Contemporary Educational Psychology 36 (2011) 49–59

Contents lists available at ScienceDirect

Contemporary Educational Psychology

journal homepage: www.elsevier.com/locate/cedpsych

Coping with boredom in school: An experience sampling perspective

Ulrike E. Nett [a,b,*], Thomas Goetz [a,b], Nathan C. Hall [c]

[a] Department of Empirical Educational Research, University of Konstanz, Germany
[b] Thurgau University of Teacher Education, Switzerland
[c] McGill University, Montreal, Quebec, Canada

ARTICLE INFO

Article history:
Available online 30 October 2010

Keywords:
Boredom
Coping
Experience sampling
Traits
States

ABSTRACT

The present study explored students' use of boredom-related coping strategies at trait and state levels. Two trait-based dimensions of coping relevant to boredom were considered, namely approach – versus avoidance-oriented and cognitively – versus behaviorally-oriented coping strategies. The two dimensions were assessed in a self-report questionnaire administered to 537 grade 11 students (55.3% female, M_{age} = 17.15 years). Additionally, 79 of these participants completed state-based boredom-related coping measures over a 2-week period using an experience sampling method. Analyses of the trait measures suggested that two contrasting, broad approaches characterized participants' strategies for coping with boredom, namely a cognitive-approach orientation and a behavioral-avoidance orientation. In both the trait- and state-based analyses, the cognitive-approach orientation was associated with lower levels of boredom. Implications for interventions promoting the use of cognitive-approach strategies for dealing with boredom in the classroom are discussed.

1. Introduction

> *"A man who is master of himself can end a sorrow as easily as he can invent a pleasure. I don't want to be at the mercy of my emotions. I want to use them, to enjoy them, to dominate them"* (Wilde, 1890/2005).

The experience of boredom is typically described as an unpleasant and undesired emotion (e.g., Mikulas & Vodanovich, 1993) and found to correspond with detrimental behavioral outcomes (Barnett & Klitzing, 2006; Larson & Richards, 1991). In secondary education settings, students tend to report frequent episodes of boredom (Larson & Richards, 1991), with a common assumption being that teachers are responsible for creating stimulating lesson plans so as to minimize students' boredom. However, in light of the considerably heterogeneous nature of students' interests and perceptions of instruction, it is not possible to uniformly prevent all students from experiencing boredom through specific curriculum or teaching methods. Therefore, it stands to reason that students' experiences of boredom are likely to be also predicted by individual differences in students' own coping strategies for dealing with boredom. Despite agreement among students and teachers that this *'sorrow'* is best minimized and ideally prevented, little is known about the strategies and behaviors used by students to *'end'* their boredom, or alternatively, *'invent'* enthusiasm or interest in the classroom. Further, little systematic research exists in which the occurrence and efficiency of different strategies used by students to cope with boredom at school is systematically addressed.

The present study aimed to address this research deficit by exploring how students cope with boredom in the classroom by identifying and evaluating strategies for reducing boredom as a critical first step toward the development of interventions for equipping students with effective coping strategies. To this end, trait-based self-report measures were assessed to classify the types of coping strategies used by students in response to boredom and to identify the extent to which students' strategy use is dispositional or trait-like in nature and corresponds with well-established personality traits (e.g., extroversion, neuroticism). In addition, to further analyze the actual occurrence and effectiveness of the situational enactment of these coping strategies, state-based self-report measures of boredom-related coping behavior were administered over a 2-week period (i.e., experience sampling method; Csikszentmihalyi & Larson, 1987; Hektner, Schmidt, & Csikszentmihalyi, 2007). To summarize, the use of trait- and state-based assessments in the present research allowed for an in-depth analysis of study hypotheses concerning the classification of dispositional, boredom-related coping strategies, validation and further exploration of their dispositional nature with other personality traits, their predictive utility with respect to actual, situated coping behaviors, as well as relations between situated coping

* Corresponding author. Address: University of Konstanz, Universitaetsstr. 10, D-78457 Konstanz, Germany.
E-mail address: Ulrike.Nett@uni-konstanz.de (U. E. Nett).

0361-476X/$ - see front matter © 2010 Elsevier Inc. All rights reserved.
doi:10.1016/j.cedpsych.2010.10.003

behaviors and emotional as well as cognitive outcomes in a classroom setting.

1.1. Boredom in the classroom

As reflected in contemporary component process definitions of emotional experiences (Kleinginna & Kleinginna, 1981; Scherer, 2000), phenomenological accounts of boredom are assumed to reflect specific emotional components. Feelings of boredom are typically described as unpleasant in nature (affective component), feeling as if time has slowed down (cognitive component), and involving a desire to escape the boring situation (motivation component). Experiences of boredom are further demonstrated in facial and bodily expressions indicating a lack of eagerness (expressive component), low arousal, and overall fatigue (physiological component). Boredom is thus commonly understood by individuals and researchers alike as a unique emotional experience consisting of multiple components, rather than simply the opposite of enjoyment or interest (Pekrun, Goetz, Daniels, Stupnisky, & Perry, 2010).

1.3.1. Research on boredom in the classroom

With respect to educational settings, Larson and Richards (1991) found middle-school students to report feelings of boredom during 32% of the time spent in class, with findings from Goetz, Frenzel, Pekrun, and Hall (2006) further suggesting that boredom is more frequently experienced by students than is anxiety – the most commonly researched emotion in the education domain (Pekrun, Goetz, Titz, & Perry, 2002). As such, although boredom is frequently experienced in the classroom, it has received remarkably little theoretical or empirical attention (Pekrun et al., 2010). Among the few existing studies in which boredom is investigated, the primary focus is on the specific outcomes associated with this emotion. Educational research suggests that boredom in school settings, and even during leisure time, is positively related to drop-out rates (Bearden, Spencer, & Moracco, 1989; Farrell, Peguero, Lindsey, & White, 1988; Tidwell, 1988; Wegner, Flisher, Chikobvu, Lombard, & King, 2008), truancy (Sommer, 1985), and deviant behavior (Wasson, 1981). These findings are consistent with studies showing boredom to be highly correlated with job dissatisfaction, absenteeism, and lack of loyalty in the workplace (e.g., Kass, Vodanovich, & Callender, 2001). Empirical evidence further suggests that boredom may also contribute to nicotine and alcohol consumption (Amos, Wiltshire, Haw, & McNeill, 2006) as well as substance abuse (Anshel, 1991), excessive gambling (Blaszczynski, McConaghy, & Frankova, 1990), distress (Barnett, 2005), and juvenile delinquency (Newberry & Duncan, 2001).

1.3.2. Causal antecedents of academic boredom

To effectively counter the negative consequences of boredom, knowledge concerning the potential causes of this emotion is needed. To this end, there exist two dominant perspectives focusing on either situational or dispositional determinants of boredom experiences. First, such experiences are typically described in educational research as elicited by situational attributes (e.g., Kanevsky & Keighley, 2003), for example, by specific characteristics of the classroom setting. In contrast, personality research evaluates feelings of boredom predominantly as the result of an individual's predisposition to interpret a given situation as boring in nature (e.g., Farmer & Sundberg, 1986; Vodanovich, 2003).

With respect to situational factors, descriptions of situations that provoke student boredom focus primarily on a lack of stimulation (e.g., Moneta & Csikszentmihalyi, 1996; Reid, 1986; Vodanovich, 2003). According to Kanevsky and Keighley (2003), only a stimulating classroom environment that is not boredom-inducing can be considered a true learning situation. However, despite the diligence of educators in providing learning environments that maintain students' attention, the effects of such efforts are often mitigated by individual differences among students with respect to individual interests, abilities, as well as dispositions to perceive academic activities as boring in nature.

The idea that experiences of boredom are the result of dispositional personality traits in addition to environmental influences (Farmer & Sundberg, 1986; Vodanovich, 2003) is supported by empirical results showing students with high levels of academic boredom to also consistently report greater boredom in leisure settings (Larson & Richards, 1991). Findings further demonstrate strong relationships between boredom propensity and other dispositional constructs such as extroversion and intrinsic motivation (Barnett & Klitzing, 2006), aggressiveness (Rupp & Vodanovich, 1997), depression, hopelessness, loneliness, and life satisfaction, as well as amotivational and autonomy orientations (Farmer & Sundberg, 1986).

1.4. Boredom-related coping strategies

One of the first validated measures of boredom-related coping strategies was developed by Hamilton, Haier, and Buchsbaum (Boredom Coping Scale; 1984) which, according to Vodanovich (2003), was somewhat lacking in theoretical sophistication. However, subsequent theoretical and empirical research in which students' strategies for coping with boredom is explored has, until recently, remained virtually nonexistent (Vodanovich, 2003). In contrast, considerable research has been conducted toward the development of classificatory frameworks for strategies used to cope with stress. Most notably, a conceptual model proposed by Holahan, Moos, and Schaefer (1996) has received significant empirical attention (Davis, DiStefano, & Schutz, 2008; Moos & Holahan, 2003) and may be adapted as a framework for understanding how students cope with boredom.

1.4.1. Classification of coping strategies

According to Holahan et al. (1996), there exist two critical dimensions underlying the various coping strategies available: (1) having an approach versus avoidance focus, and (2) being cognitive or behavioral in nature. Individuals who adopt approach strategies attempt to address the problem directly, whereas those who endorse avoidance-oriented strategies focus instead on withdrawal from an aversive situation. Concerning the second dimension, coping strategies are also assumed to involve changes in cognitions with respect to altering one's thinking in response to the situation, or alternatively, changes in observable behaviors aimed at changing one's environment.

When considered in combination, these underlying dimensions result in four categories of stress-related coping strategies. *Cognitive-approach* strategies involve changing one's perception of the situation, for example, by increasing one's focus on the potentially valuable aspects of the situation. In contrast, *behavioral-approach* strategies refer to changing the situation itself, such as efforts to directly reduce the aversive nature of the offending stimuli. With respect to avoidance strategies, *cognitive-avoidance* strategies refer to distracting oneself by focusing on less aversive thoughts not related to the situation. Finally, *behavioral-avoidance* coping involves distracting oneself from the situation by engaging in behaviors unrelated to the situation (Holahan et al., 1996).

This conceptual framework for classifying stress-related coping strategies is supported by theoretical assumptions and empirical findings in the research literatures on emotion and affect regulation. For example, research by Parkinson and Totterdell (1999) on affect regulation provides empirical evidence for the distinctions between the cognitive and behavioral strategies, and engagement (approach) as opposed diversion strategies (avoidance; see also Totterdell & Parkinson, 1999). Similarly, a process model proposed

by Gross (1998) outlines emotion regulation as involving four key elements paralleling those of Holahan, Moos, Holahan, Brennan, and Schutte (2005) including *situation selection* (approaching or avoiding certain situations), *situation modification* (behavioral strategies), *attentional deployment* (cognitive-avoidance), and *cognitive change* (cognitive-approach).

In recent research in Nett, Goetz, and Daniels (2010), the conceptual model proposed by Holahan et al. (1996) was adapted to account for how individuals cope with experiences of boredom. More specifically, four reliable coping measures specific to boredom as experienced by students in the classroom (grades 5–10) were evaluated including one representative scale of five items each for each of the four categories, such as cognitive-approach (e.g., focusing on the importance of a boring class), behavioral-approach (e.g., asking the teacher for alternate activities), cognitive-avoidance (e.g., thinking about another class), and behavioral-avoidance (e.g., chatting with classmates). The two dimensions of approach versus avoidance and cognition versus behavior were thus adapted to provide a descriptive classification of boredom-related coping strategies without additional assumptions concerning their motivational or social antecedents, correlates, or potential consequences. The assumed structure of the four categories was evaluated through confirmatory factor analysis, providing evidence that four separate coping strategies existed. Exploratory latent profile analyses further distinguished between three groups of students demonstrating differential patterns of relative endorsement of the four types of boredom-related coping strategies.

The first group, referred to as *Reappraisers*, scored the highest of all three groups on the cognitive-approach scale, indicating a marked tendency to respond to boring activities by increasing their focus on their potentially valuable aspects of the activity. The second group, labeled *Criticizers,* instead preferred to cope with boredom through behavioral-approach strategies aimed at actively changing the situation by expressing their frustration to the instructor and asking for alternative activities. Finally, a third group of students classified as *Evaders* more strongly endorsed both types of avoidance strategies, particularly behavioral-avoidance strategies such as chatting with classmates when bored. To summarize, recent empirical research suggests that the stress-related coping model proposed by Holahan et al. (1996) can be effectively adapted to classify the strategies used by students to cope with boredom in the classroom, and further, that meaningful clusters of students can be identified on the basis of student's preferred boredom-related coping strategies (Nett et al., 2010).

1.4.2. Effectiveness of boredom-related coping strategies

Concerning the potential benefits of boredom-related coping strategies, the question arises as to which of these groups is indeed most effective in minimizing feelings of boredom in an actual classroom setting. Furthermore, there are potential benefits of students' strategies for coping with boredom in the broader context of self-regulation. According to research on self-regulated learning, two critical challenges for optimizing the learning process involve minimizing internal and external distractions (Boekaerts, 1999) as well as regulating one's motivation (Sansone & Thoman, 2005; Wolters, 2003) and emotions (Parkinson & Totterdell, 1999). Successful strategies for coping with boredom thus should not only prevent students from experiencing this negative emotion, but also serve to facilitate effective learning.

In Nett et al. (2010), Reappraisers who relied primarily on cognitive-approach strategies involving cognitive reconstruals of boring mathematics classes (e.g., focusing on utility value) were found to experience less boredom than students who coped with boredom through behavioral-approach strategies (Criticizers) or avoidance strategies (Evaders). This finding is consistent with theoretical assumptions (Pekrun et al., 2010) and empirical research (Goetz, Frenzel, Stoeger, & Hall, 2010) suggesting that boredom is greater in learning situations perceived as low in value, in contrast to other learning-related emotions that correlate positively with value perceptions. The link between boredom and value is further highlighted in related research by Rana (2007), suggesting that boredom may be reduced by finding meaning in a given task, as well as studies showing value-enhancing teaching techniques to foster motivation and reduce boredom levels (e.g., Green-Demers, Pelletier, Stewart, & Gushue, 1998).

According to Sansone, Wiebe, and Morgan (1999), the use of interest-enhancing strategies is critical to regulating one's motivation and predicts greater effort and persistence during boring yet required activities (see also Sansone, Weir, Harpster, & Morgan, 1992). Findings from Gross and John (2003) also demonstrate significant benefits of cognitive reappraisal (i.e., cognitive-approach) emotion regulation strategies on positive emotions and psychological well-being. Wolters (1998) further showed motivation strategies involving intrinsic regulation, such as enhancing task value or interest, to be positively related to elaboration, critical thinking, as well as the use of metacognitive strategies.

On the other hand, avoidance strategies appear to be significantly less effective for dealing with learning-related boredom. More specifically, findings from Nett et al. (2010) revealed that students who more frequently engaged in cognitive- and behavioral-avoidance strategies, referred to as Evaders, reported the highest levels of boredom and the most worrisome pattern of achievement-related emotions (e.g., low enjoyment), motivation (e.g., low effort, interest, value), as well as cognitions (e.g., low self-concept) relative to other students. This pattern of results is consistent with those of Holahan et al. (2005) in which stress avoidance strategies are consistently positively correlated with symptoms of stress and depression.

1.5. Boredom-related coping: trait versus state assessments

As discussed above, students' experiences of boredom and use of boredom-related coping strategies may be influenced by situational as well as dispositional factors. Therefore, in order to most accurately assess the different ways in which students cope with boredom, it is important to consider both factors as potential antecedents of a student's classroom experiences and behaviors. To this end, the conceptual distinction between traits and states describes two sources of variability in psychological attributes, namely inter-individual differences due to dispositional factors and intra-individual differences caused by situational aspects (Steyer, Ferring, & Schmitt, 1992). In the coping literature, traditional approaches to conceptualizing and measuring coping behaviors typically operationalize coping strategy use as a stable and dispositional trait (for a review, see Stone, Greenberg, Kennedy-Moore, & Newman, 1991). Consequently, the most commonly utilized coping assessment methods consist of trait questionnaires and structured interviews (Stone et al., 1991) in which participants are asked about their general coping preferences in the form of hypothetical scenarios (Carver & Scheier, 1994).

As a compliment to the trait approach that is well-suited for evaluating the overall structure and personality correlates of coping strategies, more recent assessment methods also incorporate situational aspects of coping behavior (Stone et al., 1991). This measurement approach evaluates both between-person variability with respect to individual differences in coping behavior (trait assessment) as well as within-person variability across multiple assessments in how the individual copes with different situations (state assessment; Schwartz, Neale, Marco, Stone, & Shiffman, 1999). Thus, whereas trait methods are of considerable importance, state-based assessments allow for the role of situational factors to be more fully addressed and may serve as a valuable

complimentary approach for evaluating students' demonstrated use of strategies for coping with boredom in an actual classroom setting.

2. Research aims, questions, and hypotheses

The primary aim of this study was to evaluate both trait and state measures of boredom-related coping strategies in order to determine the most effective techniques used by students to cope with boredom in academic settings. More specifically, the first aim of the present study was to analyze the interrelations between specific trait boredom-related coping strategies, as well as relations between trait-based coping group membership and other personality traits (e.g., extroversion). Given the partly trait-based nature of the coping group classification measure, it was expected to correspond with well-known personality traits as measured by the Big Five. Correspondence with personality characteristics was also assessed to provide a more in-depth perspective on the overall dispositions of our trait-based coping strategy groups. The second aim of this study was to further investigate the frequency of state-assessed boredom and coping behaviors, as well as relations between coping behaviors and other state-assessed constructs (emotions, value) to explore the effectiveness of these coping behaviors. Finally, the third study aim was to explore the relations between trait and state assessments of boredom-related coping to assess the predictive utility of the trait coping measures.

Our study thus replicated with an independent sample and extended upon a trait-based investigation by Nett et al. (2010) in examining trait endorsements of boredom-related coping strategies in relation to *actual coping behavior* in real-life academic settings using the experience sampling method, as well the effectiveness of these behaviors with respect to state assessments of emotions and cognitions. Following from previous educational research showing students' emotional experiences to be largely domain specific in nature (Goetz, Frenzel, Pekrun, Hall, & Luedtke, 2007), the trait and state measures employed in the present study were evaluated specifically in regards to mathematics classes. This academic domain was selected based on previous research showing a moderate degree of student boredom in this domain (Goetz et al., 2006) and preliminary findings in support of the reliability of mathematics-specific measures of boredom-related coping strategies (Nett et al., 2010).

2.1. Question 1: trait assessment

Can the results of Nett et al. (2010) be replicated and extended concerning students' dispositional tendency to cope with boredom and their personality characteristics?

Hypothesis 1a. We hypothesized that the four-factor structure of the trait coping measures based on two coping dimensions (approach/avoidance, cognitive/behavioral) that was previously found in Nett et al. (2010) would be observed in the present confirmatory factor analyses.

Hypothesis 1b. We further hypothesized that the three coping profiles found in Nett et al. (2010), namely Reappraisers (cognitive-approach focus), Criticizers (behavioral-approach focus), and Evaders (avoidance focus), would also emerge in the present latent profile analysis.

Hypothesis 1c. Concerning the external validity of these boredom-related coping profiles, we hypothesized that coping group membership would predict trait self-reports of academic boredom, with Reappraisers reporting the lowest boredom levels (cf., Nett et al., 2010). Given the trait-oriented nature of this boredom-related coping measure, we further assumed that coping group membership would correspond to the Big Five personality traits. Assuming support for Hypothesis 1b, we expect Reappraisers to score most highly on agreeableness and conscientiousness, as investing effort in value appraisals implies being agreeable with the instructor's intentions and the perceived importance of being a conscientious student. Criticizers were expected to score higher on neuroticism than the other groups based on this group having the highest anxiety levels in Nett et al. (2010). Criticizers and Evaders were hypothesized to score relatively higher in extraversion, as they prefer to express their boredom to their teacher or classmates, respectively. No hypothesis concerning openness to experiences was proposed.

2.2. Question 2: state assessment

How often and to what extent do students engage in boredom-related coping behaviors and experience of boredom in response to real-life classroom activities?

Hypothesis 2a. It was anticipated that the frequency of students' experiences of boredom in class would be similar to that found in previous studies (e.g., 32%, Larson & Richards, 1991).

Hypothesis 2b. We hypothesized that the four coping strategies previously found for the trait measure (Nett et al., 2010) would also be observed for the state measure of boredom-related coping.

Hypothesis 2c. Concerning the external validity of the four coping measures, we hypothesized that each state coping behavior would correspond to state-assessed boredom levels as was found for the trait-based measures (Nett et al., 2010). It was further anticipated that the four coping behaviors would correlate more significantly with boredom than other academic emotions (anxiety, enjoyment) thus underscoring their boredom-specific focus.

2.3. Question 3: trait and state assessment relations

How strong is the predictive validity of trait assessments of boredom and coping strategies in terms of their respective state assessments?

Hypothesis 3a. We hypothesized a direct correspondence between students' trait-assessed reports of boredom frequency and the frequency of state-assessed boredom reports.

Hypothesis 3b. We hypothesized that the four trait-based coping strategies would positively predict their respective state-based coping behaviors (variable-centered approach).

Hypothesis 3c. We further hypothesized that students' boredom-related coping group membership, as derived from the trait measures, would significantly predict actual coping behaviors as assessed using state-based measures (person-centered approach).

3. Method

3.1. Participants and data collection

Two complimentary methods of data collection were employed. Trait data was collected via questionnaires that were group-administered to students during regular classroom periods by trained research assistants. State data was collected for 14 days

from November 2008 to March 2009 using the experience sampling method (Csikszentmihalyi & Larson, 1987; Hektner et al., 2007) involving personal digital assistant (PDA) devices programmed with PMat software (Weiss, Beal, Lucy, & MacDermid, 2004). For the trait assessment, participants were recruited from 25 classes of grade 11 students across 9 schools, with a total of 537 students completing the trait questionnaire (55.3% female). Of this initial cohort, two to four students from each class were randomly selected (i.e., names were drawn from entries submitted by each study participant) to complete the state assessment during mathematics classes (total $N = 79$; 58.2% female). The average age for trait study participants was 17.15 years ($SD = .68$), and for state study participants was 17.08 years ($SD = .54$). Study participation was voluntary and all responses were anonymous. All schools recruited from for this study were in the top track of the German education system (Gymnasium), thus minimizing the variability in mathematics ability level for state study participants.

The trait data collection occurred immediately before providing the randomly selected students from each class with PDA devices. Students were instructed to register their device when they attended a mathematics class (i.e., selecting the option to activate the study), with each class lasting 45 min. The device then signaled at a randomly selected time within the next 40 min and displayed a digital questionnaire that students were asked to immediately complete. The device stopped signaling after the first question was completed and after five minutes without a response, stopped signaling and removed the questionnaire. The questionnaire displayed one question at a time, the items were partly randomized, and required in total approximately 1–3 min to complete. Teachers were informed of the experimental protocol and agreed to student participation. The state assessment only took place during regular mathematics classes and did not interrupt class exams. Each student completed at least one and at most 11 state questionnaires ($M = 6.11$, $SD = 3.45$).

3.2. Variables and study measures

3.2.1. Trait assessment

All items on the trait-based questionnaire were evaluated on a five-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The coping scales consisted of five items each (Nett et al., 2010) and assessed four coping strategies: (1) *cognitive-approach* (e.g., "When I am bored in mathematics classes, I remind myself that the material is important"; $\alpha = .90$, $M = 16.43$, $SD = 4.70$), (2) *behavioral-approach* (e.g., "...I ask my teacher if we can do something else"; $\alpha = .80$, $M = 8.34$, $SD = 3.50$), (3) *cognitive-avoidance* (e.g., "...I study for another subject"; $\alpha = .69$, $M = 12.54$, $SD = 5.46$), and (4) *behavioral-avoidance* (e.g., "...I talk to my classmates"; $\alpha = .95$, $M = 17.95$, $SD = 5.76$).

Frequency of boredom experiences (e.g., "I am often bored during mathematics classes"; $\alpha = .93$, $M = 6.00$, $SD = 2.31$) was measured using two items. The NEO Five Factor Inventory was also administered (German version, NEO-FFI; Costa & McCrae, 1992) to assess the Big Five personality traits (Borkenau & Ostendorf, 1993). Each of the five scaks consisted of 12 items and evaluated neuroticism ($\alpha = .80$, $M = 33.43$, $SD = 7.17$), extraversion ($\alpha = .78$, $M = 42.30$, $SD = 6.49$), openness to experience ($\alpha = .72$, $M = 39.85$, $SD = 6.69$), agreeableness ($\alpha = .69$, $M = 42.18$, $SD = 5.94$), and conscientiousness ($\alpha = .86$, $M = 39.90$, $SD = 7.77$).

3.2.2. State assessment

To avoid overly intrusive state questionnaires, state constructs were assessed using single-item measures. This practice is consistent with findings from Wanous, Reichers, and Hudy (1997) showing single-item measures of job satisfaction to correlate highly with multi-item scales, as well as previous experience sampling studies on academic emotions (Goetz et al., 2010). Four types of boredom-related coping strategies were assessed in a manner consistent with the trait-based coping scales: (1) *cognitive-approach* ("I am reminding myself that the material is important"; $M = 3.25$, $SD = .91$); (2) *behavioral-approach* ("I am asking the teacher if we can do something else"; $M = 1.12$, $SD = .32$); (3) *cognitive-avoidance* ("I am studying silently for another subject"; $M = 1.93$, $SD = .93$), and (4) *behavioral-avoidance* ("I am talking to a nearby classmate"; $M = 2.16$, $SD = .90$). Participants responded to these items on a five-point Likert-type scale ranging from 1 (*not true at all*) to 5 (*absolutely true*).

The intensity of students' present experiences of boredom, anxiety, and enjoyment was also assessed using state measures ("During this activity, how strongly do you experience boredom?"; $M = 2.33$, $SD = .90$; "...anxiety?"; $M = 1.63$, $SD = .69$; "...enjoyment?"; $M = 1.98$, $SD = .75$). Participants responded to these items on a five-point Likert scale ranging from 1 (*not at all*) to 5 (*very strongly*). Perceptions of academic utility value were also assessed ("The outcome of my current activity is important to me"; $M = 3.38$, $SD = .85$) on a Likert scale ranging from 1 (*not true at all*) to 5 (*absolutely true*).

3.3. Statistical analysis

The trait assessment data represents a two-level structure in which students (Level 1; $N = 532$) are nested within classes (Level 2; $N = 25$). The data from the state assessment represents a three-level structure in which measures at certain assessment points (Level 1; $N = 483$) are nested within persons (Level 2; $N = 79$) that are nested within classes (Level 3; $N = 25$). For the sake of parsimony, we refer to the measures within persons as Level 1, to persons within classes as Level 2, and to the classes as Level 3 even when analyzing only Levels 2 and 3. Analyses were conducted via multi-level statistics using Mplus 5.1 software (Muthén & Muthén, 1998–2007). Despite no hypotheses concerning class composition (Level 3), we accounted for the stratification and non-independence of students due to cluster sampling by computing adjusted standard errors (Muthén & Muthén, 1998–2007). Regarding Levels 1 and 2, two-level models were used to analyze the relationships between variables within a specific level as well as to evaluate relations between variables on two different levels.

4. Results

4.1. Trait assessment

4.1.1. Structural validity of the trait measures

To evaluate Hypothesis 1a, confirmatory factor analysis (*CFA*) was conducted with the aim of replicating the four-factor structure of the coping measures found in Nett et al. (2010). Consistent with the recommendations of Beauducel and Wittmann (2005), the *CFI*, *SRMR*, and *RMSEA* were evaluated as fit indices. The model assessed reflected a four-factor structure in which the five-item scales loaded on four latent variables. Although each latent variable represented a different coping strategy, correlations were included between all latent factors to account for potential covariance. The five items for each scale were allowed to load only on the corresponding latent factor.

In line with Hypothesis 1a, this model showed very strong fit indices: $\chi^2/df = 1.80$, $p \leqslant .00$; $CFI = 0.972$, $SRMR = 0.052$, $RMSEA = 0.039$. The significance of the chi-square statistic can be attributed to the large sample size at the student level to which this statistic is overly sensitive (Marsh, Balla, & McDonald, 1988). The fit indices obtained are thus consistent with the rule of thumb recommending a χ^2/df ratio below three (Ullman, 2007), as well as criteria

for satisfactory goodness-of-fit recommended by Hu and Bentler (1999). The estimated correlation matrix for the latent strategy variables is presented in Table 1.

4.1.2. Identification of trait coping groups

To identify students with similar patterns of coping strategies based on their factor scores (Hypothesis 1b), latent profile analysis (LPA; Muthén & Muthén, 2000) was conducted using MPlus software (Muthén & Muthén, 1998–2007). To decide on the number of classes, we considered the Bayesian Information Criterion (BIC; Schwarz, 1978), the Lo-Mendell-Rubin test (LRMT; Lo, Mendell, & Rubin, 2001), as well as theoretical assumptions as recommended by Nylund, Asparouhov, and Muthén (2007). *LPA* findings indicated a two-class solution (Table 2) as opposed to the anticipated three-class solution. Although the *BIC* was more favorable (i.e., lower) for the three-class relative to the two-class solution, the *LMRT* showed the more complex three-class model to not fit significantly better than the more parsimonious two-class model.

The two groups identified in the *LPA* results are consistent with two of the three hypothesized groups, namely Reappraisers having above-average cognitive-approach and below-average avoidance factor scores ($M_{cognitive\text{-}approach} = 0.27$; $M_{behavioral\text{-}approach} = -0.04$; $M_{cognitive\text{-}avoidance} = -0.56$; $M_{behavioral\text{-}avoidance} = -1.38$; $N = 171$) and Evaders having below-average cognitive-approach and above-average avoidance factor scores ($M_{cognitive\text{-}approach} = -0.13$; $M_{behavioral\text{-}approach} = 0.02$; $M_{cognitive\text{-}avoidance} = 0.27$; $M_{behavioral\text{-}avoidance} = 0.66$; $N = 361$). No third group corresponding to the Criticizers in Nett et al. (2010) was detected (i.e., above-average factor scores for behavioral-approach strategies). The mean factor scores of the two groups are shown in Fig. 1. The average Latent Class Probabilities for most likely class membership showed Reappraisers and Evaders to be classified in a reliable manner (.91 and .95 probabilities of correct class allocation, respectively). The assessment of entropy as a measure of classification certainty in Mplus (Muthén & Muthén, 1998–2007) provided further support for the two-class model, with a value of .79 indicating acceptable certainty (possible range: 0–1; higher values indicate greater certainty; Celeux & Soromenho, 1996). No classroom or gender effects on the coping group membership were observed.

4.1.3. Trait coping groups and personality relations

The most likely class membership calculated by the *LPA* is not an exact observed measurement but rather a probability-based score. Analyses based solely on this measure thus do not account for the possibility that individuals belonging to the same class may markedly differ in their probabilities of class membership (Clark & Muthén, 2009). To account for such differences, an Mplus feature allowing for mean comparisons on the basis of pseudo-class draws was employed (Wang, Brown, & Bandeen-Roche, 2005). In this analysis, several random draws are made from each individual's posterior probability distribution to determine class membership, resulting in different pseudo-groups between which mean comparisons regarding auxiliary aspects can be computed (Clark & Muthén, 2009). This approach is recommended by Clark and Muthén (2009) as an acceptable compromise between group probabilities and dichotomies.

To address Hypothesis 1c, the preceding procedure was used to compare the boredom coping groups with respect to students' perceived frequency of boredom experiences, as well as the five personality traits assessed in the NEO-FFI. Table 3 outlines the results of the means comparisons tests across boredom coping groups based on posterior probability-based multiple imputations ($df = 1$), in addition to the observed means, standard errors, χ^2, and p values. In line with our assumptions and the findings of Nett et al. (2010), Reappraisers reported significantly lower levels of boredom relative to Evaders. As hypothesized, Reappraisers were also significantly more conscientious and less extroverted than Evaders. Findings based on a less conservative $p < .05$ criterion further showed Reappraisers to be more agreeable than the Evaders. No

Table 1
Estimated correlations among latent trait coping measures.

	(1)	(2)	(3)	(4)
Trait cognitive-approach	–			
Trait behavioral-approach	.09	–		
Trait cognitive-avoidance	−.17***	.18***	–	
Trait behavioral-avoidance	−.34***	.02	.37***	–

Note: $N = 532$.
*** $p < .001$.

Table 2
Information criteria values of class solutions for boredom coping groups.

No. of classes	1	2	3	4
No. of free parameters	8	13	18	23
Log likelihood	−2644.10	−2539.23	−2501.86	−2470.27
BIC	5338.42	5160.05	5116.69	5084.89
p_{LMR}	–	.00	.14	.48

Note: *BIC* = Bayesian information criteria; p_{LMR} = *p*-value of Lo-Mendel-Rubin test; $N = 532$.

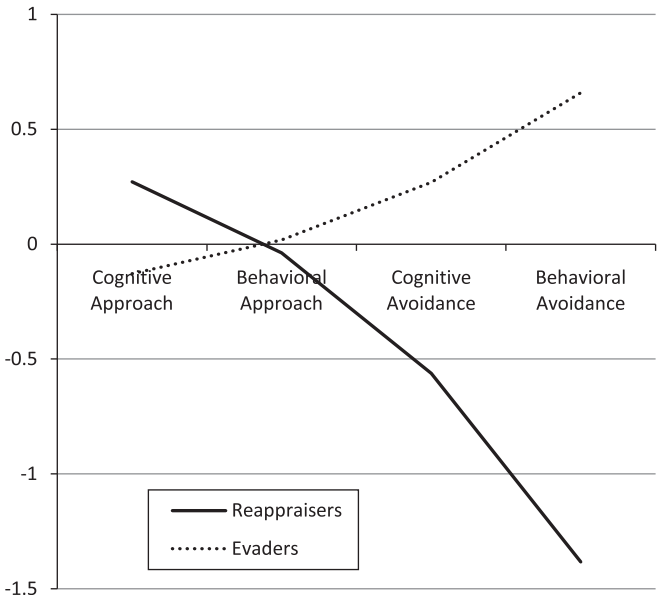

Fig. 1. Mean factor scores on trait boredom coping measures by group membership.

Table 3
Boredom group mean differences.

	Reappraisers $N = 171$		Evaders $N = 361$		χ^2	*p*
	M	*SE*	*M*	*SE*		
Boredom frequency	2.59	.09	3.15	.06	24.35	.000
Neuroticism	2.82	.05	2.78	.03	0.37	.543
Extraversion	3.39	.04	3.59	.03	12.63	.000
Openness to experience	3.35	.05	3.32	.03	0.26	.609
Agreeableness	3.58	.04	3.48	.03	4.13	.042
Conscientiousness	3.48	.06	3.24	.04	12.61	.000

Note: Equality tests of means across boredom coping groups using posterior probability-based multiple imputations with 1 degree of freedom.

group differences on neuroticism or openness to experiences were observed.

4.2. State assessment

4.2.1. Frequency of boredom experiences

Descriptive analyses were conducted to determine how often experiences of boredom were reported by students during mathematics classes (Hypothesis 2a). Of the 79 state assessment participants, only five never reported feeling bored (always selected 1 = *not at all*). Conversely, 16 students indicated having always felt some degree of boredom during mathematics classes (always selected 2 or higher). On average, students reported some degree of boredom during 58% of the state assessments and very strong feelings of boredom during 9% of state assessments. Due to the PDA devices signaling at random intervals during the mathematic classes, the percentage of participants' answers can be interpreted as the percentage of time during class during which boredom was experienced. On average, students reported moderate boredom intensity ($M = 2.33$, $SD = .90$). The intraclass correlation for boredom levels, referring to Level 1 (measurement points) and Level 2 (students), was $ICC = .26$. In multi-level modeling, the intraclass correlations evaluates the variability within Level 2 in relation to the total variability of the construct. A value of .26 thus suggests that 26% of the variability of the boredom measure is due to dispositional features, or alternatively, that 74% of the variability in this measure was due to the situational context.

4.2.2. Frequency of coping behavior

To investigate Hypothesis 2b, we evaluated how often the four types of coping behavior, corresponding to the four trait measures of boredom-related coping, were reported in the state assessments. To reiterate, items concerning the coping behaviors were asked during each assessment period regardless of the level of boredom reported by the participant at that time. The percentage data revealed that, on average, some degree of cognitive-approach behavior (i.e., reminding oneself of the materials' importance) was reported by participants 78% of the time ($M = 3.25$, $SD = .91$), as compared to behavioral-approach actions that were reported on average only 6% of the time (i.e., asking the teacher to assign alternate activities; $M = 1.12$, $SD = .32$). Concerning avoidance behaviors, participants reported some level of cognitive-avoidance behaviors during an average of 36% of the time spent in class (i.e., studying for an unrelated subject; $M = 1.93$, $SD = .93$), whereas behavioral-avoidance actions were reported 46% of the time on average (i.e., talking to a nearby classmate; $M = 2.16$, $SD = .90$). These percentages suggest that students' boredom-related coping strategies most often focus on value appraisals, and to a lesser extent, distracting behaviors unrelated to class content. In contrast, students were found to less frequently engage in cognitive distractions and very seldom attempted to persuade their teacher to assign more stimulating classroom exercises. The intraclass correlations for these four variables were $ICC_{cognitive\text{-}approach} = .20$; $ICC_{behavioral\text{-}approach} = .003$; $ICC_{cognitive\text{-}avoidance} = .24$; $ICC_{behavioral\text{-}avoidance} = .16$. These correlations indicate that while cognitive-approach, cognitive-avoidance, and behavioral-avoidance behaviors are to some degree influenced by dispositional aspects, behavioral-approach behaviors in particular appear to be predicted predominantly by the situational context.

4.2.3. Coping behavior and boredom relations

To address Hypothesis 2c, correlations between coping behaviors and reported experiences of boredom as well as state measures of academic emotions (anxiety, enjoyment) and cognition (perceived value) were assessed (Table 4). The correlations were calculated only at Level 1 with the non-independence of observations on Levels 2 and 3 taken into account. As hypothesized, whereas all four coping behaviors were significantly related to experiences of boredom, they were not uniformly related to anxiety (only behavioral-approach strategies) and enjoyment (only behavioral-avoidance strategies). In contrast to the positive relations found between boredom and behavioral as well as cognitive-avoidance approaches, cognitive-approach behaviors were correlated negatively with boredom. This approach was also much more highly correlated with perceived value than were the other coping behaviors.

Table 4
Correlations among state measures.

	Cognitive-approach	Behavioral-approach	Cognitive-avoidance	Behavioral-avoidance
Boredom	−.17**	.12*	.14*	.26***
Anxiety	.12	.16*	.04	.13
Enjoyment	−.05	.06	−.03	.10*
Value	.50**	−.07	.25**	−.13*

Note: A total of 483 state assessments of boredom-related coping behavior were obtained from 79 students.
$N = 532$.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

4.3. State and trait assessment relations

4.3.1. Predictions of boredom frequency

In the trait assessment, students were asked how often they experienced boredom during mathematics classes. To investigate Hypothesis 3a, the correlations between students' trait self-reports and the observed frequency of boredom experiences on state assessments completed during mathematics classes were conducted. These analyses revealed a significant correlation between the trait- and state-based self-reports of boredom ($r = .39$, $p \leqslant .001$) suggesting that students could, to a considerable extent, reliably predict their frequency of boredom experiences in mathematics classes.

4.3.2. Trait predicting state assessments

To investigate Hypothesis 3b, two-level regressions were conducted in which state assessments of coping behaviors (Level 1) were regressed on their respective factor scores for the four trait assessments (Level 2). To account for the boredom-contingent phrasing of the trait coping items (i.e., "When I am bored in mathematics class..."), the first set of regressions included only state assessments of coping behaviors in which students had reported some degree of boredom. For comparison purposes, a second set of regressions including only state assessments in which students did *not* experience boredom were also conducted. The results of the regression analyses showed only the trait assessments of cognitive-approach strategies (boredom indicated: $b = 0.45$, $p < .05$; boredom not indicated: $b = 1.08$, $p < .01$) and behavioral-avoidance strategies (boredom indicated: $b = 0.42$, $p < .01$; boredom not indicated: $b = 0.10$, $p > .05$) to significantly predict their respective state assessments. In other words, the only dispositional measures of boredom-related coping strategies found to predict corresponding behaviors in an academic setting were those related to changing one's perceptions of subject value, or alternatively, engaging in distracting behaviors (talking to friends). Further, the trait cognitive-approach scale was also the only coping measure to significantly predict their respective state assessment regardless of boredom being reported, suggesting that this approach may be used by students to cope with as well as *prevent* boredom experiences.

4.3.3. Trait group membership predicting state assessments

To evaluate Hypothesis 3c, a person-centered approach was adopted to explore the extent to which probability of group membership (see Clark & Muthén, 2009), as identified through *LPA*s of trait strategy measures (i.e., Reappraisers versus Evaders, see Clark & Muthén, 2009), predicted state assessments of associated coping behaviors. As probability scores range from 0 to 1, they were logit-transformed into a logistic scale (see Clark & Muthén, 2009) before inclusion in a two-level regression analysis. Due to only two groups having been identified in the present study, the two probability scores for a given individual add up to 1 and the logit-transformed scores add up to zero, resulting in regression weights for the two variables that are of equal magnitude but opposite in valence. As hypothesized, our results indicated that the more likely a student was to be classified as a Reappraiser, the more likely that student was to also report cognitive-approach behaviors in response to experiences of boredom (boredom indicated: $b = 0.03$, $p < .05$; boredom not indicated: $b = 0.02$, $p > .05$). A higher probability of being classified as a Reappraiser also predicted fewer behavioral-avoidance responses to feelings of boredom (boredom indicated: $b = -0.06$, $p < .01$; boredom not indicated: $b = -0.01$, $p > .05$), but did not predict any coping behavior if boredom was not reported. Conversely, the likelihood of a student being classified as an Evader positively predicted behavioral-avoidant responses to boredom (boredom indicated: $b = 0.06$, $p < .01$; boredom not indicated: $b = 0.01$, $p > .05$), and negatively predicted cognitive-approach behaviors if the student reported experiencing boredom (boredom indicated: $b = -0.03$, $p < .05$; boredom not indicated: $b = -0.02$, $p > .05$; same regression coefficients as above with opposite valence). It should be noted that these regression weights are not standardized, thus allowing for comparisons of significance values only.

5. Discussion

Despite the common, aversive, and problematic nature of boredom in the classroom (e.g., Larson & Richards, 1991; Tidwell, 1988; Wegner et al., 2008), little research to date has explored students' experiences of boredom or the influence of dispositional and situational factors on how students' cope with this deleterious emotion. The present study aimed to contribute to this research gap by supplementing trait evaluations of boredom-related coping strategies with state assessments conducted in real-life classroom settings.

5.1. Trait assessments of coping strategies

With respect to the first study hypothesis, our findings replicate Nett et al. (2010) in confirming a four-factor model of coping strategy endorsement specific to boredom experiences. As hypothesized, two boredom-related coping profiles similar to those identified by Nett et al. (2010) were observed, with these groups referred to as Reappraisers (high cognitive-approach, low avoidance) and Evaders (low cognitive-approach, high avoidance). However, a third group previously referred to as Criticizers was not supported by the study data. In contrast to the other groups, Criticizers were previously characterized by their emphasis on behavioral-approach strategies, and in Nett et al. (2010), scored between the other two groups on achievement, motivation, and emotions. As to why this group was not detected, it is possible that the present smaller sample size ($N = 537$) as compared to Nett et al. (2010; $N = 936$) allowed for only the most disparate coping groups to be identified. Nevertheless, these findings provide additional empirical support for the utility of this classification in accounting for boredom-related coping profiles. As hypothesized, students classified as Reappraisers reported lower levels of trait boredom in mathematics classes than Evaders. This suggests that the former group may respond to experiences of boredom more effectively than the latter, or alternatively, are less often initially bored due to their preexisting disposition to respond adaptively to this emotion. Regardless of the reason, these findings concerning boredom levels provide empirical support for the proposed mechanism underlying the potential effectiveness of boredom-related coping strategies in showing a greater relative emphasis on cognitive-approach strategies to correspond with lower boredom as assessed using trait measures.

Finally, evaluations of the relations between the trait coping measures and well-established personality variables revealed further group differences showing Reappraisers to be less extraverted and more conscientious than Evaders. In addition to underscoring the trait-like nature of the coping strategy measures, these results are consistent with the strategy profile of each group. Whereas Reappraisers demonstrated a greater focus on self-regulation (i.e., anticipating the future value of otherwise boring mathematics content), Evaders were instead shown to prefer seeking stimulation through interactions with others.

5.2. State assessments of boredom and coping behavior

In Larson and Richards (1991), students, on average, reported feelings of boredom during 32% of the time spent in class. Our results are even more worrisome in showing students to experience some level of boredom during 58% of the time spent in mathematics classes. Whereas this discrepancy in boredom frequency may be attributable to differing methods of assessment (e.g., measure sensitivity to students' boredom experiences), these results are nonetheless indicative of the highly prevalent nature of students' experiences of boredom in the classroom. With respect to our second hypothesis, our aim was to assess whether or not the relational structure observed for students' generalized reports of coping strategies would be observed when evaluating coping behaviors in real-life classroom settings. An initial analysis revealed an encouraging finding showing cognitive-approach strategies to be frequently reported during class, irrespective of whether or not boredom was indicated. In contrast, behavioral-approach behaviors were not frequently reported, perhaps due to a lack of opportunity (e.g., unresponsive teacher), resulting in a lack of variance that may have contributed to subsequent nonsignificant findings. Cognitive-avoidance strategies were also infrequently reported, likely due to students finding it easier to distract themselves by chatting with a classmate as is suggested by a positive correlation between the trait cognitive- and behavioral-avoidance measures. Analyses of behavioral-avoidance behaviors support this interpretation in showing behavioral distractions to be commonly reported by students during mathematics classes.

The intraclass correlations for each of these strategies further revealed that the variability in students' coping behavior was to a considerable extent explained by situational as opposed to dispositional factors. This shows that the classroom environment is indeed a critical determinant of students' boredom experiences and thus could potentially be modified to significantly reduce this deleterious emotion. As the present sample is quite homogenous with respect to mathematics ability levels and instruction methods, with all students having been selected from grade 11 classrooms in the top track of the German education system, further research is needed to determine the extent to which differences in instructional activities and ability levels elicits differential patterns of boredom-related coping behaviors. Nevertheless, the present study findings highlight the importance of contextual variables despite the largely homogenous nature of the learning situation assessed.

The significant relations found between each coping behavior and feelings of boredom, as compared to notably less consistent relations with other state emotions (enjoyment, anxiety), suggests that the occurrence and intensity of these coping behaviors is uniquely linked to this emotion. Nevertheless, analyses of the state assessment data suggested that cognitive-approach behaviors are most beneficial with respect to reports of boredom in actual classroom settings, as indicated by a negative relationship between these two variables. It is important to note, however, that assertions concerning the directional nature of this relationship are not afforded by the study data. With respect to value appraisals, analyses of state measures also showed cognitive-approach behaviors to positively correspond with perceptions of value. This finding is consistent with our theoretical assumptions (Goetz et al., 2010; Pekrun et al., 2010) in suggesting that cognitive-approach strategies realize their effectiveness by increasing the perceived value of boring class content. In addition to the negative relationship between cognitive-approach behaviors and boredom, significant *positive* relationships between state assessments of boredom and behavioral-approach, cognitive-avoidance, as well as behavioral-avoidance behaviors were observed. As the correlational nature of these results once again precludes directional interpretations, it is possible that these behaviors contributed to greater boredom, or alternatively, that these behaviors were prompted by experiences of boredom. Nonetheless, the lack of substantial positive relations between perceived value and behavioral-approach as well as behavioral-avoidance responses suggests that these strategies may not be effective responses to boredom. Further, although a positive correlation between cognitive-avoidance behaviors and value was observed, this may not imply negative relations with boredom as our value measure may have to some degree assessed students' perceived value of the other class for which the student was studying.

5.3. Relations between trait and state assessments

The present findings suggest that students can reliably estimate how often they experience boredom in the classroom, thus providing support for the predictive validity of students' generalized self-reports of boredom frequency. With respect to the main analyses of predictive validity of the trait coping strategy measures, only the cognitive-approach and behavioral-avoidance measures significantly predicted subsequent reports of corresponding behaviors in mathematics classes. These findings support our hypotheses concerning the predictive utility of the trait coping measures, and further, are consistent with Schwartz et al. (1999) who assert that weak relations between trait and state measures are typically observed. Our findings for cognitive-approach strategies indicate that students who endorse this strategy in the trait questionnaire also frequently report using it in real-life classroom settings. Moreover, these students were found to engage in cognitive-approach behaviors both when they experienced boredom, and when they did not, suggesting that such strategies may reduce as well as *prevent* boredom experiences. The latter interpretation is further supported by significant relations between cognitive-approach strategy endorsement and conscientiousness implying a degree of diligence and forethought concerning academic activities.

In exploring the relationship between trait-assessed probability of coping group membership and the state coping measures, the two strategy profiles observed were found to significantly predict the corresponding coping behaviors in the expected directions. In other words, latent group membership corresponded to not only trait assessments of boredom-related strategies, but also state assessments of actual coping behavior. These findings thus provide empirical evidence to suggest that momentary assessments of boredom-related coping behavior are not random, but indeed significantly predicted by dispositional preferences.

Despite these intriguing findings, however, the developmental antecedents of these dispositional preferences remain unexplored. Although it is possible that personality characteristics determine dispositional boredom-related coping preferences, it is also possible that dispositional preferences may result from long-term exposure to contextual conditions in the classroom. Whereas the significant influence of situational aspects on variability in state assessments of students coping behavior was observed in this study, further research in which the impact of situational factors on the development of students' boredom-related coping dispositions is needed.

6. Implications for research and educational practice

With respect to future studies, four critical research questions following from the study findings warrant further investigation. First, further research on the generalizability of the present findings concerning the prevalence and effectiveness of boredom-related coping strategies in other *academic domains* is warranted (e.g., science, languages, sports, arts). Second, additional studies in which differences in students' conceptualizations and perceptions of boredom as a function of *age or cultural background* are evaluated may serve to improve our understanding of how students subsequently cope with this emotion in actual classroom settings (Karabenick et al., 2007). Third, an analysis of boredom in relation to specific *classroom activities* (e.g., teaching, discussion, exercises, etc.) could help to clarify the habitual as opposed to situation-specific nature of relevant coping strategies. Following from recent research on the classroom antecedents of students' boredom (Daschmann, Goetz, & Stupnisky, in press), an informative next step would be to relate these factors to students' coping behaviors to determine which classrooms activities elicit the most boredom and if modifying that specific classroom element can serve to effectively and efficiently minimize subsequent boredom experiences. Fourth, further research exploring the effects of specific *teaching practices* on boredom and coping strategies may allow questions raised by our findings concerning limited opportunities for specific strategies to be addressed. For example, the degree to which teaching practices such as autonomy support, demonstrated enthusiasm, organization, and humor actually encourage students to address boredom experiences directly with their teacher (i.e., behavioral-approach strategies) remains to be explored.

Additionally, following from previous research suggesting that students' experiences of boredom are influenced by both situational variables (e.g., teaching effectiveness, see Kanevsky & Keighley, 2003; Vodanovich, 2003) as well as dispositional factors (e.g., Barnett & Klitzing, 2006; Farmer & Sundberg, 1986; Larson & Richards, 1991; Vodanovich, 2003), the present findings underscore the importance of developing effective boredom-reducing techniques that account for both sources of influence. Thus, in addition to encouraging teachers to develop engaging lesson plans and create a stimulating classroom environment, our results suggest that it is also critical to make teachers aware of the pervasive nature of academic boredom despite the classroom context or teaching practices, the significance of students' perceptions of classroom activities (i.e., utility value), as well as reminding students of their own potential and responsibility for regulating their responses to experiences of boredom. Further, to the extent that boredom-related coping strategies facilitate not only emotional well-being but also self-regulated learning, it is also important to underscore to teachers the potential significance of boredom-related strategies for maintaining and optimizing the learning process. In this regard, discussions between teachers and students concerning their *mutual* responsibility for minimizing boredom in the classroom and encouraging teachers to be receptive to students' feedback concerning the identification and modification of boring activities (e.g., from Criticizers) may prove beneficial.

By addressing the issue of boredom rather than ignoring it, it may be possible for teachers and students to work together reduce this deleterious emotion, and in turn, facilitate academic motivation and achievement. More specifically, our results suggest that by informing students of the potential benefits, as well as risks of specific boredom-related coping strategies (e.g., focusing on value as opposed to talking with friends), teachers are more likely to facilitate student appreciation of the course material (i.e., perceived value). For example, by teaching students how to find value in otherwise boring academic content, and subsequently allowing students to practice this coping strategy as a classroom exercise (e.g., benefits lists), students may come to better understand their role in minimizing boredom experiences and thereby maximize their learning potential.

Finally, it is anticipated that continued research on boredom and related coping efforts in a classroom setting can lead to the development of intervention programs aimed at helping students cope with boredom more effectively. For example, existing research on motivational interventions for students highlights the potential emotional and achievement benefits of programs encouraging greater personal responsibility for academic failure experiences (e.g., attributional retraining; Hall et al., 2007) or greater personal reflection on the perceived value of academic endeavors (e.g., Cohen, Garcia, Apfel, & Master, 2006). Considering the independent effectiveness of these programs, it is possible that an intervention encouraging students to assume personal responsibility for feelings of boredom by focusing on the utility value of what they are learning (i.e., cognitive-approach strategies) could help to minimize boredom experiences, enhance students' motivation and achievement, and thereby contribute to a more enjoyable classroom experience for students and teachers alike.

Acknowledgment

This project was supported by a grant from the German Academic Exchange Service (D/08/50439) to the first author, and is based on data from the doctoral dissertation of the first author.

References

Amos, A., Wiltshire, S., Haw, S., & McNeill, A. (2006). Ambivalence and uncertainty: Experiences of and attitudes towards addiction and smoking cessation in the mid-to-late teens. *Health Education Research, 21*(2), 181–191. doi:10.1093/her/cyh054.

Anshel, M. H. (1991). A survey of elite athletes on the perceived causes of using banned drugs in sport. *Journal of Sport Behavior, 14*(4), 283–307. <http://www.redi-bw.de/db/ebsco.php/search.ebscohost.com/login.aspx?direct=true&db=aph&AN=9610216663&site=ehost-live>.

Barnett, L. A. (2005). Measuring the ABCs of leisure experience. Awareness, boredom, challenge, distress. *Leisure Sciences, 27*(2), 131–155. doi:10.1080/01490400590912051.

Barnett, L. A., & Klitzing, S. W. (2006). Boredom in free time: Relationships with personality, affect, and motivation for different gender, racial and ethnic student groups. *Leisure Sciences, 28*(3), 223–244. doi:10.1080/01490400600598053.

Bearden, L. J., Spencer, W. A., & Moracco, J. C. (1989). A study of high school dropouts. *School Counselor, 37*(2), 113–120.

Beauducel, A., & Wittmann, W. W. (2005). Simulation study on fit indexes in CFA based on data with slightly distorted simple structure. *Structural Equation Modeling, 12*(1), 41–75. <http://www.informaworld.com/smpp/content~db=all?content=10.1207/s15328007sem1201_3>.

Blaszczynski, A., McConaghy, N., & Frankova, A. (1990). Boredom-proneness in pathological gambling. *Psychological Reports, 67*(1), 35–42. doi:10.2466/PR0.67.5.35-42.

Boekaerts, M. (1999). Self-regulated learning: Where we are today. *International Journal of Educational Research, 31*(6), 445–551. Retrieved from ERIC database.

Borkenau, P., & Ostendorf, F. (1993). *NEO-Fünf-Faktoren-Inventar nach Costa und Mc Crae [NEO five factor inventory according to Costa and Mc Crae]*. Göttingen: Hogrefe.

Carver, C. S., & Scheier, M. F. (1994). Situational coping and coping dispositions in a stressful transaction. *Journal of Personality and Social Psychology, 66*(1), 184–195. doi:10.1037/0022-3514.66.1.184.

Celeux, G., & Soromenho, G. (1996). An entropy criterion for assessing the number of clusters in a mixture model. *Journal of Classification, 13*, 195–212.

Clark, S. L., & Muthén, B. O. (2009). Relating latent class analysis results to variables not included in the analysis. submitted for publication. Available from http://www.statmodel.com/download/relatinglca.pdf.

Cohen, G. L., Garcia, J., Apfel, N., & Master, A. (2006). Reducing the racial achievement gap: A social–psychological intervention. *Science, 313*, 1307–1310. doi:10.1126/science.1128317.

Costa, P. T., & McCrae, R. R. (1992). *Revised NEO Personality Inventory (NEO PI -R) and NEO Five Factor Inventory. Professional Manual*. Odessa, Fla.: Psychological Assessment Resources.

Csikszentmihalyi, M., & Larson, R. (1987). Validity and reliability of the experience-sampling method. *Journal of Nervous and Mental Diseases, 9*, 526–536. doi:10.1097/00005053-198709000-00004.

Daschmann, E. C., Goetz, T., & Stupnisky, R. (in press) Testing the predictors of boredom at school: Development and validation of the precursors to boredom scales. *British Journal of Educational Psychology*.

Davis, H. A., DiStefano, C., & Schutz, P. A. (2008). Identifying patterns of appraising tests in first-year college students: Implications for anxiety and emotion regulation during test taking. *Journal of Educational Psychology, 100*(4), 942–960. doi:10.1037/a0013096.

Farmer, R., & Sundberg, N. D. (1986). Boredom proneness – The development and correlates of a new scale. *Journal of Personality Assessment, 50*(1), 4–17. doi:10.1207/s15327752jpa5001.

Farrell, E., Peguero, G., Lindsey, R., & White, R. (1988). Giving voice to high school students: Pressure and boredom, ya know what I'm sayin'? *American Educational Research Association, 25*(4), 489–502. doi:10.2307/1163126.

Goetz, T., Frenzel, A. C., Pekrun, R., & Hall, N. C. (2006). The domain specificity of academic emotional experiences. *Journal of Experimental Education, 75*(1), 5–29. <http://www.redi-bw.de/db/ebsco.php/search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2006-12843-001&site=ehost-live>.

Goetz, T., Frenzel, A. C., Pekrun, R., Hall, N. C., & Luedtke, O. (2007). Between- and within-domain relations of students' academic emotions. *Journal of Educational Psychology, 99*(4), 715–733. doi:10.1037/0022-0663.99.4.715.

Goetz, T., Frenzel, A., Stoeger, H., & Hall, N. (2010). Antecedents of everyday positive emotions: An experience sampling analysis. *Motivation and Emotion, 34*(1), 49–62. doi:10.1007/s11031-009-9152-2.

Green-Demers, I., Pelletier, L. G., Stewart, D. G., & Gushue, N. R. (1998). Coping with the less interesting aspects of training: Toward a model of interest and motivation enhancement in individual sports. *Basic & Applied Social Psychology, 20*(4), 251–261. doi:10.1207/s15324834basp2004.

Gross, J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology, 2*(3), 271–299. doi:10.1037/1089-2680.2.3.271.

Gross, J., & John, O. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology, 85*(2), 348–362. doi:10.1037/0022-3514.85.2.348.

Hall, N. C., Perry, R. P., Goetz, T., Ruthig, J. C., Stupnisky, R. H., & Newall, N. E. (2007). Attributional retraining and elaborative learning: Improving academic development through writing-based interventions. *Learning and Individual Differences, 17*, 280–290. doi:10.1016/j.lindif.2007.04.002.

Hamilton, J. A., Haier, R. J., & Buchsbaum, M. S. (1984). Intrinsic enjoyment and boredom coping scales: Validation with personality, evoked potential and attention measures. *Personality and Individual Differences, 5*(2), 183–193. doi:10.1016/0191-8869(84)90050-3.

Hektner, J. M., Schmidt, J. A., & Csikszentmihalyi, M. (2007). *Experience sampling method: Measuring the quality of everyday life*. Thousand Oaks, CA: Sage Publications.

Holahan, C. J., Moos, R. H., & Schaefer, J. A. (1996). Coping, stress resistance, and growth: Conceptualizing adaptive functioning. In M. Zeidner & N. S. Endler (Eds.), *Handbook of coping. Theory, research, applications* (pp. 24–43). New York: John Wiley & Sons, Inc.

Holahan, C. J., Moos, R. H., Holahan, C. K., Brennan, P. L., & Schutte, K. K. (2005). Stress generation, avoidance coping, and depressive symptoms: A 10-year model. *Journal of Consulting and Clinical Psychology, 73*(4), 658–666. doi:10.1037/0022-006X.73.4.658.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1–55. <http://www.redi-bw.de/db/ebsco.php/search.ebscohost.com/login.aspx?direct=true&db=aph&AN=3384345&site=ehost-live>.

Kanevsky, L., & Keighley, T. (2003). To produce or not to produce? Understanding boredom and the honor in underachievement. *Roeper Review, 26*(1), 20–28. <http://www.redi-bw.de/db/ebsco.php/search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2003-09552-002&site=ehost-live>.

Karabenick, S., Woolley, M., Friedel, J., Ammon, B., Blazevski, J., Bonney, C., et al. (2007). Cognitive processing of self-report items in educational research: Do they think what we mean? *Educational Psychologist, 42*(3), 139–151. Retrieved from ERIC database.

Kass, S. J., Vodanovich, S. J., & Callender, A. (2001). State-trait boredom: Relationship to absenteeism, tenure, and job satisfaction. *Journal of Business and Psychology, 16*(2), 317–327. doi:10.1023/A:1011121503118.

Kleinginna, P. R., & Kleinginna, A. M. (1981). A categorized list of emotion definitions, with suggestions for a consensual definition. *Motivation and Emotion, 5*(4), 345–379. doi:10.1007/BF00992553.

Larson, R. W., & Richards, M. H. (1991). Boredom in the middle school years: Blaming schools versus blaming students. *American Journal of Education, 99*(4), 418–443. doi:10.1086/443992.

Lo, Y., Mendell, N. R., & Rubin, D. B. (2001). Testing the number of components in a normal mixture. *Biometrika, 88*(3), 767–778. <http://www.jstor.org/stable/2673445?seq=2>.

Marsh, H. W., Balla, J. R., & McDonald, R. P. (1988). Goodness-of-fit indexes in confirmatory factor analysis: The effect of sample size. *Psychological Bulletin, 103*, 391–410. doi:10.1037/0033-2909.103.3.391.

Mikulas, W. L., & Vodanovich, S. J. (1993). The essence of boredom. *Psychological Record, 43*(1), 3–12. <http://www.redi-bw.de/db/ebsco.php/search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=1993-28333-001&site=ehost-live>.

Moneta, G. B., & Csikszentmihalyi, M. (1996). The effect of perceived challenges and skills on the quality of subjective experience. *Journal of Personality, 64*(2), 275–310. doi:10.1111/j.1467-6494.1996.tb00512.x.

Moos, R. H., & Holahan, C. J. (2003). Dispositional and contextual perspectives on coping: Toward an integrative framework. *Journal of Clinical Psychology, 59*(12), 1387–1403. doi:10.1002/jclp. 10229.

Muthén, B. O., & Muthén, L. K. (2000). Integrating person-centered and variable-centered analysis: Growth mixture modeling with latent trajectory classes. *Alcoholism: Clinical and Experimental Research, 24*(6), 882–891. doi:10.1111/j.1530-0277.2000.tb02070.x.

Muthén, L. K., & Muthén, B. O. (1998–2007). *Mplus user's guide* (5th ed.). Los Angeles, CA: Muthén & Muthén.

Nett, U. E., Goetz, T., & Daniels, L. M. (2010). What to do when feeling bored? Students' strategies for coping with boredom. *Learning and Individual Differences, 20*, 626–638. doi:10.1016/j.lindif.2010.09.004.

Newberry, A. L., & Duncan, R. D. (2001). Roles of boredom and life goals in juvenile delinquency. *Journal of Applied Social Psychology, 31*(3), 527–541. doi:10.1111/j.1559-1816.2001.tb02054.x.

Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling, 14*(4), 535–569. doi:10.1080/10705510701575396.

Parkinson, B., & Totterdell, P. (1999). Classifying Affect-regulation Strategies. *Cognition & Emotion, 13*(3), 277–303. doi:10.1080/026999399379285.

Pekrun, R., Goetz, T., Daniels, L. M., Stupnisky, R. H., & Perry, R. P. (2010). Boredom in achievement settings: Exploring control-value antecedents and performance outcomes of a neglected emotion. *Journal of Educational Psychology, 102*(3), 531–549.

Pekrun, R., Goetz, T., Titz, W., & Perry, R. P. (2002). Academic emotions in students' self-regulated learning and achievement: A program of qualitative and quantitative research. *Educational Psychologist, 37*(2), 91–105. doi:10.1207/S15326985EP3702.

Rana, T. (2007). Boredom and psychological malaise. *The Psychologist, 20*(5), 278–279.

Reid, K. (1986). *Disaffection from school*. London: Methuen.

Rupp, D. E., & Vodanovich, S. J. (1997). The role of boredom proneness in self-reported anger and aggression. *Journal of Social Behavior & Personality, 12*(4), 925–936. <http://www.redi-bw.de/db/ebsco.php/search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=1997-38871-006&site=ehost-live>.

Sansone, C., & Thoman, D. (2005). Interest as the missing motivator in self-regulation. *European Psychologist, 10*(3), 175–186. doi:10.1027/1016-9040.10.3.175.

Sansone, C., Weir, C., Harpster, L., & Morgan, C. (1992). Once a boring task always a boring task? Interest as a self-regulatory mechanism. *Journal of Personality and Social Psychology, 63*(3), 379–390. doi:10.1037/0022-3514.63.3.379.

Sansone, C., Wiebe, D. J., & Morgan, C. L. (1999). Self-regulating motivation: The moderating role of hardiness and conscientiousness. *Journal of Personality, 67*, 701–733. doi:10.1111/1467-6494.00070.

Scherer, K. R. (2000). Emotions as episodes of subsystems synchronization driven by nonlinear appraisal processes. In M. D. Lewis & I. Granic (Eds.), *Emotion, development, and self-organization* (pp. 70–99). Cambridge, UK: Cambridge University Press.

Schwartz, J. E., Neale, J., Marco, C., Stone, A. A., & Shiffman, S. S. (1999). Does trait coping exist? A momentary assessment approach to the evaluation of traits. *Journal of Personality & Social Psychology, 77*(2), 360–369. doi:10.1037/0022-3514.77.2.360.

Schwarz, G. (1978). Estimating the dimension of a model. *The Annals of Statistics, 6*(2), 461–464.

Sommer, B. (1985). What's different about truants? A comparison study of eighth-graders. *Journal of Youth and Adolescence, 14*(5), 411–422. doi:10.1007/BF02138836.

Steyer, R., Ferring, D., & Schmitt, M. J. (1992). States and traits in psychological assessment. *European Journal of Psychological Assessment, 8*(2), 79–98.

Stone, A. A., Greenberg, M. A., Kennedy-Moore, E., & Newman, M. G. (1991). Self-report, situation-specific coping questionnaires: What are they measuring? *Journal of Personality & Social Psychology, 61*(4), 648–658. doi:10.1037/0022-3514.61.4.648.

Tidwell, R. (1988). Dropouts speak out: Qualitative data on early school departures. *Adolescence, 23*(92), 939–954.

Totterdell, P., & Parkinson, B. (1999). Use and effectiveness of self-regulation strategies for improving mood in a group of trainee teachers. *Journal of Occupational Health Psychology, 4*(3), 219–232. doi:10.1037/1076-8998.4.3.219.

Ullman, J. B. (2007). Structural equation modeling. In B. G. Tabachnick & L. S. Fidell (Eds.), *Using multivariate statistics* (5th ed., pp. 676–780). Boston: Allyn & Bacon.

Vodanovich, S. J. (2003). Psychometric measures of boredom: A review of the literature. *The Journal of Psychology, 137*(6), 569–595. <http://www.redi-bw.de/db/ebsco.php/search.ebscohost.com/login.aspx?direct=true&db=aph&AN=12276395&site=ehost-live>.

Wang, C. P., Brown, C. H., & Bandeen-Roche, K. (2005). Residual diagnostics for growth mixture models: Examining the impact of preventive intervention on multiple trajectories of aggressive behavior. *Journal of the American Statistical Association, 100*(3), 1054–1076. doi:10.1198/016214505000000501.

Wanous, J. P., Reichers, A. E., & Hudy, M. J. (1997). Overall job satisfaction: How good are single-item measures? *Journal of Applied Psychology, 82*(2), 247–252. doi:10.1037/0021-9010.82.2.247.

Wasson, A. S. (1981). Susceptibility to boredom and deviant behavior at school. *Psychological Reports, 48*(3), 901–902.

Wegner, L., Flisher, A. J., Chikobvu, P., Lombard, C., & King, G. (2008). Leisure boredom and high school dropout in Cape Town, South Africa. *Journal of Adolescence, 31*(3), 421–431. doi:10.1016/j.adolescence.2007.09.004.

Weiss, H. M., Beal, D. J., Lucy, S. L., & MacDermid, S. M. (2004). Constructing EMA studies with PMAT: The purdue momentary assessment tool user's manual. <http://www.mfri.purdue.edu/pmat>.

Wilde, O. (2005). *The picture of dorian gray*. Oxford: Oxford University Press (Original Work published 1890).

Wolters, C. (1998). Self-regulated learning and college students' regulation of motivation. *Journal of Educational Psychology, 90*(2), 224–235. doi:10.1037/0022-0663.90.2.224.

Wolters, C. (2003). Regulation of motivation: Evaluating an underemphasized aspect of self-regulated learning. *Educational Psychologist, 38*(4), 189–205. doi:10.1207/S15326985EP3804_1.