

## What to do when feeling bored? Students' strategies for coping with boredom

Ulrike E. Nett<sup>a,\*</sup>, Thomas Goetz<sup>a</sup>, Lia M. Daniels<sup>b</sup>

<sup>a</sup> University of Konstanz, Germany/Thurgau University of Teacher Education, Switzerland Universitaetsstr. 10, 78457 Konstanz, Germany

<sup>b</sup> University of Alberta, Edmonton, Alberta, Canada T6G 2G5

### ARTICLE INFO

#### Keywords:

Boredom  
Academic emotion  
Boredom coping  
Scale development

### ABSTRACT

The goal of this study was to explore different strategies for coping with boredom. A questionnaire was developed targeting two dimensions of coping, namely approach versus avoidance oriented coping and cognitive versus behavioral oriented coping. First, based on the responses of 976 students (51% female) from grades 5 to 10, the structure of the coping with boredom scales was verified by confirmatory factor analysis. In a second step, 3 different boredom coping groups were identified by latent profile analysis. These three groups were named Reappraisers, Criticizers, and Evaders. Third, differences between these groups concerning their frequency of experiencing boredom, their academic achievement, and other emotional, motivational, and cognitive aspects of academic achievement situations were analyzed. Relative to the other 2 groups, Reappraisers preferred cognitive approach strategies, were less frequently bored, and experienced the most positive pattern of emotional, motivational, and cognitive outcomes. Finally, methodological and educational implications and directions for future research are discussed.

### 1. What to do when feeling bored? Students' strategies for coping with boredom

*"Most people pray only out of boredom; others fall in love out of boredom, still others are virtuous or depraved ...".* This is what Georg Buechner's (1835/2004, p. 61) 'Lenz' concludes to answer the question "What to do when feeling bored?"

Although this description is from a very different time and context, it may still accurately describe the behavior of many bored students in our schools today. Some of them just hope that the lesson will end quickly, others chat and flirt with their classmates, others fight the boredom and try to be compliant to the teacher and attend to the lesson, and finally others interrupt the lesson and bother the teacher and their classmates. These examples highlight what each of us knows from our own experience: There are many ways to cope with boredom in the classroom. However, little systematic research has examined how strategies to cope with boredom are structured and classified (Vodanovich, 2003b). Other questions also remain unexplored including: Which strategies are most and least adaptive in terms of coping with classroom boredom? Do some strategies allow students to stay engaged and learn something despite their boredom?

The goal of the present study was to contribute to systematic theory driven development and evaluation of scales that assess different strategies that students use to cope with boredom in the classroom. Additionally, we aimed to examine the relative adaptiveness of the identified coping strategies in order to inform future research, practice, and interventions that can help reduce this debilitating emotion. We assumed that students not only cope with boredom in distinct ways, but that they can also be grouped by their habitual preferences towards certain strategies for coping with boredom. To test these assumptions, first we created scales of different strategies for coping with boredom based on a theoretical classification system. Second, we analyzed the structure of these scales and searched for different groups of students that relied on certain patterns of strategies. Third, we investigated whether these groups differed on various outcomes such as frequency of experiencing boredom, academic achievement, and emotional, motivational, and cognitive variables. We hypothesized that students who used certain patterns of strategies would be more successful in combating boredom in school than others.

#### 1.1. Boredom at school

##### 1.1.1. Research activities on boredom

Fisher (1993, p. 396) defines boredom 'as an unpleasant, transient affective state' that is characterized by a severe lack of interest as well as difficulty concentrating on the current activity. Hebb and Donderi (1987) mark boredom by an individual's search for excitement in order to avoid boredom. Across definitions, boredom typically can be

\* Corresponding author. University of Konstanz, Universitaetsstr. 10, D-78457 Konstanz, Germany. Tel.: +49 7531 88 3588; fax: +49 7531 88 4350.  
E-mail address: Ulrike.Nett@uni-konstanz.de (U.E. Nett).

described by unpleasant, aversive feelings (affective components), as well as an altered perception of time (cognitive components), reduced arousal (physiological components), facial, vocal, and postural expressions of boredom (expressive components), and the motivation to change the activity, or to leave the situation (motivational components). Thus boredom consists of specific affective, cognitive, physiological, expressive, and motivational processes, matching contemporary component process definitions of emotions (Kleinginna & Kleinginna, 1981; Scherer, 2000). Boredom is more than just a neutral state implying a lack of enjoyment or interest (Pekrun, Goetz, Daniels, Stupnisky, & Perry, 2010). Given this profile, boredom is best regarded as a specific emotion, which may often be overlooked in schools because it is inconspicuous and nondisruptive, especially in comparison to emotions like anger and anxiety (Pekrun et al., 2010). Boredom is also overlooked by contemporary research on emotions: Even though there has been an increase of research on emotions, there remains a clear relative lack of research on boredom in general and boredom reported by students in schools specifically (Goetz, 2004; Lohrmann, 2008). In fact, in many appraisal theories of emotions, boredom is not mentioned at all (Scherer, Schorr, & Johnstone, 2001).<sup>1</sup> Likewise, boredom is normally omitted from major handbooks of emotions, aside from a short paragraph on related nonverbal features of speech (e.g., Lewis & Haviland Jones, 2000, p. 227). From an empirical perspective, consider the fact that test anxiety has been examined in more than 1000 studies to date (Hembree, 1988; Zeidner, 1998, 2007), yet only a handful of studies have explored boredom in school and university, at work, or in leisure time (Pekrun, Goetz, Titz, & Perry, 2002). In short, it seems that boredom has been largely excluded from the theoretical and empirical research on the contributions of emotions to education that has taken place over the last decade (Efklides & Volet, 2005; Linnenbrink, 2006; Schutz & Lanehart, 2002; Schutz & Pekrun, 2007).

This relatively low rate of research on boredom conflicts with the frequency of boredom experienced by students. Larson and Richards (1991) reported that middle school students are bored during 32% of the time spent in class. Goetz, Frenzel, Pekrun, and Hall (2006) reported that boredom is experienced more often than anxiety during class, and that boredom correlates significantly and negatively with enjoyment. The existing studies largely focus on two questions (Belton & Priyadharshini, 2007): Either they investigate how boredom correlates with specific outcomes like diminished academic achievement (e.g. Mann & Robinson, 2009), drop out rates (e.g. Wegner, Flisher, Chikobvu, Lombard, & King, 2008), or job dissatisfaction, absenteeism, and loyalty to the organization (e.g. Kass, Vodanovich, & Callender, 2001) or they explore the extent to which individuals are prone to experiencing boredom (e.g. Vodanovich, 2003b) and the relationship between the habitual concept of boredom proneness, defined as the tendency for a person to experience boredom more or less frequently, and other personality traits. The existing research suggests that while boredom may not immediately disturb a class, it is connected to many negative attitudes and behaviors, as reviewed next.

### 1.1.2. Relevance of boredom at school

Studies suggest that boredom during leisure time (Wegner et al., 2008) or in educational settings is positively related to poor academic achievement (Folgemann, 1976; Mann & Robinson, 2009; Maroldo, 1986; Robinson, 1975), drop out rates (Bearden, Spencer, & Moracco, 1989; Farrell, Peguero, Lindsey, & White, 1988; Tidwell, 1988), truancy (Sommer, 1985), deviant behavior (Wasson, 1981), and dissatisfaction (Gjesne, 1977). Overall, the results of the existing

studies imply that boredom is a highly relevant emotion in students' lives and that it tends to be associated with negative outcomes.

Because school can be interpreted as the workplace of children and adolescents, results of studies looking at boredom in the workplace may be relevant to the understanding of the impact of boredom at school. Researchers studying workplace boredom point out that boredom is highly correlated with job dissatisfaction, absenteeism, and lack of loyalty to the organization (Kass et al., 2001). Thackray (1981) reports that when workers experience boredom during a task that requires high levels of alertness, they report considerable stress. By extension, students may experience stress when they feel boredom impinging on the attention needed to focus on their schoolwork.

There is also evidence that boredom seems to be related to nicotine and alcohol consumption (Amos, Wiltshire, Haw, & McNeill, 2006), substance abuse (Anshel, 1991), excessive gambling (Blaszczynski, McConaghy, & Frankova, 1990), distress (Barnett, 2005), and juvenile delinquency (Newberry & Duncan, 2001). Similarly, Farmer and Sundberg (1986) showed that boredom proneness was highly positively correlated with depression, hopelessness, loneliness, amotivational orientation, whereas it was negatively associated with life satisfaction and autonomy orientation. Other research has found a significant relationship between boredom proneness and increased aggression, anger (Rupp & Vodanovich, 1997), sensation seeking (Kass & Vodanovich, 1990) and risk taking (Todman, 2003). For these results, however, keep in mind that boredom proneness, is considered a dispositional aspect of personality (Farmer & Sundberg, 1986; Vodanovich, 2003b) and is therefore conceptually distinct from any single experience of boredom.

These findings show that boredom can be associated with a range of detrimental outcomes. Sometimes, however, scholars argue that boredom is not always a negative and counterproductive emotion and can instead be viewed as a source of balance and creativity (Suedfeld, 1975; Vodanovich, 2003a). This does not appear to be the case for boredom in school, which disturbs students' ability to concentrate and focus on their schoolwork. Summarized, boredom is problematic in schools and a better understanding of how students combat this negative emotion is important.

### 1.1.3. Causes of boredom at school

To be able to help students combat boredom, we must first analyze the underlying causes of boredom. There are two perspectives on how boredom emerges in people in general and in students in particular. According to the educational sciences, boredom is caused by external situational attributes (e.g. Kanevsky & Keighley, 2003). In contrast, according to personality psychology boredom is caused by certain dispositional features of the person (e.g. Farmer & Sundberg, 1986; Vodanovich, 2003b). The two perspectives do not have to be mutually exclusive. According to Fisher (1993) boredom stems from both internal causes, in the form of personality traits, and external causes which are further divided into task and environmental influences. These different categories of causes are now reviewed.

Most descriptions of external situations that provoke boredom focus on a lack of stimulation in the task or environment (e.g. Kanevsky & Keighley, 2003; Mann & Robinson, 2009; Moneta & Csikszentmihalyi, 1996; Reid, 1986; Vodanovich, 2003b). Kanevsky and Keighley (2003) claim that only a situation that is not boring can be a true learning situation, and, like them, many educational researchers as well as practitioners are searching for ways of using "not boring" teaching strategies and creating "not boring" learning environments. Fisher (1993) highlights that boredom can be diminished if adequately demanding tasks are presented and a stimulating and autonomy permitting environment is created. While this initiative is noble, the responsibility to alleviate boredom should not rest solely on the shoulders of teachers.

The individual student must be, at least to some extent, responsible for his or her experience of boredom. No matter how diligently teachers

<sup>1</sup> Of course there are some exceptions to these appraisal theories of emotions. One noteworthy exception of these theories is the theory of flow. Csikszentmihalyi (2000) relates boredom to the emotions of interest and surprise and conceptualizes it as a state of listlessness and apathy.

try to produce "not boring" tasks and learning environments, in the end the student may still perceive and interpret the situation as boring. Thus, these perceptions may be more closely related to students' experiences of boredom than the objective situation itself. These assumptions are supported by some empirical findings. Larson and Richards (1991) found that the same students reported high rates of boredom across schoolwork and leisure time contexts. They concluded from these findings that individual dispositions contributed highly to boredom. Barnett and Klitzing (2006) found an inverse relationship between boredom and the characteristic traits of extroversion and intrinsic motivation orientation. Fisher (1998) showed that during work external as well as internal interruptions lead to a higher rate of boredom and less satisfaction. Assuming that internal interruptions, such as irrelevant thoughts, are often induced by dispositions such as neuroticism, it can be concluded that these sorts of dispositions lead to a higher rate of boredom during work and by extension, for students at school. Indeed, Mann and Robinson (2009) found that that boredom proneness is the most important moderating factor for experiences of boredom during lectures at university.

Boring activities are not always avoidable, especially in school. When faced with situations that could be construed as boring, the way that students choose to perceive and deal with the situations may prevent the onset of boredom or influence how long boredom is endured. Towards this end, students seem to use different strategies to cope with, and therefore avoid or alleviate, boredom. Students who cope with boredom effectively might be more successful in school as well as happier, more satisfied, and self confident.

### 1.2. Coping with boredom at school

The focus of the present study was to examine the strategies that students use to cope with boredom at school and their relative effectiveness. By identifying the most successful strategies to cope with boredom, researchers and practitioners will be better able to help students cope with their boredom. To date, however, there are no interventions specifically designed to reduce boredom this way, at least in part because little is known about how students cope with boredom. In other words, students' strategies for coping with boredom have not been subjected to systematic and theory driven exploration (Vodanovich, 2003b). The only exception seems to be the development of the boredom coping scale by Hamilton, Haier, and Buchsbaum (1984). This scale consists of 10 items in a forced choice format (e.g. "When I'm bored at home... '...it usually is a short time before I find something that interests me' or '...it usually requires a change of people or place to enjoy myself again.'"). It appears that these items measure ways in which the boring situation needs to be changed for the respondent to no longer feel bored. This does not reflect true coping behaviors that involve an active self regulated process. Vodanovich (2003b) claims that these scales are not based on theoretical conceptualizations that underpin coping behavior. To resolve this, we ensured that the conceptualization of coping represented in our coping with boredom scales was based on an appropriate and valid theoretical framework.

#### 1.2.1. Classification system of students' strategies of coping with boredom

In comparison to coping with boredom a lot of research has explored how people cope with stress. In order to study how students cope with boredom and develop an appropriate categorization system, we borrowed from the existing research on coping with stress. One of the most researched conceptualizations of coping with stress was forwarded by Holahan, Moos, and Schaefer (1996) and focuses on approach versus avoidance and cognitive versus behavioral coping strategies (see also Davis, DiStefano, & Schutz, 2008; Holahan, Moos, Holahan, Brennan, & Schutte, 2005; Holahan et al., 2007; Moos & Holahan, 2003). According to this conceptualization four categories

of coping strategies classified by two dimensions are identified. The first dimension identifies the focus of the coping strategy as either approach or avoidance. Approach strategies involve coping by solving the problem, whereas, avoidance strategies involve coping by evading or fleeing the problem. The second dimension distinguishes between cognitive and behavioral strategies related to coping. We adopted this classification system to categorize students' styles of coping with boredom (Table 1).

All approach coping strategies, whether cognitive or behavioral, involve trying to resolve the problem itself. *Cognitive approach* strategies involve changing the perception of the situation. Imagine a student who reminds himself that even though a mathematics lesson is boring it is really important. This reminder may change his perception without changing the objective situation, and he may not feel bored. *Behavioral approach* strategies, on the contrary, involve trying to actually change the boring situation. For example, imagine a student who simply asks the teacher for more interesting tasks. If his demand is met, he will have successfully changed the situation and remedied his boredom. Indeed, it is possible that even if his demand is not met, he may inadvertently change the situation by making the teacher aware that the students are bored thus leading to modifications to the lesson.

Strategies that help the student to forget about the boring situation, either by thinking of something or doing something not associated with the situation, are classified as avoidance. Thus, students can avoid boring lessons without leaving their classroom. *Cognitive avoidance* strategies involve students occupying their thoughts with something not associated with the lesson. In short, these students take refuge from the boring situation by thinking of something more exiting. For example, imagine a student who avoids her boring mathematics lesson by thinking about the exciting content of her debate in the next lesson. *Behavioral avoidance* strategies, in contrast, are seen when students distract themselves from boring situations by doing something else. A highly typical example of a behavioral avoidance strategy is a student, chatting with a classmate during the lesson.

Especially in the context of school, it can be difficult to distinguish between cognitive and behavioral avoidance strategies because thinking of something else and doing something else are often linked to each other. For example thinking about the next subject might be linked with preparing the homework for this subject silently. Keeping this in mind, we classified the avoidance strategies into cognitive and behavioral by their predominant aspect. For example, studying for another subject was classified as cognitive avoidance because the mental aspect is predominant. Often cognitive avoidance strategies remain unnoticed by the teacher and do not disrupt the lesson itself. Talking to classmates, in contrast, was classified as behavioral avoidance because the behavioral aspect of this action is more obvious and the lesson itself is normally interrupted.

#### 1.2.2. Effectiveness of different strategies of coping with boredom

It seems likely that these strategies will exert different impacts on the frequency of experiencing boredom as well as other academic, emotional, motivational, and cognitive aspects of achievement situations. We assumed that approach coping, especially through cognitive approach strategies like cognitive reappraisal that focuses on the value of the situation, would result in a particularly positive pattern of outcomes. This hypothesis is supported by empirical findings presented next.

**Table 1**  
Classification system of students' strategies of coping with boredom.

Type of coping	Approach coping	Avoidance coping
Cognitive	Thinking differently to change the perception of the situation.	Thinking of something else not associated with the situation.
Behavioral	Taking actions to change the situation.	Taking actions not associated with the situation.

Goetz, Frenzel, Stoeger, and Hall (2010) showed that, especially in academic achievement situations, there is a strong negative relationship between the value of the subject and boredom. These results are in line with previous assumptions that boredom is a unique emotion because it coincides with a low level of perceived value (Pekrun et al., 2010), whereas other emotions tend to correlate positively with the perceived value of the situation. For this reason, it seems that strategies that reinforce the value of the situation might be the most efficient in reducing boredom and, by extension, enhancing positive outcomes such as higher academic achievement, more enjoyment and interest, etc. Some pre-existing research supports these assumptions. For example, Green Demers, Pelletier, Stewart, and Gushue (1998) argued that although boring activities cannot always be avoided, combating boredom with interest enhancing strategies may actually augment motivation. Likewise, Rana (2007) proposed that boredom can be combated by finding meaning in the task. Both from a theoretical standpoint and based on empirical literature, it seems that cognitive approach strategies (i.e., positive reappraisal) may be the most beneficial for reducing boredom.

For similar reasons, avoidance coping may be the least beneficial in reducing boredom. This has certainly proven to be the case in the context of coping with stress in which avoidance strategies have been connected to further stress and depressive symptoms (Holahan et al., 2005; Holahan et al., 2007). Research is particularly needed on the effectiveness of different types of strategies for coping with boredom because it seems that in reality students usually cope with boredom by using avoidance oriented cognitions or behaviors (Goetz, Frenzel, & Pekrun, 2007).

### 1.3. Contributions of the present study

Although evidence suggests that boredom is a highly relevant and problematic emotion in the context of school, it also reveals that it is often neglected. Because boredom is provoked by characteristics of both the situation and the person, teachers' attempts to alleviate boredom in school by creating learning environments that are "not boring" are likely to be insufficient. In addition, students must be able to cope with boredom in an effective and productive way. To date, students' strategies for dealing with boredom have rarely been the topic of systematic and theory driven research. To advance the research in this area, we developed a measurement instrument to assess different strategies to cope with boredom and examined the relative efficiency of these different coping strategies on a range of outcomes. The results of this study provide a strong foundation from which future research can proceed in terms of implementing interventions that equip students with effective strategies for coping with boredom. Moreover, the results are also applicable to teachers who will be able to create learning environments that foster a productive way to cope with boredom. Overall, these results will help all members of the learning community work towards reducing boredom in the classroom.

## 2. Research aims and hypotheses

### 2.1. Aims of the study

The first aim of this study was to develop scales that measured four different categories of strategies to cope with classroom boredom. The questionnaire was designed in line with the aforementioned theoretical framework which differentiates between four categories comprised of two dimensions: approach versus avoidance and cognitive versus behavioral coping. For each category, namely (1) *cognitive approach*, (2) *behavioral approach* (3) *cognitive avoidance*, and (4) *behavioral avoidance*, we chose five specific and representative strategies, thus resulting in a total of 20 questionnaire items. The five items chosen to measure each category were developed within a

research group and tested and reduced through a preliminary pilot study with  $N = 165$  students of the same age range as in the present study (Schriefer, 2006). We validated the structure of these scales through confirmatory factor analysis (CFA).

Because emotional experiences have been shown to be largely domain specific in nature (Goetz, Frenzel, Pekrun, Hall, & Luedtke, 2007), we assumed that coping with boredom would be domain specific as well, hence we focused on one domain, namely mathematics. We chose mathematics because previous research shows that students report experiencing an average amount of boredom in this domain (Goetz et al., 2006). Although the scales refer to coping with boredom in mathematics lessons only, their structure is easy to adapt to other subject areas.

The second aim was to identify students who showed different patterns in their use of strategies for coping with their boredom, from this point forward referred to as "boredom coping groups". These groups reflect the relative likelihood of each strategy being used to combat boredom and thus lend themselves to further analyses regarding the effectiveness of certain patterns of coping strategies in reducing boredom. Specifically, we tested how the boredom coping groups differed in their frequency of experiencing boredom, in their academic achievement, and in their emotions, motivation, and cognitions towards mathematics. In total, these analyses investigated both inter individual differences of coping behavior (nomothetic approach) as well as the effectiveness of intra individual patterns of coping strategies (idiographic approach).

### 2.2. Research hypotheses

#### 2.2.1. Hypothesis 1

We hypothesized that the theoretical structure of the mathematics related boredom coping scales would be supported through CFA. We hypothesized that four distinct coping scales would be identified.

#### 2.2.2. Hypothesis 2

We hypothesized that different boredom coping groups would emerge, reflecting students' use of different combinations of strategies to cope with boredom in mathematics classes.

#### 2.2.3. Hypothesis 3

We hypothesized that these boredom coping groups would differ in their frequency of experiencing boredom, in their academic achievement, and in their emotions, motivation, and cognitions related to mathematics. In line with theoretical assumptions (Goetz et al., 2010) students who preferred cognitive approach strategies (i.e., positive reappraisal) were expected to be most successful in coping with boredom.

## 3. Method

### 3.1. Participants and data collection

Participants were from 38 classes involving grades 5 to 10 from all tiers of the German three track education system. In the German school system, students are separated after grade 4 into three tracks (upper, middle, and top track) according to their level of achievement. Two or three classes were sampled in each grade and type of school. In total, 976 students participated, 500 of them (51%) were female. The average age of these students was 14.25 years ( $SD = 2.16$  years) and most students in the German system celebrate their eleventh birthday during grade 5. Participation in the study was voluntary and all responses were anonymous. To ensure objectivity, the data were collected via self report instruments that were group administered to students during regular classroom periods by trained research assistants and the classroom teacher was not present.

### 3.2. Variables and study measures

#### 3.2.1. Strategies to cope with boredom

We developed a questionnaire with scales designed to measure four categories of coping strategies. Each item began with the common stem "When I am bored in mathematics class..." followed by (1) cognitive approach (e.g., "...I make myself aware of the importance of the issue."), (2) behavioral approach (e.g., "...I ask my teacher for more interesting tasks."), (3) cognitive avoidance (e.g., "...I study for another subject."), (4) and behavioral avoidance (e.g., "...I talk to my classmates."). Participants responded to these items, as well as all other items on the questionnaire, on a five point Likert type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The scales contained five items each and showed satisfactory descriptive statistics and internal consistency as shown in Table 2. All items exhibited satisfactory corrected item total correlation (ranging from .39 to .83, median = .74).

#### 3.2.2. Frequency of boredom

Frequency of boredom was measured by two items (e.g. 'I am often bored during mathematic lessons'). The descriptive statistics of this scale were:  $\alpha = .88$ ,  $M = 5.95$ ,  $SD = 2.40$ .

#### 3.2.3. Academic achievement

German grades range from 'very good' (grade 1) to 'not sufficient' (grade 6). To be interpreted more easily, these grades were inverted to range from 1 equaling 'not sufficient' to 6 'very good', thus higher grades indicated better achievement in mathematics at school. Students' grades on their recent written examination in mathematics ( $M_{aa1} = 3.71$ ,  $SD_{aa1} = 1.37$ ) as well as the grades of their last two semi annual reports ( $M_{aa2} = 3.72$ ,  $SD_{aa2} = 1.09$ ,  $M_{aa3} = 3.85$ ,  $SD_{aa3} = 1.07$ ) in mathematics were obtained as objective measures of students' academic achievement in mathematics.

#### 3.2.4. Emotions, motivation, and cognitions in mathematics

The remaining scales used in this study were from internationally well established scales that had been translated into German and in some instances were modified in two ways. Some scales were shortened by selecting the most representative items for each construct and some were reworded to fit and refer to the context of a mathematics classroom. Within German samples, these adapted items have already been used successfully (cf., Pekrun et al., 2007).

**3.2.4.1. Enjoyment and anxiety.** Well established scales were used to measure the discrete emotions of enjoyment (three items, e.g. 'I enjoy being in mathematics class,'  $\alpha = .88$ ,  $M = 8.15$ ,  $SD = 3.29$ ), and anxiety (four items, e.g. 'Thinking about mathematics class, makes me feel uneasy,'  $\alpha = .77$ ,  $M = 7.47$ ,  $SD = 3.38$ ). Both scales were adapted from the mathematic version of the Achievement Emotions Questionnaire ([AEQ M]; Pekrun, Goetz, & Frenzel, 2005; [AEQ]; Pekrun et al., 2002).

**3.2.4.2. Effort and interest.** Two items were used to assess effort in mathematics; e.g. 'I work hard to do well in mathematics,' ( $\alpha = .76$ ,  $M = 7.43$ ,  $SD = 2.13$ ). These items were adapted items from the Motivated strategies for Learning Questionnaire ([MSLQ]; Pintrich, Smith, Garcia, & Mckeachie, 1993). Three items were used to assess

interest, e.g. 'After a math class, I am often curious about what we are going to do in the next lesson,' ( $\alpha = .76$ ,  $M = 7.62$ ,  $SD = 3.02$ ). These items were adapted according to Frenzel, Goetz, Pekrun, and Watt (2010) from the "Questionnaire for Study Interest" by Schiefele, Krapp, Wild, and Winteler (1993). The items refer specifically to the subject of mathematics and suit the target group of adolescent students.

**3.2.4.3. Value and self concept.** The value of achievement in mathematics was assessed by five items, e.g. 'Getting a good grade in mathematics is the most satisfying thing for me' ( $\alpha = .85$ ,  $M = 19.22$ ,  $SD = 4.87$ ). These items were adapted from the extrinsic goal orientation scale of the MSLQ (Pintrich et al., 1993) and referred specifically to the subject of mathematics thus suiting the target group of adolescent students. To assess academic self concept in mathematics, we used the Academic Self Description Questionnaire ([ASDQ]; Marsh, 1990) with three items, e.g. 'I get good marks in mathematics' ( $\alpha = .84$ ,  $M = 8.95$ ,  $SD = 3.45$ ).

## 4. Results

### 4.1. Structural validity of the scales

Preliminary analysis showed that the four scales designed to measure students' strategies for coping with boredom had satisfactory descriptive statistics and internal consistency (Table 2). For hypothesis 1, we used confirmatory factor analysis (CFA) to test the extent to which the structure of the empirically assessed four scales conformed to the proposed theoretical structure. Mplus software (L. K. Muthén & Muthén, 1998–2007) was used to compare the fit indices of the assumed model to the fit indices of competing models. Mplus allows the hierarchical structure of the data to be taken into account, which was important in the current analyses because students were nested within classes. Standard errors resulting from standard procedures are typically downwardly biased (Hox, 2002). According to the recommendations of Beauducel and Wittmann (2005) the CFI as well as the SRMR and the RMSEA were considered as fit indices.

Three possible models were compared. The first model tested a one factor structure in which all items loaded on a single latent variable that did not differentiate between the four categories of coping strategies. The second model tested a second order factor structure in which the five items used to measure each of the four categories of coping strategies loaded on separate latent variables and then these four latent variables together loaded on one second order latent variable. The third model tested a four factor structure in which the 5 item scales load on four different latent variables each representing a different category of coping strategy and these four latent factors, although possibly correlated, remained largely separate from each other. In all three models, the five items for each scale were allowed to load on the corresponding factor only. In line with hypothesis 1 we predicted the third model that tested a four factor structure would provide the strongest fit of the data because it represents the proposed theoretical framework of four different and separate categories of strategies to cope with boredom.

Table 3 shows that the third model provided the strongest fit indices, thus confirming that the four factor structure was the best representation of the data (Fig. 1). The one factor model did not meet any of the goodness of fit criteria recommended by Hu and Bentler (1999). Table 4

**Table 2**  
Cronbach's  $\alpha$ , means and standard deviation of the coping with boredom scales.

	Cronbach's $\alpha$	M	SD
(1) Cognitive-approach	.91	15.46	5.34
(2) Behavioral-approach	.83	8.04	3.91
(3) Cognitive-avoidance	.83	11.75	5.09
(4) Behavioral-avoidance	.92	16.39	6.32

Note. The response format for emotions, control, and value consisted of a 5-point Likert scale ranging from 1 to 5. The scales consist of 5 items each.  $M$  = Mean of the sums of the items.  $N = 976$ .

**Table 3**  
Fit indices of the competitive coping with boredom models.

	Chi <sup>2</sup>	Df	CFI	SRMR	RMSEA
(a) One-factor model	4501.27	170	.44	0.172	0.162
(b) Second-order model	561.17	166	.95	0.070	0.049
(c) Four-factor model	514.71	164	.96	0.052	0.047

Note. CFI = Comparative Fit Index; SRMR = Standardized-Root-Mean-Square-Residual; RMSEA = Root Mean Square Error of Approximation.  $N = 976$ .

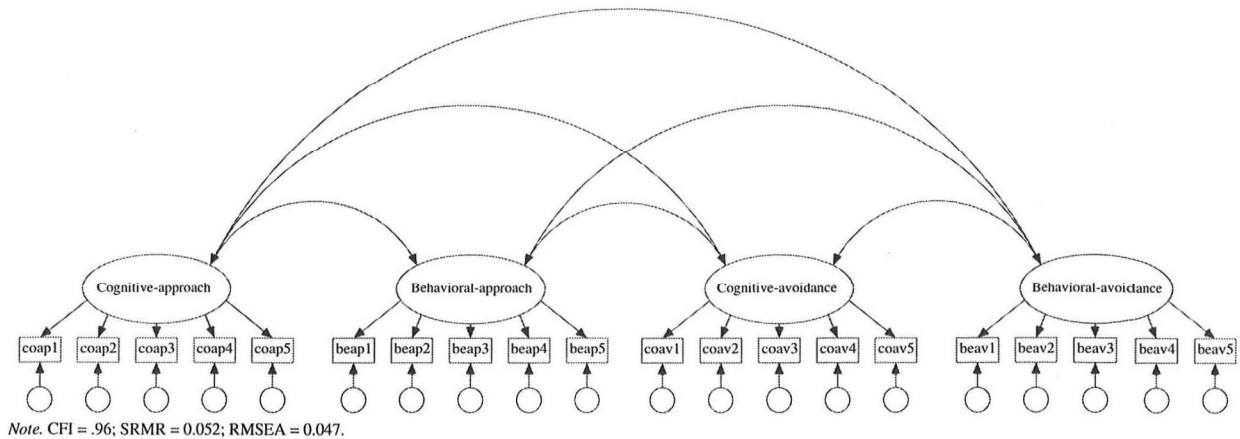


Fig. 1. Four-factor Model of the Boredom Coping Scales which Provided the Best Fit Indices.

Table 4  
Estimated correlations of the latent variables.

	(1)	(2)	(3)	(4)
(1) Cognitive-approach	–			
(2) Behavioral-approach	.05*	–		
(3) Cognitive-avoidance	.21**	.31**	–	
(4) Behavioral-avoidance	.39**	.21**	.47**	–

Note. \*  $p < .01$ ; \*\*  $p < .001$ ;  $N = 976$ .

presents the estimated correlation matrix for the latent variables of strategies to cope with boredom, thus the correlations are corrected for attenuation.<sup>2</sup> As additional evidence that the four boredom coping scales represent unique constructs, we explored their divergent validity with several other outcomes assessed in the present study, such as frequency of boredom, academic achievement, enjoyment, anxiety, effort, interest, value of achievement and self concept in mathematics. Examination of the correlations between the latent factors of the four boredom coping strategies and these latent outcomes revealed that only the correlation between cognitive approach strategies and effort provided a high effect with  $r = .59$ . All other correlations were of medium effect size or less, thus, demonstrating that the four coping strategies are not redundant with these existing variables (Table 5).

4.2. Identification of boredom coping groups

According to hypothesis 2 we assumed that students would rely differently on the four strategies of coping with boredom and that patterns of use could be separated into unique “boredom coping groups.” To investigate this hypothesis, we used latent profile analysis (LPA; 1999; B. O. Muthén & Muthén, 2000) in Mplus (L. K. Muthén & Muthén, 1998–2007) to identify students with similar patterns of coping strategies based on their factor scores or relative spacing on each of the four latent variables (i.e., cognitive approach, behavioral approach, cognitive avoidance, and behavioral avoidance strategies). This procedure also takes the hierarchical structure of the data into account. LPA is also known as a latent class analysis (LCA) in observed

<sup>2</sup> Although not theoretically based, several other models seemed logical and were tested to further assure the statistical robustness of the four-factor model. Specifically we tested (a) a two factor model with one cognitive-approach factor and all other items loading on a second factor, (b) an approach versus avoidance two factor model, (c) a cognitive versus behavioral two factor model and (d) a three factor model with one cognitive-approach, one behavioral-approach and one avoidance factor. None of these models met any goodness of fit criteria.

Table 5  
Correlations of the latent boredom coping strategies measures with further latent measures of aspects of academic achievement situations.

	Cognitive-approach	Behavioral-approach	Cognitive-avoidance	Behavioral-avoidance
Frequency of occurrence of boredom	.45**	.17**	.32**	.49**
Academic achievement in mathematics	.06	.03	.12*	.13**
Enjoyment of mathematics	.39**	.03	.23**	.34**
Anxiety of mathematics	.01	.19**	.17**	.11**
Effort in mathematics	.59**	.07	.22**	.29**
Interest in mathematics	.46**	.09	.19**	.37**
Value of achievement in mathematics	.42**	.03	.11**	.13**
Self-concept in mathematics	.11**	.10*	.07	.12**

Note. \*  $p < .01$ ; \*\*  $p < .001$ ;  $N = 976$ .

continuous variables. The conceptual goal of a LCA is to detect unobserved heterogeneity in a sample in order to reveal homogenous groups of participants that share a similar pattern of responses (B. O. Muthén, 2001). This goal is similar to the goal of cluster analysis: to identify certain groups in respect to observed response patterns. But in contrast to cluster analysis, LCA is model based and probabilistic (Nylund, Nishina, Bellmore, & Graham, 2007). It is assumed that a categorical latent variable underlies the observed outcome variables and determines the structure of the response pattern, therefore determining the class membership.<sup>3</sup>

There are two different kind of statistical indicators used in LCA. First, a commonly used information criteria (IC) is the Bayesian Information Criterion (BIC; Schwarz, 1978) which accounts for the log likelihood of a model as well as the number of model parameters and the sample size (Nylund et al., 2007). It provides relative information about different models, and a lower BIC indicates a better model. Second, fit indices, which are based on likelihood ratio tests, compare the model fit of two different models. The Lo Mendell Rubin Test (LMRT; Lo, Mendell, & Rubin, 2001), for example, provides a  $p$  value which indicates if the

<sup>3</sup> Nylund et al. (2007) summarize three key benefits of this approach: First, according to B. O. Muthén and Muthén (2000), the probabilistic character of the LCA implies that the assumed model can be replicated independently with new samples. Second, it is not necessary to standardize the variables, predictors and outcome variables can be included in the model at the same time. Third, statistical indicators for LCA models can be calculated and used to decide on the number of classes.

**Table 6**  
Information criteria values for different class solutions.

No. of classes	1	2	3	4	5	6
No. of free parameters	8	13	18	23	28	33
Log likelihood	5523.61	5248.65	5094.34	5005.35	4952.23	4895.56
BIC	11,102.29	10,586.79	10,312.58	10,169.01	10,097.20	10,018.27
$p_{LMR}$	–	.00	.02	.20	.22	.39

Note. BIC = Bayesian Information Criteria;  $p_{LMR}$  = p-value of the Lo-Mendel-Rubin test;  $N=976$ .

$k$  class model is significantly better than the  $k-1$  class model. As recommended by Nylund et al. (2007) the BIC and the LMRT should be used to support the theoretical assumptions tested in a LCA.

The results of the LPA indicated a three class solution. Table 6 provides information about the criteria values for different class solutions. Although the BIC decreased from the three to the four class solution, suggesting the four class solution should be preferred, the LMRT showed that the more complex four class model did not provide a significantly better fit than the more parsimonious three class model. As such, we preferred the more simplistic three class solution, particularly because the BIC as well as the LMRT tend to overestimate the number of classes (Nylund et al., 2007).

The average Latent Class Probabilities for most likely class membership are presented in Table 7 and indicate that the three class model provides a very clear classification. The entropy is a measure of classification certainty calculated by Mplus (L. K. Muthén & Muthén, 1998–2007). The value is bounded from [0; 1] with values closer to 1 indicating greater classification certainty (Celeux & Soromenho, 1996). The entropy of this three class solution was .78, thus suggesting a fair amount of certainty.

The mean factor scores of the three groups are shown in Fig. 2. Factor scores<sup>4</sup> are standardized such that a score of zero represents an average value on the latent variable and scores above or below zero indicate an above or below average value on the latent variable respectively. In choosing labels for the three groups, we focused on the factor score mean profile and the variables on which the group differed most (above or below) from an average score.

The first group was labeled the Reappraisers ( $N=418$ ) because they scored below average on all strategies except the cognitive approach scale, which they seemed to prefer above all others. This group tried to cope with boredom by increasing their awareness of the value and importance of mathematics and changing their views of the situation. We labeled the second group the Criticizers ( $N=145$ ) because they focused on behavioral approach strategies and thus tried to change the situation by disapproving or suggesting changes to the teacher. This group also used cognitive and behavioral avoidance strategies more often than average. The third group was labeled the Evaders ( $N=413$ ) because they tried to avoid feeling bored by occupying themselves with something else. Although behavioral avoidance was their strategy of choice, they also relied on cognitive avoidance strategies more than average. They did not try to change the situation and scored below average on both approach strategies. Therefore, the three class solution aligned with our theoretical assumptions that cognitive avoidance strategies may not be used separately from the behavioral avoidance strategies in a classroom setting.

<sup>4</sup> Analyzing the factor score mean profiles of the groups, it is necessary to keep in mind that factor scores represent a person's relative spacing not the absolute value of a variable. One implication of this is that factor score means must be interpreted relative to the group size. For example, because the Criticizers are the smallest group their scores do not contribute as much to the overall average, thus when their scores differ from zero it reflects a smaller difference than for the other two groups.

**Table 7**  
Probabilities for most likely class membership (row) by latent class (column).

	Class 1	Class 2	Class 3
Class 1	.90	.03	.08
Class 2	.09	.89	.02
Class 3	.09	.01	.90

Note. Entropy = .78;  $N=976$ .

### 4.3. Group differences

#### 4.3.1. Gender differences

We tested for gender differences between the three boredom coping groups that were identified by LPA. According to a Pearson  $\chi^2$  test, gender and group affiliation were independent ( $\chi^2 = 2.22$ ,  $df = 2$ ,  $p = .33$ ).

#### 4.3.2. Differences in emotions, motivation, and cognitions in mathematics

Next, we tested for differences between groups on several important academic outcomes related to mathematics including the frequency of experiencing boredom during mathematics, academic achievement, enjoyment and anxiety, effort and interest, and value of achievement and self concept. To do this, we calculated the mean for each of these variables separately for each boredom coping group and then compared the three different boredom coping groups on these variables and analyzed the effect size of the differences.

We used the software Effectlite (Steyer & Partchev, 2007), which is a statistical program for the univariate and multivariate analysis of mean differences between groups on outcome variables in designs with and without covariates. It works as a pre and post processor to Mplus (L. K. Muthén & Muthén, 1998–2007). In many ways Effectlite can be considered to perform the latent variable equivalent of conducting a univariate or multivariate analysis of variances (ANOVA or MANOVA, respectively) with one between group factor.<sup>5</sup> One group must be assigned as the reference group to which the means of the other two target groups will be compared by regression analysis. The means of the target groups can only be interpreted in comparison to the reference group, not in comparison to each other (Steyer & Partchev, 2007). Because we hypothesized that behavioral approach strategies would be most beneficial for coping with boredom, it seemed that the Reappraisers were likely to have the greatest success in combating their boredom, and thus they were set as the reference group.

The statistical significance of differences was determined by effect sizes that are based on the ratio of the effect, the mean difference between treatment and reference group, and the standard deviation of the reference group. This type of effect size is largely comparable to

<sup>5</sup> Effectlite provides two very important advantages in comparison to a traditional ANOVA. First, Effectlite runs analyses on latent rather than manifest variables. Second, the program does not presume homogeneity of variances between the different groups. For more details on the use of Effectlite see Steyer and Partchev (2007), Steyer, Partchev, Kroehne, Nagengast, and Fiege (2008) or Steyer (2005).

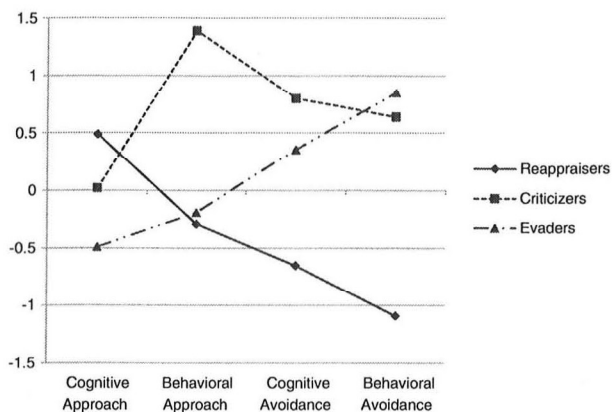


Fig. 2. Student's Latent Mean Factor Scores on Coping Strategies Separated by Group Membership.

Cohen's *d* (J. Cohen, 1988), except that it allows differences in the variances of the two groups (Steyer & Partchev, 2007).

Table 8 shows the latent means for all of the outcome variables, as well as the standard deviation within each group, the effect (i.e., mean difference between the Reappraisers as the reference group and each target group), the effect size, and the significance of the effect determined by dividing the effect by the standard error. Each row represents the comparison of latent means for one outcome variable, and all comparisons differed significantly at a stringent alpha level ( $p < .001$ ).

#### 4.3.2.1. Frequency of experiencing boredom and academic achievement.

As hypothesized, the Reappraisers reported feeling bored less frequently than the two other groups. The differences in academic achievement were smaller, although still in favor of the Reappraisers. The difference between Reappraisers and Criticizers although statistically significant, was not meaningful, whereas the difference between Reappraisers and Evaders was of medium effect size according to Cohen (1988) and therefore may be interpreted as a more meaningful difference.

4.3.2.2. *Anxiety and enjoyment.* Considering the emotional aspects, Reappraisers reported the highest levels of enjoyment in mathematics and the lowest levels of anxiety. Also interesting, it seems that although Criticizers enjoy mathematics more than the Evaders they experience more anxiety as well. Overall, it seems that the Evaders are the least emotionally involved group. In interpreting this effect, it is important to note that the standard deviation of anxiety for Criticizers equals 1.0 while the standard deviation for the two other groups is far smaller.

4.3.2.3. *Effort and interest.* The results for effort and interest are comparable to the pattern of enjoyment. In short, Reappraisers put more effort into mathematics and were also more interested, Criticizers score between the Reappraisers and the Evaders, who scored lowest on both aspects.

4.3.2.4. *Value and self concept.* In line with the hypothesis, Reappraisers valued achievement in mathematics more than the other two groups, and again the Evaders had the lowest score. Contrary to assumptions, however, no effect between Reappraisers and Criticizers emerged for self concept in mathematics. In fact, the Criticizers seemed to have a slightly higher self concept than students classified as Reappraisers.

#### 4.3.3. Graphical depiction of the groups' profiles on all outcome variables

We used correspondence analysis as a dimension reducing graphical method to visually represent the empirical structure of the data. This method is primarily intended to transform numeric,

multidimensional information into a graphical, two dimensional format (Greenacre & Blasius, 1994) by representing each row (i.e., outcome variable) and each column (i.e., boredom coping group) in the table of means (Table 8) as vectors in a multidimensional space.<sup>6</sup> Using correspondence analysis, the Euclidian distances between the different endpoints of these vectors in a multidimensional space are calculated and the points are then approximately transferred into points of a 2 dimensional plane that can be plotted.

In the current analysis, the three boredom coping groups as well as the eight outcome variables were plotted on a grid as points on a plane (for similar use of correspondence analysis see Kleine, Goetz, Pekrun, & Hall, 2005). To facilitate comparisons and to match the procedure used in calculating the effect sizes, the latent means were standardized by dividing each mean by the standard deviation of the Reappraisers because they were the reference group. The results are displayed graphically in Fig. 3.

The distance between any two points represents the amount of profile similarity between the two constructs. A small distance between two points on the grid indicates that the two constructs are very similar in their profile and have a common underlying dimension (Benzécri, 1992; Greenacre, 1993). Fig. 3 clearly shows that the Reappraisers seem to be the most successful in alleviating boredom during lessons and have the most positive profile in terms of emotions, motivation, and cognitions related to mathematics. Essentially this group is close to all adaptive outcomes and far from both frequency of boredom and anxiety. The Evaders, in contrast, are the closest to boredom, suggesting their combination of strategies is not very effective in reducing boredom. Moreover, this group is characterized by the most negative academic profile being relatively far from the measures of emotion, motivation, and cognition. The Criticizers are just slightly less close to being bored during Mathematics than the Evaders, also suggesting that their combination of coping with boredom strategies is not as effective as those used by the Reappraisers. Although Criticizers still wrestle with boredom, they are also more emotionally involved in the mathematics lessons and have better mathematics self concept than Evaders. In fact, Criticizers proved to be very close to self concept, perhaps reflecting their reliance on behavior avoidance strategies that involve trying to resolve boredom by voicing their discontent and asking for changes.

## 5. Discussion

Given that boredom is one of the most common and debilitating emotions reported by students (Goetz et al., 2006; Larson & Richards, 1991), there is a need to be able to diagnose ineffective coping behavior and to implement intervention programs that teach students how to cope with boredom adaptively, thus ultimately reducing boredom in school. With this in mind, the objectives of the current study were twofold: to confirm four theoretically underpinned boredom coping strategies and to identify effective and counterproductive patterns of coping strategies used by students. Three hypotheses extended from these objectives. The first hypothesis was based on the well established literature on coping with stress. Like strategies to cope with stress, we expected the data to support a model in which students' strategies for coping with boredom were categorized along two dichotomous dimensions, namely approach or avoidance and cognitive or behavioral. Second, we presumed that

<sup>6</sup> In constructing the matrix, consider first the boredom-coping group of Reappraisers that has an 8-dimensional profile, represented by an 8-dimensional vector consisting of a relatively low frequency of experiencing boredom, high academic achievement, high enjoyment, low anxiety, high effort and interest, high value of achievement in mathematics, and medium self-concept. In contrast, consider the outcome variable "frequency of experiencing boredom" that has a 3-dimensional profile, represented by a 3-dimensional vector consisting of relatively low frequency of experiencing boredom in Reappraisers, medium frequency in Criticizers, and relatively high frequency in Evaders.



**Table 8**  
Latent means differences in aspects of academic achievement situations.

	Reappraisers		Criticizers				Evaders				Chi <sup>2</sup>	DF	p
	N=418		N=145				N=413						
	M	SD	M	SD	Effect size	Effect/SE	M	SD	Effect size	Effect/SE			
Frequency of occurrence of boredom	2.34	1.02	3.26	1.02	0.90	8.16	3.38	1.04	1.02	12.85	175.80	2	0.000
Academic achievement in mathematics	3.97	0.73	3.83	0.76	0.19	1.60	3.72	0.70	0.35	3.98	21.33	2	0.000
Enjoyment of mathematics	2.87	1.02	2.41	1.09	0.45	4.05	2.13	0.93	0.73	9.55	99.69	2	0.000
Anxiety of mathematics	1.74	0.75	2.19	1.00	0.62	4.42	1.90	0.81	0.22	2.48	22.63	2	0.000
Effort in mathematics	3.99	0.91	3.51	0.91	0.54	4.58	3.35	1.01	0.71	7.99	67.26	2	0.000
Interest in mathematics	3.04	0.87	2.81	0.87	0.27	2.27	2.38	0.72	0.77	9.12	96.98	2	0.000
Value of achievement in mathematics	4.16	0.92	3.96	0.91	0.22	1.99	3.76	1.07	0.44	5.16	28.88	2	0.000
Self-concept in mathematics	3.28	0.89	3.34	0.82	0.06	0.57	3.01	0.91	0.31	3.81	21.84	2	0.000

Note. All tests are significant at  $p < .001$ ,  $N = 976$ .

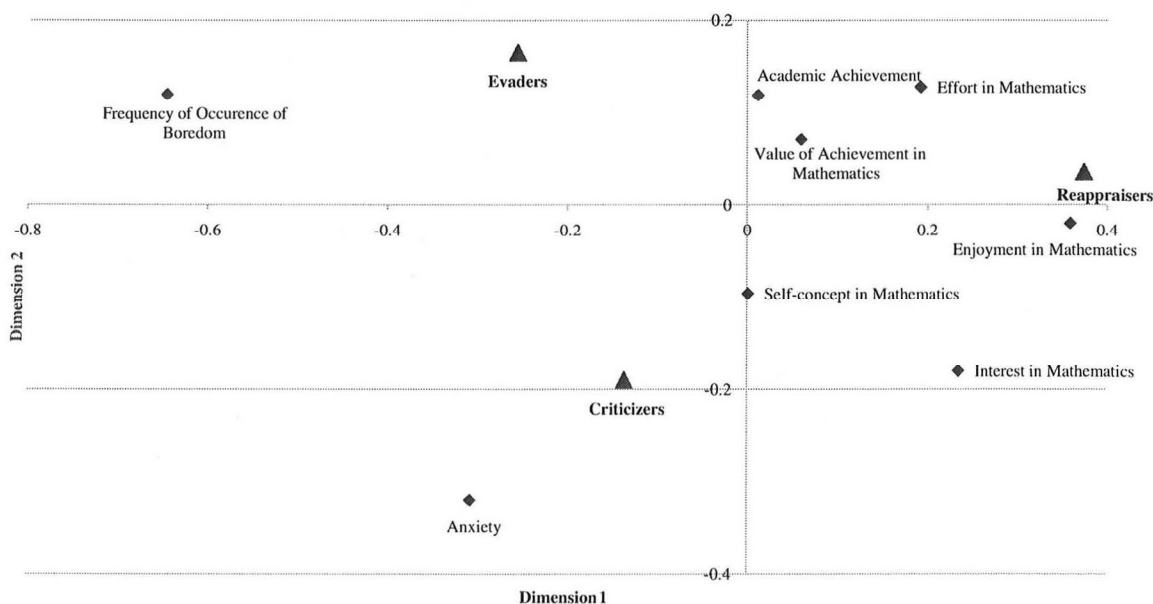
students would rely on different combinations of these strategies to cope with boredom and that distinct boredom coping groups would be identified. Third, we hypothesized that these boredom coping groups would differ in their frequency of occurrence of boredom, in their academic achievement, and in their emotions, motivation, and cognitions towards mathematics. In pursuing these research questions, we developed and evaluated new scales to assess different strategies for coping with boredom. Next, we identified patterns in students' use of different coping strategies and examined their effectiveness. All analyses were run using the Software Mplus (L. K. Muthén & Muthén, 1998 2007) in order to account for the nested structure of the data, namely students within classes.

In school, boredom remains a common emotion despite teachers' efforts to generate interesting lessons. Because teachers cannot resolve all boredom issues on their own, researchers and practitioners need to focus on students' personal strategies to cope with boredom. This is also reflected in the fact that the current literature suggests that boredom is rooted in both the situation (e.g. Kanevsky & Keighley, 2003; Vodanovich, 2003b) and in dispositional features within the

person (e.g. Barnett & Klitzing, 2006; Farmer & Sundberg, 1986; Larson & Richards, 1991; Vodanovich, 2003b). It seems obvious that, in school, boring situations cannot be avoided for every student at all times: Some students simply perceive things as boring. As such, our analyses focused on both inter individual differences in coping behavior and the intra individual effectiveness of combinations of coping strategies, and these are the focus of the following discussion.

5.1. The structure of strategies of coping with boredom

There are many different ways to cope with boredom. In designing the coping with boredom scales, we recognized it was impossible to represent every individual strategy that students may use to combat boredom. Instead, we borrowed a model that has been successful in studying coping with stress (Holahan et al., 1996; Moos & Holahan, 2003) and created items that were highly representative of its four broad categories, namely cognitive approach strategies, behavioral approach strategies, cognitive avoidance strategies, and behavioral avoidance strategies. This model proved to be equally applicable to



Note. ▲ = Boredom-coping group. ◆ = Achievement, emotion, motivation, and cognitive academic outcomes. The Dimension 1 and 2, represented on the x-axis and y-axis respectively, were created through the reduction of the 8-dimensional x 3-dimensional vectors and thus are labeled according to any particular metric.

Fig. 3. Correspondence Analysis for Different Aspects of Academic Achievement Situations.

coping with boredom as it historically is to coping with stress. The results of a CFA showed that a four factor model had the best fit indices, thus allowing us to conclude that the scales load on four different, well separable latent variables representing distinct coping strategies.

Naturally, the four strategies are not completely independent. The correlation between the latent variables measuring cognitive approach and behavioral approach was very low and non significant. This finding suggests that within the approach domain cognitive and behavioral strategies are fairly independent from each other. Within the avoidance domain, a small significant correlation between cognitive and behavioral strategies emerged, indicating a higher degree of concomitance. In short, there was greater distinction between cognitive and behavioral strategies in the approach domain than in the avoidance domain where a student who tries to distract himself from a boring situation by thinking of something different might also drift to doing something different or vice versa.

Looking across approach and avoidance domains, it seems that both avoidance scales correlate negatively with cognitive approach strategies and positively with behavioral approach strategies. This pattern of results may reflect differences in students' perceptions of the source or cause of their boredom. For example, students who are aware that their perceptions of a situation may be related to their experiences of boredom may be more inclined to try and change their own perceptions than students who view the teacher or situation as the only trigger of boredom. In trying to change their perspectives, these students would employ cognitive approach strategies but not avoidance strategies. In contrast, students who believe boredom originates from boring lessons or boring teaching may be inclined to try to change the situation by asking the teacher to change the delivery of the lesson (behavioral approach strategy) or by finding some means to escape from the situation (cognitive and/or behavioral avoidance strategies). Thus, all three of these strategies may be associated with seeing boredom as something "external" to the student. Although we recognize that boredom can stem from the situation and/or the student's perception of the situation, students may perceive only one "locus of boredom". These observations suggest that one avenue of future research may be to consider relationships between the use of certain coping strategies and students' perceived causes of boredom.

## 5.2. Different types of students' behavior in coping with boredom

The results of the latent profile analysis provide a more elaborate picture of how students use different strategies to cope with boredom. Three groups were identified: Reappraisers focused primarily on cognitive approach strategies, Criticizers focused primarily on behavioral approach strategies, and Evaders focused primarily on cognitive and behavioral avoidance strategies. Reappraisers, who endorsed cognitive approach strategies more than average and the three other strategies less than the average, appeared to be the most adaptive. This supports our belief that cognitive approach strategies (i.e., reappraisal) may be especially important in ameliorating boredom because it may be able to increase the perceived value of the situation or content. It is also interesting that Reappraisers were the only group characterized by one dominant strategy, cognitive approach, whereas the two other groups endorsed at least two different strategies more than average. Although more research is needed, we can tentatively conclude that cognitive approach strategies do not need to be used in conjunction with other types of coping strategies to be successful.

We chose the label "Criticizers" because this group predominately relied on behavioral approach strategies, and this type of strategy usually involves verbalizing one's feelings of boredom and making demands of the teacher to change the lessons to something less boring. In addition, this group also used cognitive and behavioral avoidance strategies more often than average, thus suggesting the students look to distract themselves from a boring lesson. Together,

this profile suggests that these students might balance all three types of strategies in their quest to cope with boredom. Future research could focus on whether these students are likely to use behavioral approach strategies first and then resort to avoidance strategies if they are unsuccessful in bringing about change the situation.

Unlike the other two groups, Evaders' preferred avoidance to approach strategies. These students were more likely to distract themselves than to try and directly resolve their boredom either cognitively or behaviorally. Evaders and Criticizers similarly endorse cognitive approach strategies (lowest for both groups) as well as cognitive and behavioral avoidance strategies (above average for both groups), but were very different with respect to behavioral approach, which was highest in Criticizers and below average in Evaders. One explanation for this difference may be that Evaders are too reserved to speak out directly about their boredom and prefer a less direct or disruptive means of dealing with boredom. Future research may want to examine the extent to which this type of coping behavior is domain specific in nature. We speculate that this pattern of coping might be most common in rigid courses that students do not like and find uninteresting, and least common in more flexible courses or open classroom settings in which students can work collaboratively with their classmates and move between tasks at their discretion.

Considering these profiles in light of the earlier idea that strategies to cope with boredom may be based on the students' perceived causes of boredom, we would assume that Reappraisers view the locus of boredom to reside in themselves and therefore use a type of strategy that encourages changes in their own perceptions of the situation. In contrast, it may be that both Criticizers and Evaders view the locus of boredom to reside in the situation or the person responsible for the situation (i.e., the teacher). From this perspective, students in the Criticizer group believe that the situation is changeable with sufficient protest and thus choose to use behavioral approach strategies. In contrast, reliance primarily on avoidance strategies suggests that students in the Evader group believe that the situation is not changeable and instead rely on coping strategies that allow the situation to be endured as best as possible.

## 5.3. Relationships between Coping with Boredom and Aspects of Academic Achievement Situations

Any discussion of coping strategies begs the question about the relative effectiveness of different coping styles. Like others, we are intrigued by this question but also face difficulties in trying to answer the question with empirical cross sectional data that precludes making definitive statements about the causal ordering of the constructs: It is impossible to determine with certainty which came first, the coping behavior or the adaptive outcome. Even with longitudinal data it remains difficult to determine whether students who use certain coping strategies experience less boredom or whether students who suffer from less boredom have a preference for certain coping strategies. Nonetheless, our results do suggest that certain combinations of coping strategies have greater benefit for students' boredom, academic achievement, emotions, motivation, and cognitions. Because boredom is the only academic emotion which intensifies as the value of the academic subject decreases (Goetz et al., 2010; Pekrun et al., 2010), it seems logical that one effective way to reduce boredom is to increase the value of the situation. Of the four types of strategies, cognitive approach most directly achieves this aim. Thus, because the Reappraiser group had the strongest reliance on cognitive approach strategies, we expected them to have the most adaptive profile of achievement related outcomes.

Because boredom is a negative emotion that is usually associated with other negative outcomes (e.g. Bearden et al., 1989; Farmer & Sundberg, 1986; Farrell et al., 1988; Goetz et al., 2006; Kass et al., 2001; Rupp & Vodanovich, 1997; Sommer, 1985; Thackray, 1981; Tidwell, 1988; Wasson, 1981; Wegner et al., 2008), successful coping

with boredom should be evidenced by less frequent occurrence of boredom and higher academic achievement as well as improved emotions, motivation, and cognitions. Reappraisers reported experiencing boredom with significantly less frequency than the two other groups, thus supporting the assumption that finding value in the lesson might be the most positive way to cope with boredom because it targets the boredom at its root (Green Demers et al., 1998; Rana, 2007). Of course, this result must be interpreted cautiously because the direction of causation is not clear. It is possible that students who prefer this strategy experience less boredom. However, it is equally possible that students who only experience infrequent boredom use this strategy as their first course of action but may resort to other strategies if they had to cope with boredom more often. The fact that Reappraisers are both the least often bored in mathematics and have the highest performance in mathematics suggests that boredom is not only an unpleasant and inconvenient emotion but it is also negatively connected to academic performance. Reappraisers also showed the most adaptive profile in terms of lower anxiety and higher enjoyment, effort, interest, and value than the other groups. Overall, this suggests that students in the Reappraisers group were successful in coping with their boredom.

Although neither group was as effective as Reappraisers, the Criticizers group appeared to cope with boredom better than the Evaders. Criticizers reported a higher score on anxiety and enjoyment in mathematics, effort and interest, and value and self concept than the Evaders. This pattern suggests that Criticizers have sufficient emotional involvement in mathematics (both positively and negatively) as well as enough value and self concept to actively invest effort to try and remedy a situation they perceive as boring. In fact, for self concept there was no significant difference between Reappraisers and Criticizers suggesting that Criticizers may in some aspects be closer to Reappraisers than Evaders.

In contrast, the low score on all outcomes and generally concerning profile by Evaders may suggest that they are relatively uninvolved and simply "do not care". Evaders appear more concerned with avoiding the symptoms of boredom than resolving the problem. Ironically, their reliance on avoidance strategies appears to be the least effective in meeting this desire. These findings align with the research in the field of coping with stress that has shown avoidance coping to be connected to maladaptive outcomes like stress and depressive symptoms (Holahan et al., 2005; Holahan et al., 2007).

## 6. Implications for research and educational practice

### 6.1. Implications for further research

We propose three specific avenues for future research based on our results, the pursuit of which will contribute to our ability to understand the efficiency of different coping behaviors, to identify at risk students, and to implement interventions that teach adaptive coping strategies. First, further validation of the coping with boredom scales should be undertaken to better understand how coping with boredom relates to other constructs. More specifically, the evaluation of the relationships between the experience of boredom and students' boredom coping and aspects of academic achievement requires further investigation. Because effective boredom coping should minimize the negative outcomes associated with boredom we would expect to find either mediation or moderation effects between the experience of boredom, boredom coping, and other academic constructs. In other words, the use of an effective coping strategy might occur more clearly when controlling for the experience of boredom. These questions, however, are beyond the scope of the current study because experimental or longitudinal data is needed to investigate the directional influences between these constructs. Furthermore it would be interesting to examine the relationships between the frequency of boredom, boredom coping strategies,

personal characteristics (e.g. boredom proneness), and the perceived antecedents of boredom in the classroom, particularly the perceived locus of boredom but also the relationship between boredom and different types of classroom environments and teaching strategies.

Second, there is a need to generalize the current findings by considering other strategies for coping with boredom and other academic domains. This would help determine the extent to which strategies to cope with boredom are domain specific. It may also be possible to adapt the current scales to assess the ways students' cope with other negative academic emotions such as anxiety, anger, and hopelessness. This would help determine the extent to which coping strategies are emotion specific.

Third, future research needs to address potential differences between trait and state approaches to coping with boredom. It is possible that students may have strategies on which they habitually rely but other strategies they apply in response to a particular situation. To research situational strategies to cope with boredom, a diary study or experience sampling method would be appropriate. Detailed research that focuses not only on the experience of boredom but also on students' coping styles and their effectiveness allows us to make informed decisions about dealing with this negative emotion in the classroom and designing interventions that increase effective boredom coping and minimize students' boredom experiences.

### 6.2. Implications for practice

The findings of this study testify to the fact that boredom in school can be highly detrimental and must be taken seriously. Although teachers try to create interesting lessons, they must be aware that despite their best intentions some students may still perceive "interesting" lessons as "boring". Thus, in addition to stimulating lessons other options must be explored.

The first and most obvious option is to consider ways to teach students to cope with boredom more effectively. Given the positive outcomes associated with students' use of cognitive approach strategies, these seem a logical starting place in terms of interventions. Based on theory, it is likely that cognitive approach strategies results in adaptive coping because they allow students increase the value of the subject area or lesson, thus targeting the root of boredom: low value. Several interventions already exist that aim at encouraging greater personal responsibility for academic failure experiences (e.g., attributional retraining; Hall et al., 2007; Haynes, Perry, Stupnisky, & Daniels, 2009) or greater personal reflection on the perceived value of academic endeavors (G. L. Cohen, Garcia, Apfel, & Master, 2006). In as much as these interventions could be adapted to teach students to focus on the utility and value of the subject or course they may help students reduce their boredom.

Although cognitive approach strategies appeared to be the most beneficial in reducing boredom, there may also be hope for the adaptiveness of behavioral approach strategies. Our results show that students rarely use behavioral approach strategies, perhaps because teachers are not receptive to students' suggestions. Thus, it is possible that more positive outcomes may be associated with behavioral approach strategies if students are given opportunities to voice their opinion on activities and have their perspectives taken seriously by their teachers. Giving students the opportunity to use behavioral approach strategies more intensely and reacting to their demands might help combat boredom. In order for this to work, however, teachers need to recognize that students do not necessarily intend to offend the teacher by expressing their boredom, but may be actively coping with boredom through a behavioral approach strategy.

Along the same line, we need to discourage students from using avoidance strategies that tend to be associated with primarily maladaptive outcomes. Again, students may turn to avoidance strategies because they do not feel able to discuss the issue of boredom with their teachers. Therefore, the issue of boredom needs to

be addressed more openly in schools in order for students to move away from avoidance strategies. For example, teachers can talk with their students about boredom and find out what sorts of activities they perceive as boring. By drawing attention to boredom rather than neglecting it, perhaps teachers and students can together combat this deleterious emotion.

Any combination of the suggestions articulated above may help students and teachers better understand how students cope with boredom and provide opportunities to reduce the occurrence of boredom in general. What is imperative to underscore at this point is that both students and teachers must take some responsibility for boredom and must both be involved in finding an adequate way to reduce this emotion in their classrooms. Progress in this area is contingent on the establishment of strong working relationships between researchers and practitioners in order to design and implement intervention programs that will help reduce boredom.

### Acknowledgement

This paper was supported by a grant from the German Academic Exchange Service awarded to 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.
- 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.
- Barnett, L. A. (2005). Measuring the ABCs of leisure experience: Awareness, boredom, challenge, distress. *Leisure Sciences, 27*(2), 131–155.
- 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.
- 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.
- Belton, T., & Priyadharshini, E. (2007). Boredom and schooling: A cross-disciplinary exploration. *Cambridge Journal of Education, 37*(4), 579–595.
- Benžecri, J.-P. (1992). *Correspondence analysis handbook*. New York: Marcel Dekker.
- Błaszczynski, A., McConaghy, N., & Frankova, A. (1990). Boredom-proneness in pathological gambling. *Psychological Reports, 67*(1), 35–42.
- Buechner, G. (2004). *Lenz (R. Sieburth, Trans.)*. New York: Archipelago books (Original work published 1835).
- Celeux, G., & Soromenho, G. (1996). An entropy criterion for assessing the number of clusters in a mixture model. *Journal of Classification, 13*, 195–212.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum.
- Cohen, G. L., Garcia, J., Apfel, N., & Master, A. (2006). Reducing the racial achievement gap: A social-psychological intervention. *Science, 313*, 1307–1310.
- Csikszentmihalyi, M. (2000). Boredom. In A. E. Kazdin (Ed.), *Encyclopedia of psychology, Vol. 1*. (pp. 442–444) New York: Oxford University Press.
- 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.
- Efklides, A., & Volet, S. (Eds.). (2005). *Feelings and emotions in the learning process. Special issue* (Vol. 15).
- Farmer, R., & Sundberg, N. D. (1986). Boredom proneness—The development and correlates of a new scale. *Journal of Personality Assessment, 50*(1), 4–17.
- 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.
- Fisher, C. D. (1993). Boredom at work: A neglected concept. *Human Relations, 46*(3), 395–417.
- Fisher, C. D. (1998). Effects of external and internal interruptions on boredom at work: Two studies. *Journal of Organizational Behavior, 19*(5), 503–522.
- Folgemann, K. (1976). Bored eleven-year olds. *British Journal of Social Work, 6*(2), 201–211.
- Frenzel, A. C., Goetz, T., Pekrun, R., & Watt, H. M. G. (2010). Development of mathematics interest in adolescence: Influences of gender, family and school context. *Journal of Research on Adolescence, 20*, 507–537.
- Gjesne, T. (1977). General satisfaction and boredom at school as a function of the pupil's personality characteristics. *Scandinavian Journal of Educational Research, 21*, 113–146.
- Goetz, T. (2004). *Students' emotional experiences and self-regulated learning in mathematics*. München: Utz.
- Goetz, T., Frenzel, A. C., & Pekrun, R. (2007a). Regulation von Langeweile im Unterricht. Was Schülerinnen und Schüler bei der "Windstille der Seele" (nicht) tun [Regulation of boredom in class. What students do (not) when experiencing the "windless calm of the soul"]. *Unterrichtswissenschaft, 35*(4), 312–333.
- 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.
- Goetz, T., Frenzel, A. C., Pekrun, R., Hall, N. C., & Luedtke, O. (2007b). Between- and within-domain relations of students' academic emotions. *Journal of Educational Psychology, 99*(4), 715–733.
- Goetz, T., Frenzel, A. C., Stoeger, H., & Hall, N. C. (2010). Antecedents of everyday positive emotions: An experience sampling analysis. *Motivation and Emotion, 34*, 49–62.
- 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.
- Greenacre, M. (1993). *Correspondence analysis in practice*. London: Academic Press.
- Greenacre, M., & Blasius, J. (Eds.). (1994). *Correspondence analysis in the social sciences. Recent developments and applications*. London: Academic Press.
- 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.
- 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.
- Haynes, T. L., Perry, R. P., Stupnisky, R. H., & Daniels, L. M. (2009). Attributional retraining in higher education. In J. C. Smart (Ed.), *Handbook of Research in Higher Education* (Vol. 227–272). New York: Springer.
- Hebb, D. O., & Donderi, D. C. (1987). *Textbook of psychology*, 4th ed. Hillsdale: Lawrence Erlbaum Associates.
- Hembree, R. (1988). Correlates, causes, effects, and treatment of test anxiety. *Review of Educational Research, 58*(1), 47–77.
- 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.
- Holahan, C. J., Moos, R. H., Moerkbak, M. L., Cronkite, R. C., Holahan, C. K., & Kenney, B. A. (2007). Spousal similarity in coping and depressive symptoms over 10 years. *Journal of Family Psychology, 21*(4), 551–559.
- 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*. New York: John Wiley & Sons, Inc.
- Hox, J. J. (2002). *Multilevel analysis: Techniques and applications*. Mahwah, NJ: Lawrence Erlbaum Associates.
- 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.
- Kanevsky, L., & Keighley, T. (2003). To produce or not to produce? Understanding boredom and the honor in underachievement. *Roeper Review, 26*(1), 20–28.
- Kass, S. J., & Vodanovich, S. J. (1990). Boredom proneness: Its relationship to type a behavior pattern and sensation seeking. *A Journal of Human Behavior, 3*, 7–16.
- 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.
- Kleine, M., Goetz, T., Pekrun, R., & Hall, N. (2005). The structure of students' emotions experienced during a mathematical achievement test. *Zentralblatt für Didaktik der Mathematik, 37*(3).
- Kleingina, P. R., & Kleingina, A. M. (1981). A categorized list of emotion definitions, with suggestions for a consensual definition. *Motivation and Emotion, 5*(4), 345–379.
- 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.
- Lewis, M., & Haviland-Jones, J. (2000). *Handbook of emotions*. New York: Guilford Press.
- Linnenbrink, E. (2006). Emotion research in education: Theoretical and methodological perspectives on the integration of affect, motivation, and cognition. *Educational Psychology Review, 18*(4), 307–314.
- Lo, Y., Mendell, N. R., & Rubin, D. B. (2001). Testing the number of components in a normal mixture. *Biometrika, 88*(3), 767–778.
- Lohrmann, K. (2008). Langeweile im Unterricht. Ergänzende Darstellung des Forschungsstands: Zusammenfassung von Einzelstudien. Retrieved from: <http://www.waxmann.com/index2.html?kat/1896.html>
- Mann, S., & Robinson, A. (2009). Boredom in the lecture theatre: An investigation into the contributors, moderators and outcomes of boredom amongst university students. *British Educational Research Journal, 35*(2), 243–258.
- Maroldo, G. K. (1986). Shyness, boredom, and grade point average among college students. *Psychological Reports, 59*, 395–398.
- Marsh, H. W. (1990). The structure of academic self-concept: The Marsh/Shavelson model. *Journal of Educational Psychology, 82*(4), 623–636.
- 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.
- 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.
- Muthén, B. O. (2001). Latent variable mixture modeling. In G. A. Marcoulides & R. E. Schumacker (Eds.), *New developments and techniques in structural equation modeling* (pp. 1–33). Philadelphia: Lawrence Erlbaum Associates.

- 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.
- Muthén, L. K., & Muthén, B. O. (1998–2007). *Mplus user's guide*, Fifth Edition. Los Angeles, CA: Muthén & Muthén.
- 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.
- Nylund, K., Nishina, A., Bellmore, A., & Graham, S. (2007). Subtypes, severity, and structural stability of peer victimization: What does latent class analysis say? *Child Development*, 78(6), 1706–1722.
- 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., & Frenzel, A. C. (2005). *Academic emotions questionnaire—Mathematics (AEQ-M)—User's manual*. München: University of Munich: Department of Psychology.
- 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.
- Pekrun, R., vom Hofe, R., Blum, W., Frenzel, A. C., Goetz, T., & Wartha, S. (2007). Development of mathematical competencies in adolescence: The PALMA longitudinal study. In M. Prenzel (Ed.), *Studies on the educational quality of schools. The final report of the DFG Priority Programme* (pp. 17–37). Münster: Waxmann.
- Pintrich, P. R., Smith, D. A. F., Garcia, T., & Mckeachie, W. J. (1993). Reliability and predictive validity of the motivated strategies for learning questionnaire (MSLQ). *Educational & Psychological Measurement*, 53(3), 801–813.
- Rana, T. (2007). Boredom and psychological malaise. *The Psychologist*, 20(5), 278–279.
- Reid, K. (1986). *Disaffection from school*. London: Methuen.
- Robinson, W. P. (1975). Boredom at school. *British Journal of Educational Psychology*, 45, 141–152.
- 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.
- 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.
- Scherer, K. R., Schorr, A., & Johnstone, T. (Eds.). (2001). *Appraisal processes in emotion. Theory, methods, research*. Oxford University Press.
- Schiefele, U., Krapp, A., Wild, K. -P., & Winteler, A. (1993). Der 'Fragebogen zum Studieninteresse' (FSI). *Diagnostica*, 39(4), 335–351.
- Schriefer, A. (2006). *Coping-Strategien bei Langeweile in der Schule*. Unpublished thesis, University of Munich, Munich, Germany.
- Schutz, P. A., & Lanehart, S. L. (2002). Introduction: Emotions in education. *Educational Psychologist*, 37(2), 67–68.
- Schutz, P. A., & Pekrun, R. (2007). *Emotion in education*. San Diego: Academic Press.
- 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.
- Steyer, R. (2005). Analyzing individual and average causal effects via structural equation models. *Methodology: European Journal of Research Methods for the Behavioral and Social Sciences*, 1(1), 39–54.
- Steyer, R., & Partchev, I. (2007). *A program für the uni- and multivariate analysis of unconditional, conditional and average mean differences between groups*. Jena: University of Jena.
- Steyer, R., Partchev, I., Kroehne, U., Nagengast, B., & Fiege, C. (2008). *Causal effects in experiments and quasi-experiments*. Springer Verlag.
- Suedfeld, P. (1975). The benefits of boredom: Sensory deprivation reconsidered. *American Scientist*, 63(1), 60–69.
- Thackray, R. I. (1981). The stress of boredom and monotony: A consideration of the evidence. *Psychosomatic Medicine*, 43(2), 165–176.
- Tidwell, R. (1988). Dropouts speak out: Qualitative data on early school departures. *Adolescence*, 23(92), 939–954.
- Todman, M. (2003). Boredom and psychotic disorders: Cognitive and motivational issues. *Psychiatry*, 66(2), 146–167.
- Vodanovich, S. J. (2003a). On the possible benefits of boredom: A neglected area in personality research. *Psychology and Education: An Interdisciplinary Journal*, 40(3), 28–33.
- Vodanovich, S. J. (2003b). Psychometric measures of boredom: A review of the literature. *The Journal of Psychology*, 137(6), 569–595.
- 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.
- Zeidner, M. (1998). *Test anxiety. The state of art*. New York: Plenum.
- Zeidner, M. (2007). Test anxiety in educational contexts: Concepts, findings, and future directions. In P. Schutz, R. Pekrun, & G. Phye (Eds.), *Emotion in education* (pp. 165–183). Amsterdam, Boston: Elsevier Academic Press.