control is low (over-challenging) and when task demands are low and perceived control is high (under-challenging). Future studies need to measure incentive value, task demands, and perceived control to examine how these variables relate to different dimensions of academic boredom in under- and over-challenging situations.

The findings from this research might have significant implications for teachers. For example, teachers should be aware that students who complain about boredom may not be talking about the same thing. Hopefully this research project can help to provide a clearer picture of several different meanings students might have in mind when they say they are bored in under- and over-challenging academic situations.

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