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High school students' feelings:

Discoveries from a large national survey and an experience sampling study

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Abstract

We investigated students' feelings at high school in a nation-wide survey of 21,678 US students (study 1), and in a four-week study using experience sampling methodology (ESM) with 472 students across 5 high schools (study 2). Both studies combined mixed methods, including open-ended questions and rating scales (e.g., PANAS). In study 1, seventy-five percent of the feelings students reported in their responses to open-ended questions were negative. The three most frequently mentioned feelings were tired, stressed, and bored. Similar findings emerged with rated items. The prevalence of negative feelings was largely similar across demographic groups. Study 2 largely corroborated the findings from study 1. Although the retrospective measures showed similar results to study 1, the in-the-moment measures also showed frequent positive feelings. We discuss the findings in light of the 'sleep deprivation epidemic', the achievement motivation literature, and implications for the validity of state- and trait measures of academic emotions.

Key words: Academic emotions, high school, mixed methods, national sample, experience sampling method, demographics.

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Students spend at least one quarter of their waking lives in school (Hamre & Pianta, 2010), making school a context that powerfully shapes the course of youth development (Eccles & Roeser, 2011). High school is an environment where adolescents begin to form their personal and social identities, develop meaningful relationships, and learn essential life skills to attain future goals and make important life choices (Dick & Rallis, 1991; Marttinen et al., 2017; Noack, Kracke, Gniewosc, & Dietrich, 2010; Simpkins, Davis-Kean, & Eccles, 2006).

Given the impact of school time on youth development, students' school experiences matter. In particular, the feelings students experience during their time at school influence their motivation, wellbeing, and achievement (Brackett & Rivers, 2014; Kochanska, Murray, & Harlan, 2000; Pekrun, Goetz, Titz, & Perry, 2002). Recent studies suggest that negative feelings are frequent among high school students (Mojtabai et al., 2016; Twenge et al., 2010; Twenge, Zhang, & Im, 2004; Twenge, 2014), but it is not well known exactly which feelings students experience and how often they are experienced, as most studies only focus on a small number of feelings or have small samples. Moreover, some recent studies suggest that retrospective assessments of feelings may be biased, compared to in-the-moment assessments (e.g., Goetz et al., 2013). The studies presented here employ a mixed-methods approach to examine how high school students feel at school, and tests the generality of findings by comparing open-ended and self-rated retrospective reports (study 1) and in-the-moment ratings (study 2).

Theoretical background

This study examines students' emotions and feelings at school. We define emotions and feelings in terms of constructionist theories and appraisal theories as the results of subjective interpretations of experiences of arousal, valence, and potency/intensity, and the subject's theories and knowledge about their causes and meanings (constructionists; see Barrett, 2006, 2012; Russell, 2003), and as the result of evaluations of experienced stimuli on dimensions like novelty, pleasure/valence, cause, compatibility with values and norms, urgency, and controllability (appraisal theories, e.g., Ellsworth & Scherer, 2003).

This study is based on a dimensional approach to emotions, meaning we distinguish between valence (positive versus negative; e.g., Watson & Tellegen, 1985), arousal (high versus low; e.g. Russell & Barrett, 1999), and approach motivation (e.g., Lang, Bradley, & Cuthbert, 1990; Harmon-Jones & Harmon-Jones, 2010) and aim to capture these dimensions in our assessments. At the same time, we take into account arguments raised by constructionist theories of emotions, according to which there is much idiosyncrasy in regard to how emotions are experienced (Barrett & Wager, 2006), how their structure differs between individuals (Barrett & Wager, 2006), and how they co-occur with each other in different individuals (e.g., Moeller, Ivcevic, White, & Brackett, 2018).

With reference to these findings and studies showing the importance of content differences between specific emotions (called emotion granularity, see Barrett, Mesquita, Ochsner, & Gross, 2007; Kashdan, Barrett, & McKnight, 2015; Tugade, Fredrickson, & Barrett, 2004), we try to reconcile the aforementioned dimensional approach with our aim to capture and study granular emotions, meaning content differences between specific emotions. For this theoretical integration, we use a partially theory-driven and partially exploratory multi-method

approach to capture the aforementioned dimensions as well as emotional granularity in high school students.

We use the term *emotion* when referring to an established literature using that term (e.g., ‘academic emotions’) and when referring to affective experiences that constructionist and appraisal theorists would agree to label an emotion (for the consensus and debates among emotion researchers, see e.g., Ekman, 2016, and Lange, Dalege, Borsboom, van Kleef, & Fischer, under review).

To also capture the broad sense of students’ affective experiences and avoid terminological ambiguities, we use the term *feeling* throughout this article when we need to address affective states that students report, but which might provoke a terminological debate among emotion researchers, such as feeling tired, feeling judged, or feeling crappy. This umbrella term *feelings*— is used when it is unclear whether other constructionist or appraisal theorists of emotion would agree to label an experience an emotion. Because of an ongoing debate whether or not interest should be called an emotion (e.g., Silvia, 2004, 2005), we also use the umbrella term *feelings* to refer to experiences typically studied under the label of ‘academic emotions’ (e.g., interest, anxiety, boredom, see e.g., Pekrun, 2006), as well as experiences labeled ‘other affective states’ in the PANAS-X and much of the existing literature, like the feeling of tiredness (see Watson & Clark, 1994).

Furthermore, our research questions are informed by the previous research on gender differences in Math and STEM anxiety and the related discrepancies between situational and retrospective anxiety measures in this regard (Pekrun et al., 2002; Goetz et al., 2013; Bieg et al., 2015; Moeller et al., 2015).

Feelings matter for learning and optimal youth development

The effects of schooling are in part characterized by the feelings students experience at school: For example, academic and social feelings experienced at school predict students' attention, motivation, academic performance, relationships, health, and well-being (Brackett & Rivers, 2014; Kochanska, Murray, & Harlan, 2000; Pekrun, Goetz, Titz, & Perry, 2002). Accordingly, how students feel at school, along with a range of other psychosocial factors, likely plays a major role in how attending school impacts youth development. What students feel in school (e.g., enjoyment vs. boredom, hope vs. discouragement) is linked with their academic success (Pekrun et al., 2002). Specifically, feelings such as enjoyment and interest correlate positively with academic achievement, because they are associated to students' attention, concentration, engagement, and persistence in learning activities (Eccles, 2005; Salmela-Aro, Moeller, Schneider, Spicer, & Lavonen, 2016; Schiefele, 1996). On the other hand, feelings such as boredom and anxiety correlate negatively with achievement, with highly skilled students tending to be particularly prone to boredom (Ellis & Ashbrook, 1988; Larson, & Richards, 1991; Ma, 1999; Meinhardt & Pekrun, 2003; Pekrun et al., 2010). Anxiety and boredom also are known to diminish cognitive resources and thus negatively impact school performance (Ellis & Ashbrook, 1988; Hembree, 1990; Pekrun, Goetz, Daniels, Stupnisky, & Perry, 2010; Pekrun et al., 2002).

Given the psychological and developmental significance of feelings in school, it is noteworthy that high school students now report more severe and chronic experiences of negative feelings in their lives. Compared with those growing up in past decades, adolescents today are more likely to experience anxiety, depression, and feel as if they do not have much control over their lives (Mojtabai et al., 2016; Twenge et al., 2010; Twenge, Zhang, & Im, 2004;

Twenge, 2014). The results from the National Surveys on Drug Use and Health, for example, revealed a rise in major depressive episodes from 8.7% in 2005 to 11.3% in 2014 in adolescents – the largest single rise since data have been collected (Mojtabai et al., 2016). Moreover, feelings of tiredness and fatigue are endemic due to increasing sleep deprivation among U.S. adolescents (National Sleep Foundation, 2006; Owens et al., 2014). Moreover, colleges have reported increases in mental health issues related to negative feelings, such as anxiety and feeling depressed (Center for Collegiate Mental Health; 2016).

Globally, the 2012 Program for International Student Assessment (PISA) of 15-year olds found that the U.S. ranked 48th among 65 countries in their reported happiness at school, lower than the average of countries in the Organization for Economic Co-Operation and Development (OECD, 2013). Furthermore, the frequency of negative feelings among high school students seems to be an international problem. A recent survey of over 7,000 German high school students found that 43% of them felt stressed “often” or “very often”, and one out of three of these frequently stressed students suffered headaches, back pain, or sleep problems at least once a week (IFT-Nord, 2017). The same report found that 36% of the students felt tired due to schoolwork and 40% felt overwhelmed by schoolwork.

Who experiences which feelings at school?

While the studies described above offer insights into the rise of negative feelings that adolescents experience, they are limited in regard to the age range of the participants, gender, socioeconomic status (SES), the range of feelings studied, and the specific location (e.g., home or school) where the feelings were experienced. In particular, there is a lack of systematic comparisons of broad sets of feelings across demographic groups. Hence, whether certain

students experience different feelings at school is not well established. We therefore explore the prevalence of students' feelings at school.

In order to find out whether the prevalence of students' feelings at school is universal across different demographic groups or specific to particular subgroups of students, we also explore the relation of gender, SES, and ethnicity on students' feelings. This also is an exploratory research question, because of inconclusive and contradicting findings in the previous research. While many studies have examined the relationship of students' feelings and emotions to diverse person characteristics and demographics, we believe that this is the first study to explore this relation in a large national sample.

Gender

Results on the influence of gender on students' feelings at school is inconclusive. Studies applying retrospective measures often find generally higher levels of distress, anxiety, and depression among female students in both school and higher education (Bayram & Bilgel, 2008; Chapell et al., 2005; Jadoon et al., 2010; Dyrbye, Thomas, & Shanafelt, 2006; Locker & Cropley, 2004; Mousavi, Haghshenas, & Alishahi, 2008; Wiklund, Malmgren-Olsson, Öhman, Bergström, & Fjellman-Wiklund, 2012; but for contradicting evidence see Deb, Chatterjee, & Walsh, 2010). Much if the research on gender differences in feelings at school focuses on domain-specific Math and Science anxiety and suggests that females tend to feel more anxious about STEM subjects (Mallow, 1994; Udo, Ramsey, Reynolds-Alpert, & Mallow, 2001; Udo, Ramsey, & Mallow, 2004).

On the other hand, several previous studies suggest that such gender differences disappear if situational instead of retrospective measures are applied (Bieg et al., 2015; Goetz et

al, 2013; Moeller et al., 2015). However, the previous research is not entirely conclusive, since Schneider et al. (2016) found that male and female students reported *similar* situational emotions and feelings in Finnish secondary schools (in Helsinki) but not in US high schools (in East Lansing, Michigan). In the latter sample, females reported higher situational stress and lower situational positive feelings like happiness, confidence, and feeling active.

Retrospective measures also suggest that female students tend to experience less pride and enjoyment and more shame and hopelessness in Mathematics, compared to male peers (Frenzel, Pekrun, and Goetz, 2007). In addition to gender identity, the sexual orientation has also been found to impact students' feelings at school; students who identified as neither male nor female and students with non-heterosexual orientations reported experiencing more negative feelings (e.g., feeling sad) and less positive feelings (e.g., feeling accepted and connected; e.g., White et al., 2017).

Several studies have suggested that students' responses to retrospective measures (such as the question "how anxious do you typically feel...in Math") might be confounded with gender-specific stereotypes, and that gender differences in Math anxiety disappear when situational instead of retrospective measures are used (Bieg et al., 2015; Goetz et al., 2013; Moeller et al., 2015). Based on these findings, we would question whether the above-mentioned studies on gender differences in students' feelings at school would have found different results if they had used situational instead of retrospective measures. Studies with situational assessments are comparably rare and usually limited to small samples, due to the burden they imply for both researchers and participants.

Thus, it seems currently unclear to what degree gender affects the affective experiences of students at school. The previous research on situational measures is limited and inconclusive,

the previous research with retrospective measures has been discussed to be biased, and it is unknown whether previously reported differences between retrospective and situational assessments generalize to large samples, whether they replicate in US samples (Schneider et al., 2016 suggest that they do not), and whether they generalize to other feelings than anxiety. Because of the inconclusive findings in the previous research, we treat these research questions as exploratory.

Socio-economic status

The relationship between students' social-economic status (SES) and both positive and negative feelings is not well established. In one study, SES was correlated with student reports of belonging in school (Wang & Eccles, 2012). Interest and intrinsic motivation in reading, however, does not appear to be correlated with parents' educational level, a proxy for SES (Durik, Vida, & Eccles, 2006). More generally, studies suggest that happiness increases with SES or income (Gerdtham & Johannesson, 2001; Aaker, Rudd, & Mogilner, 2010), whereas other studies found income unrelated to happiness (Ahuvia, 2007; Ahuvia & Friedman, 1998). A third group of studies suggests that if finances are invested in life experiences such as travel, income is associated with greater life satisfaction (Dunn, Gilbert, & Wilson, 2011). However, much of this previous research has focused on adults, who may have more control over their income than high school students. Moreover, the relationship between SES and different feelings has not been systematically studied with regard to learning-related feelings, such as interest and boredom experienced in the school context. Because of the mixed findings in the previous research, we explore the relation between SES and students' feelings at school rather than stating directed hypotheses.

Race / ethnicity

Little is known about the relation of race and ethnicity to students' feelings at school. Affect-related school behaviors and experiences such as engagement in school and school attachment were found to be on average lower among African-American students than among European-American students (Ainsworth-Darnell & Downey, 1998). Johnson et al. (2001) found that African-American students reported lower levels of school attachment, but were more likely to pay attention and complete homework. Other studies have found that school identification was higher among African-American students than European-American students (Voelkl, 1997). Moreover, African-American students were found to experience more flow (a state of deep concentration and absorption in a current activity), as well as higher enjoyment, motivation, and positive affect in classrooms than any other racial group (Shernoff, Knauth, & Makris, 2000). These studies, however, generally survey a small number of students in a few selected schools, which does not allow for a systematic examination of how often students experience which feelings, and how these feelings differ across demographic groups.

The Present Research

Little is known about the prevalence of a wide range of feelings in U.S. high schools. Past studies have often focused on one feeling at a time, such as interest, boredom, confusion, and anxiety (e.g., Goetz, Frenzel, et al., 2013; Goetz, Bieg, et al., 2013; D'Mello, Lehman, Pekrun, & Graesser, 2014; Hulleman & Harackiewicz, 2009). However, in order to systematically compare which feelings students experience most and least often at school, it is necessary to assess multiple feelings simultaneously. Although some studies use item lists of distinct and per se granular feelings (e.g., Ketonen et al., 2017), these items are often collapsed into composite scales labeled positive and negative emotions. Hence, there is a need for more

knowledge about the prevalence of granular emotions and for a distinction of emotions by their specific content at school (see also Barrett, Mesquita, Ochsner, & Gross, 2007; Kashdan, Barrett, & McKnight, 2015; Tugade, Fredrickson, & Barrett, 2004).

In addition to more granular feelings, we also aspired to assess a broader list of emotions than the previous research. Typically, feeling item lists have been limited to the feelings that previous research has identified as most prevalent or most relevant to learning outcomes, but there may be some students who experience other granular emotions beyond those frequently mentioned by their peers. It might even be that there are still unknown feelings that the previous research has not identified as frequent but that are frequent among students.

In order to capture the utmost granular and yet exhaustive lists of feelings and to make sure we did not miss any feeling relevant to students' lives, the current research examined U.S. high school students' feelings at school with a multi-method approach: qualitative, quantitative retrospective, and quantitative in-the-moment measures of feelings in school using a large, diverse sample of students. We aimed to explore which words students used to describe their own feelings, how often certain feelings were experienced at school, and whether demographic student characteristics were associated with the experienced feelings.

In order to reach a broad sample of U.S. high school students across all states and school types, study 1 used a widely distributed online survey. A second study was conducted to ensure replicability and validity of the findings in five high schools across Connecticut. This second study used in-depth assessments of students' situational feelings in specific learning moments in classrooms, collected over a four-week period.

Study 1

Research questions and hypotheses

A growing body of research has focused on a small subset of common student emotions and feelings (Pekrun & Linnenbrink-Garcia, 2012; Silk et al., 2003), such as test anxiety (see Zeidner, 2007 for a review), boredom (see e.g., Goetz et al., 2013), or interest (e.g., Hulleman & Harackiewicz, 2009). However, evidence is scant regarding the full range of feelings that high school students experience at school, and how those feelings relate to students' demographic characteristics. The present study addresses this gap in the literature by surveying a range of positive and negative feelings with over 20,000 students in the 9th to 12th grades across the United States.

Specifically, this study asked high school students to describe how they felt at school in their own words, and the percentage of time they felt a wide-range of feelings related to social and academic experiences at school. Three broad research questions guided this study:

RQ1: Which feelings do students report when they are asked to describe in their own words their typical feelings at school? This was an exploratory question.

RQ2: Which feelings do students report most frequently at school using emotion rating scales? This was an exploratory question.

RQ3: Which demographic characteristics predict the feelings students experience at school?

Based on findings by Shernoff et al. (2000), we expected that African-American students were more likely to report positive academic feelings. We had no hypothesis in regard to negative feelings. Since previous research on the relation of SES with feelings provided mixed results, we examined this relationship as an exploratory research question.

Furthermore, we conducted two validity checks to ensure the validity and representativeness of our findings:

RQ4: Validity check: Are there differences between students who received the invitation to the online survey through different channels (social media versus through their schools)?

RQ5: Validity check: Do open-ended responses reflect similar experiences as rating scales?

Materials and methods

Data collection procedures

Data were collected between April and June 2015 using an online survey powered by Qualtrics. Participants were recruited through schools and dozens of social media outlets. The invitation with the link to the online survey was distributed through (a) the email lists of 23 high schools our research institute partnered with, (b) multiple social media channels, including education partners like Edutopia and Greater Good Science Center, and our primary research partners: Facebook and Born This Way Foundation, and (c) our research institution's own social media channels. Study participants include 21,678 students who met our inclusion criteria. These were participants who: (1) lived in the U.S. (filtered by IP address), (2) reported being in grade 9 to 12, (3) were between 13 and 19 years old, (4) provided at least six valid answers, and (5) did not write "nonsense" (e.g., "lizard") in the open-ended questions. Fifty-five (55.12%) percent of the participants indicated that they had heard about the study from their school, 16.36% had found the survey link through Born This Way Foundation's social media channels (Twitter and Facebook), 10.25% had learned about the study from a friend (through social media, email, or text message), 8.35% had seen an ad or feed on Facebook, 1.83% had been invited by another organization (e.g., DoSomething.org), and 8.01% reported "other" channels through which they had learned about the survey. Demographic characteristics of students who received the invitation to the survey through different channels are compared in Tables S1 and S2 in the supplemental materials (see also the "s" in the results section).

The instructions for the survey mentioned that it was about students' feelings at school, and that the aim of the survey was to "understand how students typically feel at school so that we can work on making schools the best possible places for students to learn and thrive."

Sample

The sample was diverse in terms of ethnic background, gender, sexual orientation identity, age, socioeconomic status, school type, and state of residence. Students were on average 15.89 years old ($SD = 1.26$) and represented all grade levels: 9th grade (27.80%), 10th grade (25.52%), 11th grade (24.94%), and 12th grade (21.74%). Students identified as 31.76% male, 64.93% female and 0.67% trans male, 0.35% trans female, and 2.29% "other" gender identities. The sample was 55.93% White/Caucasian, 12.75% Hispanic, 12.25% Black/African-American, 8.72% Asian/Asian-American, 5.68% Biracial or Multiracial, 0.72% American Indian or Alaska Native, 0.51% Native Hawaiian or Other Pacific Islanders, and 3.45% who identified as "other". Students identified as 75.82% heterosexual/straight, 11.12% bisexual, 7.50% gay or lesbian, and 5.56% "other". Students were from public (83.35%) and private (12.77%) schools. All 50 states were represented. Almost forty percent (39.61%) of the students responded while being at school, 54.91% took the survey at home, and 5.46% were surveyed in another after-school setting, other than home. Over a quarter (26.50%) of the students lived in large cities, 19.70% in small cities, 47.28% in suburban towns, and 6.52% in rural places. Subjective SES was measured by asking the question, "Think of a ladder with 10 steps representing where people stand in the United States. At step 10 are people who are the best off – those who have the most money, the most education, and the most respected jobs. At step 0 are the people who are worst off – those who have the least money, least education, and the least respected jobs or no job". Ostrove, Adler, Kuppermann, and Washington (2000) validated this measure by showing its associations

with household income, education, and occupation. The average SES rating was 6.46 ($SD = 1.96$).

Measures

First, students were asked, “Think about the range of positive and negative feelings you have in school each day. How do you typically feel when you are in school? List up to three feelings.”. The question was followed by three empty text fields. Open-ended answers were assigned to discrete feeling categories (480 categories were identified). For instance, the answers “happy”, “I feel happy”, and “Most of the time I feel happy” were assigned to the category “happy”. Valence was classified as negative, positive, or neutral by two researchers (91.10% agreement; all disagreements were resolved by discussion).

Students also were asked to rate how often they experienced 10 feelings from the Positive and Negative Affect Schedule for children (PANAS; Ebesutani et al., 2012), using a scale from 0 (*never*) to 100 (*always*). Five items captured positive affect: $\alpha = .90$ and five negative affect: $\alpha = .84$). In the present study, the factor structure of the PANAS subscales was supported in a confirmatory factor analysis, after a residual correlation between the items afraid and scared was included in the model [$\chi^2(df) = 2224.851(33)$, $p = .000$; TLI = .981; CFI = .974; RMSEA = .056; SRMR = .042].]. In addition, we report ratings for the two feelings that had been mentioned most frequently in the open-ended responses, namely stressed and bored. Seventeen additional academic and social feelings were assessed and reported elsewhere (Moeller et al., 2018; White et al., 2017), but are not addressed in this study. For a justification of the item selection for the survey and this article, please see the supplemental materials on pages 8ff.

*Results of study 1**Which words do students choose to describe their feelings at school? (RQ1)*

In the open-ended responses, 74.20% of all of the feelings reported by students were negative, 23.52% positive and 2.28% neutral or unclear valence. Table 1 summarizes the top ten responses. The first three columns show the most frequent answers for the first, second, and third response fields, respectively, and the fourth column reports the most common feelings mentioned overall. Eight of the top ten feelings were negative: tired, stressed, bored, anxious, annoyed, sad, lonely, and depressed (in order of reporting). The two positive feelings reported were happy and excited.

INSERT TABLE 1 HERE

How often do students experience different feelings in school? (RQ2)

The results from the rating scales (Table 2) corroborated the open-ended responses. Students most often reported feeling stressed (79.83% of the time) and bored (69.51% of the time). Tired, the most common response to the open-ended question, was not included in the rating scales because it is not usually considered an emotion and hence was not included in the sources from which we drew our items (the PANAS short version for children and the academic emotion literature)¹. Results from the PANAS subscales of positive affect and negative affect showed that students reported positive feelings on average 46.60% of the time and negative feelings 40.67 of the time.

INSERT TABLE 2 HERE

¹ Feeling tired appears as an “other affective state” in the PANAS-X, though (Watson & Clark, 1994).

Do students' feelings differ by demographic groups? (RQ3)

Gender, age, SES, school type and race/ethnicity were significant correlates of positive feelings. Positive feelings were experienced more frequently by male versus female students, older versus younger students, higher SES versus lower SES students, private versus public school students, and ethnic minority (Hispanic, Black, Asian, and Multiracial) versus White students. However, all effect sizes were small, with the largest being the regression coefficient for SES ($\beta = .209^{**}$). Combined, these demographic variables explained less than 9% of variance in positive feelings.

Negative feelings were associated with female gender, age, SES, and race/ethnicity, but not school type. Negative feelings were experienced more frequently by female versus male students, younger versus older students, lower SES versus higher SES students, and ethnic minority (Hispanic, Black, Asian) versus White students. Bi- or multiracial students did not differ from White students in terms of negative feelings. Again, all effect sizes were small, with the largest being the regression coefficient for SES ($\beta = -.157^{**}$). All these demographic variables explained less than 6% of variance in negative feelings².

*INSERT TABLE 3 HERE**Validity check: Are there differences between students who received the invitation to the online survey through different channels (social media versus through their schools)? (RQ4)*

Since participants for this study came through three primary channels (partnering schools, Born This Way Foundation's social media channels, and a public link on diverse other social

² More nuanced relations between feelings and both gender identities and sexual orientation identities were examined in a separate study (see White et al., 2017).

media), we conducted a validity check to examine whether respondents from different samples were comparable in regard to the variables examined in this study.

Chi²-tests were conducted to compare the different responder groups in regard to their demographics and multivariate analyses of variance (MANOVA) were used to compare the different respondent groups in regard to their feelings (see Tables S1 - S3). Due to the large sample size, all group differences were significant, but effect sizes were small. There were some small group differences in regard to gender (*Cramer's V* = .088), sexual orientation (*Cramer's V* = .224), grade (*Cramer's V* = .092), school type (*Cramer's V* = .171), urban versus rural school environment (*Cramer's V* = .141), age (η_p^2 = .009), and SES (η_p^2 partial = .053). The respondent groups differed only slightly in their feelings, with small effect sizes ($.01 \leq \eta_p^2 \leq .057$).

Validity check: Do open-ended responses reflect similar experiences as rating scales?

(RQ5)

Unlike the rating scales we used for RQ2, the open-ended responses for RQ1 are rather uncommon measures of feelings. Although there is high face validity in asking students to describe their feelings in their own words, we conducted a validity check to examine whether both measures reflected similar experiences.

We examined all open-ended feelings for which we had corresponding ratings to make the comparison. In addition to examining how students rated the same feeling they had mentioned in open-ended responses, we also examined how they rated the opposite feeling. For example, we performed *t*-tests comparing scale ratings of feeling happy and sad for students who mentioned feeling happy in the open-ended question vs. those who did not mention being happy in the open-ended question (see Table S4 in the supplemental materials).

As Table S4 (see supplemental materials) shows, students' open-ended responses indicating feelings of happiness, stress, sadness, loneliness, anxiety, boredom, nervousness, and depression were strongly associated with students' ratings of the same feelings and their opposites. All differences in ratings between students who mentioned a given feeling and students who did not mention that feeling were significant and all effect sizes were moderate to large ($0.44 \leq |d| \leq 1.50$). On average, students who mentioned being happy in their open-ended responses also had higher mean scores of happiness and lower ratings of sadness than students who did not mention feeling happy in their open-ended responses. Vice versa, students who mentioned feeling sad in their open-ended responses had higher ratings for sadness and lower ratings for happiness than students who did not mention being sad in their open-ended responses. In similar ways, open-ended reports of feeling stressed were associated with higher ratings for stress, open-ended reports of feeling anxious were associated with higher ratings of feeling afraid and scared, open-ended reports of feeling lonely were associated with higher ratings of feeling alone and lower ratings of feeling connected, open-ended reports of feeling bored were associated with higher ratings of feeling bored and lower ratings of feeling interested, open-ended reports of feeling nervous were associated with higher ratings of feeling nervous, and open-ended reports of feeling depressed were associated with higher ratings of feeling cheerful.

Discussion study 1

This study marks one of the first efforts to investigate the larger range of feelings in a large, diverse sample of U.S. high school students. When students were asked to describe feelings that they experienced at school in their own words, students reported mostly negative feelings. Nearly three-quarters of the feelings they reported were negative, with tired, bored, and stressed emerging as the most frequent (reported by 26.38% - 39.27% of all students). Among

the top ten most frequently mentioned feelings, only two were positive, namely happy (reported by 22.72% of all students) and excited (reported by 5.11% of all students).

The responses to the rating scales supported the open-ended findings. Students reported feeling stressed and bored the most (79.83% and 69.51% of the time, respectively). The open-ended questions provided interesting insights into the granularity of students' feelings. The large overlaps between open-ended responses and rated items supported the validity of the former.

We further examined whether demographic characteristics of students were associated with their school-based feelings, and found that all demographic groups similarly reported predominantly negative feelings. Small effect sizes suggested that higher SES was associated with high scores on scales of positive feelings and lower scores on scales of negative feelings. Female students tended to report lower positive and higher negative feelings, particularly higher stress, which is consistent with previous findings (e.g., Goetz et al., 2013). African-American students tended to report higher positive and lower negative feelings, compared to White students.

Although we examined a large sample of students from across the U.S., the sample was largely one of convenience recruited through schools, youth serving organizations, and social media. This dissemination strategy enabled us to get students from multiple sources. However, this does not guarantee that the data are bias-free. It is possible that mostly dissatisfied students took the survey although these results support recent research on the increasing rates of stress and anxiety among adolescents (APA, 2015). To identify potential biases, we tested whether participants who received the survey invitation through different channels, such as their school or social media, differed from another in terms of demographic characteristics and reported feelings. Effect sizes of these group differences were small, and negative feelings were

frequently reported by all groups, suggesting that the main conclusions of this study robustly apply to all groups of participants. It cannot be ruled out that some participants took the survey multiple times, but it does not seem likely, since this causes extra work and no incentives were given.

One limitation of the current study is that it measured feelings with retrospective assessments, which require students to aggregate their “typical” feeling in their mind, across all situations experienced at school. This may lead to biases, for example due to memory errors. For example, reports of Math anxiety differ between retrospective measures and in-the-moment assessments (Goetz et al., 2013). While retrospective reports of Math anxiety reflect gender-stereotypical beliefs about one’s own competencies and suggest that female students experience more Math anxiety, these gender differences disappear when in-the-moment assessments are applied. We do not know whether similar biases affect students’ reports of stress, boredom, or tiredness, which also may be biased by students’ beliefs rather than by their actual experiences. In Study 2 we cross-validate our findings using in-the-moment measures of high school students’ feelings.

Another limitation is that the survey was distributed close to the end of the school year (April-June 2015), so that it cannot be ruled out that season effects (exam preparations, getting ready for the summer) influenced the feelings students felt at high school. Systematic comparisons of feelings in different stages of the high school year are needed to examine whether negative feelings prevail throughout the year or if they increase towards the end of the school year.

Study 2

Study 2 sought to replicate and extend the findings from study 1 by using in-the-moment measures of students' feelings. In order to avoid possible self-selection biases that may affect online surveys (Bethlehem, 2010), we recruited six public Connecticut high schools that represented students with diverse socio-economic backgrounds.

Research Questions and hypotheses

RQ6: Will students report similar feelings as in study 1 when asked open-ended questions about typical feelings at school? Based on our previous findings of study 1, we expected students to report primarily negative feelings, including tired, stressed, and bored in retrospective measures.

RQ7: How do in-the-moment measures of feelings in specific learning situations compare to retrospective ratings? We expected that retrospective measures and in-the-moment measures of feelings might differ in regard to overall mean scores, based on findings by Bieg et al., (2015) and Goetz et al. (2013)³. However, since -to our knowledge- no previous study has examined a similar set of feelings used in this study, we had no specific hypothesis and examined differences between retrospective and in-the-moment measures as exploratory question. It was a priori unclear whether the same negativity expected for the open-ended questions would appear in the situational measures, as the previous research on that question is somewhat inconclusive, with several previous ESM studies

³ While Bieg et al (2015) and Goetz, Bieg, et al. (2013) suggest that discrepancies between retrospective measures and situational measures are due to domain-specific and gender-specific competence beliefs and associated response biases, we aimed to explore whether similar discrepancies would appear generally, beyond the distinction of specific school subjects. Several studies suggest that the lack of gender differences in situational measures reported by Bieg et al. (2015) and Goetz, Bieg, et al. (2013) is domain-unspecific (Moeller et al., 2015; Schneider et al., 2016).

suggesting that situational emotion measures typically show stronger positive than negative emotions (e.g., Schneider et al. (2016).

RQ8: Which demographic characteristics are related to feelings students report in specific learning situations in high school classrooms? Based on the findings from study 1, we expected female students to report higher negative and lower positive feelings in retrospective measures. However, findings by Bieg et al. (2015), Goetz et al. (2013), Moeller et al., (2015) suggested that gender differences should disappear in ESM measures, which is why we expected that gender differences in anxiety would disappear in situational measures of feelings.

Materials and Methods

Data collection procedures

In-the-moment experiences of feelings were assessed using experience sampling method (ESM). We used an App from LifeData Corp (2016), which runs on Android and iPhone smartphones. Over the course of four weeks, students filled out short surveys on their own smartphones at three time points per day during school lessons. All in-school ESM signals were timed to occur five minutes before the end of a class, to keep interruptions in the classroom low. Also in order to reduce interruptions of important school activities, there was a one-hour response window before each survey disappeared. All questions pertained to the last activity the students had been doing in the moment when the signal occurred. The timing of the three beeps per day was balanced across the four weeks of data collection, so that beeps occurred in all class periods on all weekdays. The data comprised 18,610 ESM responses/situations. The average number of completed ESM surveys per person was 29.61. The response rates and participant numbers differed between schools with a range between 16.00 and 31.65. The school with the

highest number and percentage of participants also had the highest response rate to ESM surveys. We perceived that the support for the study by the principal and teachers was crucial for the recruitment and retention of participants.

Sample

High school students from five public high schools in CT had parental permission to participate in the research. Schools were selected to represent diverse socio-economic backgrounds: 7.00% of our participants were from three low income schools, all of which had more than 96% of students eligible for free lunch. The other 93.00% of our participants went to the two high income schools in which only 7.2-8.2% of students were eligible for free lunch. Students were 15.84 ($SD = 1.17$) years old on average and 71.18% identified as female. There were 28.44% 9th graders, 29.78% 10th graders, 28.67% 11th graders, and 13.11% 12th graders. Five-hundred and thirteen students completed baseline surveys with retrospective measures of feelings and questions about demographics. The original dataset included a sixth low-SES school, which was excluded from the final sample because only 14 students responded to ESM surveys and only 3 responded to the follow-up questionnaire. One reason for the low response rate in this school might have been due to the fact that unlike the other five schools, there was no way to reach parents via email or intranet to request their parental permissions, so many students could not be included in the study. Of those students who did provide parental consent and own assent, 472 completed the Experience Sampling Method (ESM) surveys and 226 students completed the follow up survey, which included demographic variables.

Measures

Retrospective online survey: Like study 1, we assessed retrospective ratings of feelings experienced at school with rating scales and open-ended responses. In order to compare feelings

across measures, retrospective measures assessed the same feelings as the experience sampling measures, using the same response scale from 0 (*never*) to 100 (*always*) that we had used for retrospective assessments in study 1. In addition, open-ended questions were used to ask students “How do you typically feel when you are at school? Name up to three feelings.”

Experience sampling: In-the-moment feelings were assessed with 13 single items that were selected to assess three dimensions (high versus low arousal, positive versus negative valence, and approach motivation), preceded by the question “*How did you feel as you were beeped?*”. Items assessing feeling enthusiastic, happy, interested, curious, calm, relaxed, frustrated, anxious, afraid, tired, sad, bored, and stressed were rated on a response scale of 1 (*not at all*) to 4 (*very much*). The feelings were kept as single items instead of being collapsed into scales because the exploratory and confirmatory factor analyses suggested that models with unrestricted covariance among the items on either level fitted the data best (see supplemental materials, Table S-5). A model with three factors on either levels also showed a sufficient model fit (RMSEA = .043; CFI = .950; TLI = .907; SRMR_{within} = .025; SRMR_{between} = .049) and its factor structure is reported in Table S-6 in the supplemental online materials. However, this model did not seem robust and interpretable because no item loaded higher than .410 on the third within-level factor, all items characterizing the third factor on either level showed strong cross-loadings, and the third factor on the within-level was hard to interpret, as it was characterized at the same time by high arousal items of both valences (enthusiastic, interested, curious, stressed, afraid, anxious, frustrated) but at the same time included an item which is usually considered a marker of rather low arousal (sad), and the same factor represented approach motivation (interested, curious) and avoidance motivation (anxious, afraid). Since parsimony and interpretability are crucial criteria for model selection in exploratory factor analyses, and since these criteria were not met here, we

chose to continue our analyses by treating the situational feelings as granular, i.e., separate on the facet level.

Demographic variables: Gender and grade were assessed in the start survey of the ESM assessments and were therefore available for the ESM respondents. SES and ethnicity were assessed at the end of the study. Given the small sample size, it was not possible to examine the effects of SES and ethnicity on situational feelings, because the sample of participants providing answers on the ESM measures and follow up survey was too small ($N = 226$) for that purpose.

Results of study 2

Are responses to open-ended questions about typical feelings at school replicated? (RQ6)

Seven out of the top ten most frequently mentioned feelings were the same in study 2 as in study 1, namely the feelings stressed, happy, tired, bored, anxious, sad, and annoyed (Table 4). Tired, stressed, and bored were again the three most frequent negative feeling. Three of the top ten most frequently mentioned feelings differed from the findings in study 1. In this study, feeling nervous, frustrated, and angry replaced the study 1 feelings of being lonely, excited, and depressed. Feeling happy was the second most frequently mentioned feeling in study 2 (mentioned by 30.60% of all students), while in study 1 it was the fourth most frequently mentioned feeling (mentioned by 22.72% of all students).

INSERT TABLE 4 HERE

How do in-the-moment measures of feelings in specific learning situations compare to retrospective ratings? (RQ7)

For research questions 5 and 6, multilevel analyses were conducted on the ESM measures in order to disentangle the variation in feelings from situation to situation ('situation-level') and the component that remains stable across all measurement points of a person but varies from one person to another ('person-level'). Multilevel analyses were conducted in Mplus 7, Version 1.31 (Muthén & Muthén, 2012-2015), using the TYPE = TWOLEVEL command. The robust estimator MLR was used to account for eventual non-normality in item distributions. Missing data were estimated using Full Information Maximum Likelihood (FIML).

The means and standard deviations of ESM measures in Table 5 were estimated in two-level analysis in which all feelings were allowed to correlate with all others on both the situation-level and the person-level. For Table 5, the measures had to be transformed in order to get to the same response scale metric, because different response scales were used in the ESM measures (1 = *not at all* – 4 = *very much*) and the retrospective measures in the online questionnaire (0 = *never* – 100 = *always*). For that purpose, we used the "Proportion of Maximum Scaling Method" ("POMS", see Little, 2013), which brings all scales to a metric from 0 (*minimum*) to 1 (*maximum*).

Table 5 summarizes the descriptives for ESM measures and retrospective survey. Feeling tired was again the most strongly endorsed feeling, in the ESM measures, as it also had been in the study 1 survey.

The intra-class correlations for ESM variables were estimated in a three-level analysis using Mplus. Substantial ICCs on the person-level indicated that 21%-38% of the variation in ESM measures was due to differences between individuals, while the larger part was due to

differences between learning situations. The small ICC on the level of schools (level 3) indicates that very little variance in the ESM measures was due to differences between schools. We therefore proceeded with two-level analyses (beeps nested in individuals) in the following analyses.

INSERT TABLE 5 HERE

Which demographic characteristics are associated with feelings students report in specific learning situations in high school classrooms? (RQ8)

Table 6 presents estimates for six separate regressions of feelings regressed on demographic variables on the person-level, while the feelings were also allowed to vary on the situation-level. Each of the regressions was performed with one feeling as an outcome. As Table 6 shows, female gender identity was associated negatively with most positive feelings (except for happiness) and associated positively with most negative feelings (except for bored and afraid). Grade was negatively associated only with the feeling of anxiety and unrelated to all other feelings. In all cases, the regression coefficients were small and the determination coefficients ($.011 \leq R^2 \leq .76$) were small and mostly significant.

INSERT TABLE 6 HERE

Discussion study 2

This study both corroborated and extended findings from study 1. On retrospective assessments, students reported similar feelings using both open-ended responses and rating scales, as in study 1. Seven out of ten of the most frequently mentioned feelings in response to the open-ended question were the same across the two studies, namely the feelings of stress, happiness, tiredness, boredom, anxiety, sadness, and annoyance. Likewise, the feeling ratings

were very similar across studies 1 and 2. Tired, stressed, and bored were again the three most frequently experienced negative feelings at school according to the ratings, and mean scores as well as standard deviations of other feelings were very similar in both studies.

The in-the-moment measures of feelings in high school classrooms painted a slightly different picture. Although ‘tired’ was again the most frequently experienced feeling, positive feelings like calm, happy, and relaxed came in second, third, and fourth place, followed by stressed (place 5) and boredom (place 6). Feeling tired was the only feeling rated above the scale midpoint, suggesting that, on average, students tended to affirm feeling tired but tended to reject all other feelings (meaning they rated other feelings on average with “not at all” or “rather not”). Even though they were on average rated below the scale midpoint, meaning below the threshold of average item affirmation, positive feelings were more predominant in the situational measures than they had been in the retrospective measures.

That female students tended to report lower positive and higher negative feelings in the situational measures was unexpected. While our study 1 would suggest such gender differences, several previous studies have suggested that situational measures of emotions are typically similar for male and female students (e.g., Bieg et al., 2015; Goetz et al., 2013; Moeller et al., 2015). However, the previous research on that question is not yet conclusive, as for example Schneider et al. (2016) have pointed out that in the US, female high school tended to feel stronger situational stress and lower situational positive emotions (happiness, confidence, and feeling active) than male students. The authors found these gender differences in situational emotion measures only for the US sample, but not for a simultaneously collected Finnish sample, suggesting that they might be context-specific and more typical for U.S. high school students.

Unexpectedly, the significantly stronger situational anxiety in female than male students contradicted previous findings, according to which situational anxiety is similar in male and female students (see Goetz et al., 2013; Moeller et al., 2015). The small effect size ($\beta = .158^{**}$) and the insignificant determination coefficient ($R^2 = .026$) could imply that even though the gender difference for situational anxiety was significant, the effect was very small and possibly not of any practical relevance. A further reason to question the practical implication of this finding is the fact that the gender difference was significant only for the anxiety item but not for the item asking about the feeling of being afraid.

That many findings from study 1 were replicated in this study 2 suggests that no serious sample biases or self-selection biases resulted from the broad online dissemination of the survey in study 1. In study 2, we had a higher control over who our participants were and where they came from, because surveys were only accessible to students in six selected public high schools. In contrast, most of the survey links in study 1 were accessed by a less controlled audience of internet users who heard about the study on social media. Nevertheless, sampling biases may affect ESM studies like this, too. Since the ESM surveys interrupt everyday life situations in class, it may be that students miss the surveys in particular situations when they feel particularly stressed or anxious, or situations when they feel particularly excited and hence motivated to continue what they are currently doing instead of interrupting it for yet another survey. Future studies should therefore try to link ESM responses to objective class observations or other objective data. While of course the best approach to the missing data problem is not to have any (Allison, 2001), this is an often unrealistic goal in ESM research in schools, because the burden on the participants is high, because teachers ask students to put the phone away in certain situations (e.g., tests), because participants sometimes do not hear a notification or choose to

concentrate on their learning activity instead, and because ESM apps may malfunction on some phones. In order to identify the exact prevalence of situational emotions and feelings in classrooms while avoiding such potential sample biases, we suggest that future studies choose a shorter time frame (e.g., one week instead of four weeks as we did) and maintain close communication with teachers and participants to ensure that participants are motivated and allowed to respond to surveys in class. We perceived in this and our previous students that the support by principals, teachers and parents is crucial to the recruitment and retention of adolescent participants in ESM studies and recommend that future studies keep a close contact to the schools during recruitment and data collections. This implies that there might be a sample bias in this and other ESM studies in the sense that schools in which principals, teachers, and parents form a tightly knitted support system, more students may participate in a study and more responses per person may be given. It can be argued that such support and the feelings that students experience at school may be confounded. Future studies therefore should try to control for such contextual factors and gather larger and more representative samples of students from different backgrounds and schools.

This study suggests that keeping feelings on the granular level might contribute to relevant insights, compared to the frequent approach of collapsing feelings into larger factors or composite scores. The finding supporting the granularity of feelings came from the factor analysis, which suggested that models with unrestricted co-variance among feelings or models with correlated factors and items cross-loading on multiple factors described the data sufficiently well. In addition, the factor structure differed on the within- and between-level, suggesting that a multi-level factor analysis might describe the factor structure better than a composite score measure that would collapse all items into a single mean or sum score (for more findings

concerning the level-dependent structure of emotions, see Ketonen et al., 2017; Vansteenland et al., 2005). Keeping emotion and feeling measures granular is also consistent with recommendations by leading emotion scientists (Barrett, Gross, Christensen, & Benvenuto, 2001; Tugade, Fredrickson, & Barrett, 2004). What is more, it has often been pointed out that examining constructs on the level of specific facets can be more insightful and often leads to higher and better understandable correlations with outcomes than examining constructs on the level of higher-order factors (Armstrong & Anthoney, 2009; Beauducel, Liepmann, Felfe, & Nettelsnstroth, 2007; Schimmack, Oishi, Furr, & Funder, 2004). Taken together, our findings suggest that it is important to study both global factors of positive and negative feelings, and more granular feelings.

General discussion

This article gives a snapshot of the feelings of high school students in the U.S. Two studies contributed unique insights. Study 1 surveyed a large sample (over 20,000 students) from across the U.S. Study 2 provided a longitudinal and in-the-moment perspective, supporting the validity, replicability, and generalizability of the initial findings.

The main contributions of this study are:

(1) This study gives a broad overview of the feelings students experience, in their own words. An advantage of this approach is the broad scope of assessed feelings, which is larger than in typical studies using pre-defined item sets. The partially exploratory approach of including open-ended responses allowed us to identify the predominance of the feeling of being tired, which typical studies would not have assessed on the basis of it being an *affective state* (Watson & Clarke, 1994) rather than emotion that only rarely included in standard emotion measures. We found that feeling tired is the most prevalent feeling, which replicated across three

measures and two samples. This seems relevant because other studies do not usually include this feeling in their measures and consequently miss how frequent it is among students in a U.S. high school sample. Given that the chronic sleep deprivation and consequential tiredness are highly relevant and detrimental to many relevant aspects of optimal youth development, including learning, emotion regulation, mental and physical health, this finding seems highly relevant. It implies that it might be a good idea to include the feeling of being tired among the measures on academic emotions in future studies, despite of the fact that tiredness considered an *other affective state* rather than an emotion (Watson & Clark, 1994).

Another main contribution of this study is the mixed-methods approach applied here, which allowed for comparisons of findings about frequencies across different measures (retrospective and in-the-moment emotion ratings as well as open-ended responses). This revealed for example that negative feelings were very prevalent in the retrospective assessments, but not so much in situational ones, both of which is in line with previous research: The negative feelings revealed in retrospective assessments are in line with findings of peaking sleep deprivation, stress, and boredom in adolescence (see APA, 2015; National Sleep Foundation, 2006; Owens et al., 2014; UNICEF, 2013). The more frequent positive feelings in situational assessments are in line with previous ESM studies, which often find that positive emotions and feelings have higher person-level mean scores than negative feelings (see e.g., Schneider et al., 2016).

It should be noted that positive feelings were not absent in the retrospective measures either. 25% of the terms mentioned in open-ended responses were positive, and one out of five students in Study 1 and one out of three students in Study 2 mentioned feeling happy in open-ended responses (Tables 1 and 4). Likewise, the moderate mean scores of the positive PANAS

items (Table 2) corroborates that students do from time to time experience diverse positive feelings at school. Future studies could examine the determinants of these positive feelings to find out how –and if- their frequency can be increased. The reasons why we emphasize the negative feelings in this article are on one hand their striking predominance and on the other hand the need for educators to act on negative feelings.

The comparisons between retrospective and situational measures also revealed, rather unexpectedly, that gender differences in terms of stronger negative and lower positive feelings in females were not limited to retrospective assessments, as several previous studies had suggested (Bieg et al., 2015; Goetz et al., 2013; Moeller et al., 2015; and the Finnish sample in Schneider et al., 2016). Instead, females reported lower negative and higher positive situational feelings, as Schneider et al. (2016) found in their US sample.

Both studies indicated that a large percentage of high school students feel tired, stressed, and bored at high school. The prevalence of tiredness was prominent in both samples across measures. The frequent experience of negative feelings likely undermines students' attention, motivation, and ability to learn and thrive (de Anda et al., 2000; Meijer, Habekothé, & Van Den Wittenboer, 2000).

Different methods provided unique insights into the feelings of high school students. Open-ended questions showed which labels students use when they are free to report the feelings coming to their minds. Without this approach, we might not have found out how frequent feelings of tiredness are among high school students, since feeling tired is not typically assessed on available emotion and feeling rating scales. Thus, open-ended responses provide a richness and granularity of feelings experienced by students that other assessments do not offer. The individual answers in open-ended responses, however, make it difficult to compare students with

each other. For instance, it is not clear if a student who does not mention feeling happy indeed does not experience happiness, or if other feelings were more salient. While using open-ended text responses as assessments of feelings and emotions may seem uncommon to Education researchers, such text-based information has been used a lot for a long time in the field of sentiment analyses of texts (Baccianella, Esuli, & Sebastiani, 2010; Kim & Hovy, 2004; Pang, Lee, Vaithyanathan, 2002; Schwartz et al., 2013; Wilson, Wiebe, & Hoffmann, 2009). Thus, text responses are widely known and used to reveal important aspects of people's feelings, and comparing open-ended and rated feelings seems a fruitful endeavor for future studies on emotions and feelings at school. It is possible that using sentiment analyses on students' texts and verbal expressions might help us overcome some of the biases that confound retrospective rated self-reports of feelings. Systematic comparisons between students' texts and their ratings in self-reports might help understand which exact determinants drive students' ratings versus text descriptions.

The rated items made it possible to assess *how often* certain feelings were experienced, and to compare students in regard to these frequencies. We used the PANAS (short form for children; Ebesutani et al., 2012) to achieve good psychometric properties and to examine which demographic factors predicted the frequency of positive and negative feelings at school. A disadvantage of the retrospective ratings is the possibility that they may be biased by the beliefs of students about themselves or school (see Bieg et al., 2015; Goetz et al., 2013) or by memory errors (see Takarangi, Garry, & Loftus, 2006).

Experience sampling measures of feelings filled that gap and provided in-the-moment assessments of academic emotions and feelings, which are arguably less likely to be biased than retrospective measures. The ESM measures also allowed us to disentangle the time-invariant

components of feelings that remain stable in a person across multiple measurement time points (between-level), and those components that fluctuate from one learning situation to another (within-level).

Thus, each of the applied assessments contributed unique insights that the other assessments did not provide. We believe that this triangulation of information is a strength of the current study. All measures and both studies indicated that tiredness, stress, and boredom are the top experienced feelings in high school students, which necessitate further investigation.

This was a rather exploratory study, not because of a lack of previous research concerning our research questions, but because of inconclusive findings in the previous research, and because of our novel integration of mixed methods (particularly open-ended responses used to capture students' feelings at school). In our research questions, we explained in detail which expectations the previous research suggested and where previous studies seem to contradict each other, leaving a gap for us to explore. For example, a multitude of studies which used retrospective measures suggested that females feel more anxious and generally more negative, at school and in general, but other studies found with situational assessments that those gender differences disappeared and were likely due to biases in retrospective assessments, but then other studies found gender differences in situational measures in one country (US) but not in another (Finland). This is one example of previous research leaving us with clear but contradicting expectations, which is why we chose to frame our research questions as exploratory ones, because it was unclear what to expect in a large, national US sample with a mixed-methods approach that has not previously been used in this form. Of course, our findings require replications. We tried to provide first insights on robustness and replicability by using two studies and samples and examining the same questions with different measures and analyses.

Demographic influences on students' feelings: Theoretical implications

Both studies indicated that negative feelings were frequent across demographic groups, yet female students tended to report higher negative and lower positive feelings in both studies and retrospective as well as in-the-moment measures. Study 1 also indicated that negative feelings tended to be more pronounced in students coming from low SES backgrounds. The observed demographic differences in average levels of students' feelings have important implications for two ongoing debates: First, students who reported higher socio-economic status tended to report higher positive and lower negative feelings. Thus, in respect to the often-disputed question of whether money makes individuals happy, this study supports the notion that SES makes it more likely for high school students to feel happy.

Moreover, our two studies make a contribution to an ongoing debate about whether situational measures nullify gender differences in academic emotions that retrospective measures suggest (see Goetz et al., 2013). We found no gender difference in situational measures of feeling afraid, and the gender difference in situational anxiety ($\beta = .158^{**}$; $R^2 = .026$) was very small. This supports previous findings according to which male and female students tend to report relatively similar anxiety levels when asked with in-the-moment measures such as ESM (Bieg et al., 2015; Goetz et al., 2013). Yet, the overall tendency of females to report more negative and less positive feelings (e.g., in composite scores collapsing various granular feelings, or in a number of granular feelings other than anxiety) was replicated across measures (retrospective measures in study 1 and in-the-moment measures in study 2) and is in line with findings reported by Schneider et al. (2016), who found that female US high school students reported lower situational happiness, confidence, and activeness, and higher stress, than their male peers, while Finnish high school students did not differ by gender in situational feelings.

This suggests that, at least in US samples, gender differences in both negative and positive feelings cannot fully be “explained away” by biases limited to retrospective measures, as it has been discussed for anxiety in German samples (see Bieg et al., 2015 and Goetz et al., 2013), since the gender differences did not entirely disappear in our situational measures. We suggest future studies systematically compare retrospective and situational measures for a variety of feelings in a variety of contexts (e.g., STEM subjects, countries, and across different situation characteristics), in order to find out how characteristics of the assessments, situations, person, and specific content of the feelings determine these gender differences in situational assessments.

Maybe gender-specific self-selections drive the more anxious and stressed males out of ESM assessments, or the more stressed and anxious girls into ESM assessments in the US but not in Germany. Maybe the exact content and associated expectations of gender stereotypes differ between the US and Germany, explaining the differences between the existing gender differences in ESM measures in the US (our sample and Schneider et al., 2016) and the lack thereof in Germany (Bieg et al., 2015 and Goetz et al., 2013).

Tiredness: Reflecting an endemic lack of sleep

That tiredness was the most frequently reported and experienced feeling in U.S. high school students in both studies corroborates other research, which has revealed the prevalence of sleep deprivation among adolescents in the U.S. In 2016, the National Sleep Foundation (2006) concluded that over 87% of high school students in the United States get far less than the recommended 8 to 10 hours of sleep, with the amount of sleep time decreasing over the past years. In 2014, the American Academy of Pediatrics called the problem of tired teens “a serious threat to the academic success, health, and safety of our nation’s youth and an important public health issue” (Owens et al., 2014). A lack of sleep causes more than just the tiredness we

observed in our study, it also has detrimental impacts on students' abilities to concentrate and learn (Dewald, Meijer, Oort, Kerkhof, & Bögels, 2010) and to regulate their feelings (Talbot, McGlinchey, Kaplan, Dahl, & Harvey, 2010). Severe consequences of lack of sleep include affective disorders such as depression, car crashes due to drowsiness, and both suicidal thoughts and attempts (e.g., Owens et al., 2014; Roberts, Roberts, & Duong, 2009).

There are many possible culprits for teens' sleep deprivation, including heavy and late-night use of social media, early school start times, excessive homework causing students to study into the evening, and a lack of time management skills among students (Owens et al., 2014). Earlier bedtimes seem desirable, but hard to achieve given teens' circadian rhythm, which makes it harder for them to go to bed before 11 p.m. (e.g., Wolfson & Carskadon, 1998). Several studies have examined whether starting school later may be a remedy. Adjusting the school day to start 20-30 minutes later increased students' sleep hours and reduced their tiredness, fatigue, and depressed mood; it also improved students' motivation, health, and class attendance (Owens, Belon, & Moss, 2010; Perkinson-Gloor, Lemola, & Grob, 2013). Later school start times have also been linked to better achievement and test results (Carrell et al., 2011; Cortes, Bricker, & Rohlf, 2012; Edwards, 2012; Heissel & Norris, 2017).

Stress: An ambiguous feeling

Increasing students' hours of sleep might also help to remedy part of their high levels of stress, assuming that high stress reflects a lack of recovery. The results of this study corroborate previous findings, which have reported very high levels of stress among children, adolescents, and college students (Center for Collegiate Mental Health, 2016; IFT-Nord, 2017). Recent studies demonstrate that stress levels of youth have crept beyond those of adults and that American youth rank in the bottom quarter among other developed nations on measures of well-

being and life satisfaction (APA, 2015; UNICEF, 2013). High stress levels are not only a problem for students' psychological well-being, but also detrimental for their learning, since chronic stress and the associated elevated cortisol levels can negatively impact brain structures associated with executive functioning and memory (Lupien et al., 1998). The consequences are severe, as chronic stress has been associated with physical illness such as inflammatory and autoimmune diseases (Lupien, McEwen, Gunnar, & Heim, 2009), proneness to infections, depression, burnout, heart disease, and suicide and stress-related premature death (Grover, Green, Pettit, Monteith, Garza, & Venta, 2009).

Since addressing the causes of feelings was beyond the scope of this study, it is unclear what exactly students meant when using the term 'stress'. It is possible that students use the term to describe both positive stress ("eustress") and negative stress ("distress"; Selye, 1974; Nelson & Simmons, 2003). Distress is the result of demands that exceed the person's capabilities of readjusting and regaining balance, whereas eustress occurs in demanding situations with which the person can cope. Supporting the notion of stress as an ambiguous feeling, we found that students who reported high levels of stress reported at the same time experiencing both negative and positive feelings (Moeller et al., 2018). Whether stress feels negative or motivating and controllable is in part determined by perceived personal and social resources (Folkman, 2013; Lazarus & Folkman, 1984). It is likely that some stressed students have the personal resources to cope successfully with their stress, such as the ability to manage emotions (Bonanno & Burton, 2013), or social resources, such as supportive relationships with adults and peers at school or at home, whereas for others, the social and academic environment at school might be the source of stress in itself and pose a demand on their resources (e.g., low support for meaningful learning, cruelty among peers). Attempts to remedy high stress levels among

students can therefore target either the demands, which can be lowered (e.g., by giving less homework, or less standardized testing, or less demanding tasks), or the resources of students, which can be increased (e.g., by increasing time management, recovery periods, or controllability of tasks).

Another possible reason for the common use of the term stress might be the tendency for Americans to describe themselves as ‘busy’ (Burnett, Gorsline, Semlak, & Tyma, 2007; Fineman, 2013). Burnett and colleagues (2007) found that between one third and one half of holiday letter writers describe themselves as busy and under time pressure, and that these descriptions are now more frequent than they were several decades ago. This busy-ness is considered a badge of honor – it signifies that one is actively doing what is perceived as necessary for success in life. Given the many stressed-out students in our samples, a cultural shift that supports greater self-care for students might be beneficial for the learning, health, and wellbeing in U.S. high schools.

Boredom: The need for engaging teaching

In line with some previous studies (e.g., Larson & Richards, 1991; Shaw, Caldwell, & Kleiber, 1996), we found that high school students are frequently bored. The high levels of boredom observed in our study suggest that there likely is a need for the incorporation of teaching strategies that foster greater curiosity and engagement (Holt, Bry, & Johnson, 2008; Hulleman & Harackiewicz, 2009; Hulleman, Godes, Hendricks, Harackiewicz, 2010; Markowitz, 2004; Wang & Eccles, 2012). For example, it has been argued that making school tasks challenging can increase students’ interest and feelings of being absorbed in the task at hand, which in turn increases their likelihood to re-engage and persist in similar tasks in the future (Schneider et al., 2016). It should be noted, however, that some methods that enhance

engagement may at the same time enhance stress, and that there might be a threshold above which challenges and even intrinsic motivation co-occur with anxiety, stress, and burnout symptoms (see e.g., Schneider et al., 2016; Salmela-Aro et al., 2016).

Like stress, boredom seems to have its up- and downsides. The downsides are more obvious and include the facts that bored students find little meaning in their schoolwork, get distracted easily, and experience little motivation to engage or persist in tasks. On the upside, boredom can instigate exploration and discovery of other topics (Bench & Lench, 2013), and may foster creativity (Harris, 2000; Mann & Cadman, 2014)⁴. Positive and negative states of situational boredom at school were described by Goetz and colleagues (2013), who, using experience sampling methods, found that some boring situations (‘indifferent boredom’) occur with slightly positive affect, while other situations are associated with strong negative experiences. In separate analyses, we found support for the notion of boredom as an ambiguous feeling when we examined our data using co-occurrence network analyses: Boredom co-occurred with both positive feelings (e.g., happy, calm, relaxed) and negative feelings (e.g., tired, stressed, annoyed) within some individuals and situations (Moeller et al., 2018).

Social-emotional learning

Social-emotional learning (SEL) programs aim at enhancing both teachers’ and students’ abilities to understand and manage their feelings. Growing evidence shows that schools addressing the social and emotional needs of students and adults through evidence-based SEL approaches achieve better outcomes: A meta-analysis of more than 200 studies showed that

⁴ The effect of boredom on creativity is controversially discussed, as older studies typically linked boredom to decreased creativity (Larson, 1990; Schubert, 1977) and the evidence for the reverse relationship is rather new (see above).

students in schools with integrated SEL programs performed better academically, experienced less stress, engaged in fewer problem behaviors, had more positive attitudes about school, and engaged in more prosocial behavior (Durlak et al., 2011). More recent research also found positive shifts in classroom climate and teacher instructional quality after implementing RULER, one evidence-based SEL program (Brackett & Rivers, 2014; Hagelskamp, Brackett, Rivers, & Salovey, 2013).

Historically, it was said that feelings have no place in school (see Salovey & Mayer, 1990). Today, researchers and practitioners agree that feelings matter a great deal in school, especially among adolescents (e.g., Pekrun & Linnenbrink-Garcia, 2012). Our results further support this conclusion and show that there is a strong need for educators to understand students' discrete affective experiences, including their possible causes and consequences, in order to both enhance teaching practices and create more positive classroom and school climates. Educators also can more directly support students' emotional development through direct instruction on emotional skills (Brackett, Rivers, Reyes, & Salovey, 2012; Heller, 2017), which help students to effectively manage both positive and negative feelings.

References

- Aaker, J. L., Rudd, M., Mogilner, C. (2011). If money does not make you happy, consider time. *Journal of Consumer Behavior*, 21(2), 126-130. doi:10.1016/j.jcps.2011.01.004
- Ahuvia, A. C. (2007). Wealth, consumption and happiness. In A. Lewis (Ed.), *The Cambridge handbook of psychology and economic behavior* (pp. 199-226). Cambridge: Cambridge University Press.
- Ahuvia, A. C., & Friedman, D. (1998). Income, consumption, and subjective well-being: Toward a composite macromarketing model. *Journal of Macromarketing*, 18(2), 153–168. doi: 10.1177/027614679801800207
- Ainsworth-Darnell, J. W., & Downey, D. B. (1998). Assessing the oppositional culture explanation for racial/ethnic differences in school performance. *American Sociological Review*, 63(4), 536 – 553.
- Allison, P. (2001). *Missing data –Quantitative applications in the social sciences*. Thousand Oaks, CA: Sage, Vol. 136.
- American Psychological Association (2015). Stress in America: Paying with our health. Retrieved from <http://www.apa.org/news/press/releases/stress/2014/stress-report.pdf>
- Armstrong, P. I., Anthoney, S. F. (2009). Personality facets and RIASEC interests: An integrated model. *Journal of Vocational Behavior*, 75(3), 346-359. doi:10.1016/j.jvb.2009.05.004
- Baccianella, S., Esuli, A., Sebastiani, F. (2010). Sentiwordnet 3.0: An enhanced lexical resource for sentiment analysis and opinion mining. In: Chair) NCC, Choukri K, Maegaard B, Mariani J, Odijk J, et al., editors, Proceedings of the Seventh International Conference on

Language Resources and Evaluation (LREC'10). Valletta, Malta: European Language Resources Association (ELRA).

Barrett, L. F., Gross, J., Christensen, T. C., & Benvenuto, M. (2001). Knowing what you're feeling and knowing what to do about it: Mapping the relation between emotion differentiation and emotion regulation. *Cognition Emotion*, 15(6), 713–724. doi: 10.1080/02699930143000239

Bayram, N. & Bilgel, N. (2008). The prevalence and socio-demographic correlations of depression, anxiety, and stress among a group of university students. *Social Psychiatry*, 43(8), 667-672. <https://doi.org/10.1007/s00127-008-0345-x>

Beauducel, A., Liepmann, D., Felfe, J., & Nettelsnstroth, W. (2007). The impact of different measurement models for fluid and crystallized intelligence on the correlation with personality traits. *European Journal of Psychological Assessment*, 23, 71-78. doi:10.1027/1015-5759.23.2.71

Bench, S. W., & Lench, H. C. (2013). On the function of boredom. *Behavioral Sciences*, 3(3), 459-472. doi: 10.3390/bs3030459

Bethlehem, J. (2010). Selection bias in web surveys. *International Statistical Review*, 78(2), 161-188. doi: 10.1111/j.1751-5823.2010.00112.x

Bieg, M., Goetz, T., Wolter, I., & Hall, N. C. (2015). Gender stereotype endorsement differentially predicts girls' and boys' trait-state discrepancy in math anxiety. *Frontiers in Psychology*, 6, 1404. <https://doi.org/10.3389/fpsyg.2015.01404>

Bonanno, G. A., & Burton, C. L. (2013). Regulatory flexibility an individual differences perspective on coping and emotion regulation. *Perspectives on Psychological Science*, 8(6), 591-612. doi: 10.1177/1745691613504116

- Brackett, M. A., & Rivers, S. E. (2014). Transforming students' lives with social and emotional learning. In R. Pekrun & L. Linnenbrinck-Garcia (Eds.). *International handbook of emotions in education* (pp. 368-388). New York, NY: Routledge.
- Brackett, M. A., Rivers, S. E., Reyes, M. R. & Salovey, P. (2012). Enhancing academic performance and social and emotional competence with the RULER feeling words curriculum. *Learning and Individual Differences*, 22(2), 218-224.
doi:10.1016/j.lindif.2010.10.002
- Burnett, A., Gorsline, D., Sendlak, J., & Tyma, A. (2007, November). Earning the badge of honor: The social construction of time and pace of life. In J. Watkins (Chair), *Scholar to Scholar Session I*. Session conducted at the National Communication Association annual convention, Chicago, IL.
- Carrell, S. E., Maghakian, T., & West, J. E. (2011). A's From Zzzz's? The causal effect of school start time on the academic achievement of adolescents. *American Economic Journal* 3(3), 62-71. doi: 10.1257/pol.3.3.62
- Center for Collegiate Mental Health. (2016, January). *2015 Annual Report*. (Publication No. STA 15-108). Retrieved from http://ccmh.psu.edu/wp-content/uploads/sites/3058/2016/01/2015_CCMH_Report_1-18-2015.pdf
- Chapell, M.S., Blanding, Z.B., Takahashi, M., Silverstein, M.E., Newman, B., Gubi, A. & McCann, N. (2005). Test anxiety and academic performance in undergraduate and graduate students. *Journal of Educational Psychology*, 97(2), 268-274. doi: 10.1037/0022-0663.97.2.268
- Cortes, K. E., Bricker, J., & Rohlf, C. (2012). The role of specific subjects in education production functions: Evidence from morning classes in Chicago Public High Schools.

- The B. E. Journal of Economic Analysis & Policy*, 12(1), 1-34. doi: 10.1515/1935-1682.2749
- D'Mello, S., Lehman, B., Pekrun, R., & Graesser, A. (2014). Confusion can be beneficial for learning. *Learning and Instruction*, 29, 153-170. doi: 10.1016/j.learninstruc.2012.05.003
- De Anda, D., Baroni, S., Boskin, L., Buchwald, L., Morgan, J., Ow, J., Siegel Gold, J., & Weiss, R. (2000). Stress, stressors and coping among high school students. *Children and Youth Services Review*, 22(6), 441-463. doi:10.1016/S0190-7409(00)00096-7
- Deb, S., Chatterjee, P. & Walsh, K.M. (2010). Anxiety among high school students in India: Comparisons across gender, school type, social strata, and perceptions of quality time with parents. *Australian Journal of Educational and Developmental Psychology*, 10(1), 18-31.
- Dewald, J. F., Meijer, A. M., Oort, F. J., Kerkhof, G. A., & Bögels, S. M. (2010). The influence of sleep quality, sleep duration and sleepiness on school performance in children and adolescents: A meta-analytic review. *Sleep Medicine Reviews*, 14(3), 179-189. doi: 10.1016/j.smrv.2009.10.004
- Dick, T. P., & Rallis, S. F. (1991). Factors and influences on high school students' career choices. *Journal for Research in Mathematics Education*, 22(4), 281-292. doi: 10.2307/749273
- Dunn, E. W., Gilbert, D. T., & Wilson, T. D. (2011). If money doesn't make you happy, then you probably aren't spending it right. *Journal of Consumer Psychology*, 21(2), 115-125. doi: 10.1016/j.jcps.2011.02.002

- Durik, A. M., Vida, M., & Eccles, J. S. (2006). Task values and ability beliefs as predictors of high school literacy choices: A developmental analysis. *Journal of Educational Psychology, 98*(2), 382-393. doi: 10.1037/0022-0663.98.2.382
- Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development, 82*(1), 405-432. doi: 10.1111/j.1467-8624.2010.01564.x
- Dyrbye, L. N. & Thomas, M. R. & Shanafelt T. D. (2006). Systematic Review of Depression, Anxiety, and Other indicators of psychological distress among U.S. and Canadian Medical Students. *Journal of the Association of American Medical Colleges/Academic Medicine, 81*(4), 354-373.
- Ebesutani, C., Regan, J., Smith, A., Reise, S., Higa-McMillan, C., & Chorpita, B. F. (2012). The 10-Item positive and negative affect schedule for children. Child and parent shortened versions: Application of item response theory for more efficient assessment. *Journal of Psychopathology and Behavioral Assessment, 34*(2), 191-203. doi:10.1007/s10862-011-9273-2
- Eccles, J. S. (2005). Subjective task value and the Eccles et al. model of achievement-related choices. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 105-121). New York, NY: Guilford Press.
- Eccles, J. S., & Roeser, R. W. (2011). Schools as developmental contexts during adolescence. *Journal of Research on Adolescence, 21*(1), 225-241. doi: 10.1111/j.1532-7795.2010.00725.x

Edwards, F. (2012). Early to rise? The effect of daily start times on academic performance.

Economics of Education Review, 31(6), 970-983. doi: 10.1016/j.econedurev.2012.07.006

Ellis, H. C., Ashbrook, P. W. (1988). Resource allocation model of the effects of depressed mood states on memory. In K. Fiedler & J. Forgas (Eds.), *Affect, cognition and social behavior* (pp. 25-43). Gottingen, Federal Republic of Germany: Hogrefe.

Feldman Barrett, L., Wager, T. (2006). The structure of emotion: Evidence from neuroimaging studies. *Current Directions in Psychological Science*, 15(2), 79-83. Doi: 10.1111/j.0963-7214.2006.00411.x

Feldman Barrett, L., Mesquita, B., Ochsner, K. N. & Gross, J. J. (2007). The experience of emotion. *Annual Review of Psychology*, 58, 373-403. doi: 10.1146/annurev.psych.58.110405.085709

Fineman, M. (2013, September 2). Please stop complaining how busy you are. *Harvard Business Review*. Retrieved from <https://hbr.org/2013/09/please-stop-complaining-about>

Folkman, S. (2013). Stress: appraisal and coping. In *Encyclopedia of behavioral medicine* (pp. 1913-1915). New York, NY: Springer.

Frenzel, A. C., Pekrun, R., Goetz, T. (2007). Girls and mathematics—A “hopeless” issue? A control-value approach to gender differences in emotions towards mathematics. *European Journal of Psychology of Education*, 22(4), 497-514. doi: 10.1007/BF03173468

Gerdtham, U. G., Johannesson, M. (2001). The relationship between happiness, health, and socio-economic factors: results based on Swedish microdata. *The Journal of Socio-Economics*, 30(6), 553-557. doi: 10.1016/S1053-5357(01)00118-4

- Goetz, T., Bieg, M., Lüdtke, O., Pekrun, R., & Hall, N. C. (2013). Do girls really experience more anxiety in mathematics? *Psychological Science*, 24(10), 2079-2087. doi: 10.1177/0956797613486989
- Goetz, T., Frenzel, A. C., Hall, N. C., Nett, U. E., Pekrun, R. & Lipnevich, A. A. (2014). Types of boredom: An experience sampling approach. *Motivation and Emotion*, 38(3), 401-419. doi: 10.1007/s11031-013-9385-y
- Grover, K. E., Green, K. L., Pettit, J. W., Monteith, L. L., Garza, M. J., & Venta, A. (2009). Problem solving moderates the effects of life event stress and chronic stress on suicidal behaviors in adolescence. *Journal of Clinical Psychology*, 65(12), 1281-1290. doi: 10.1002/jclp.20632
- Hagelskamp, C., Brackett, M. A., Rivers, S. E., & Salovey, P. (2013). Improving classroom quality with the ruler approach to social and emotional learning: Proximal and distal outcomes. *American Journal of Community Psychology*, 51(3-4), 530-543. doi: 10.1007/s10464-013-9570-x
- Hamre, B. K., & Pianta, R. C (2010). Classroom Environments and Developmental Processes. Conceptualization and Measurement. In J. L. Meece & J. S. Eccles. *Handbook of Research on Schools, Schooling, and Human Development* (p. 25-41). London: Routledge. doi:10.4324/9780203874844.ch3
- Harmon-Jones, E. & Harmon-Jones, C. (2010). On the relationship of trait PANAS positive activation and trait anger: Evidence of a suppressor relationship. *Journal of Research in Personality*, 44, 120-123. doi:10.1016/j.jrp.2009.09.001
- Harris, M. B. (2000). Correlates and characteristics of boredom proneness and boredom. *Journal of Applied Social Psychology*, 30(3), 576-598. doi: 10.1111/j.1559-1816.2000.tb02497.x

- Heissel, J. & Norris, S. (2016). Rise and shine: The effect of school start times on academic performance from childhood through puberty. *Journal of Human Resources*, 52(4), 1-42. doi: 10.3368/jhr.53.4.0815-7346R1
- Heller, R. (2017). On the science and teaching of emotional intelligence. An interview with Marc Brackett. *Phi Delta Kappan*, 98(6), 20-24. doi: 10.1177/0031721717696473
- Hembree, R. (1990). The nature, effects, and relief of mathematics anxiety. *Journal for Research in Mathematics Education* 21(1), 33-46. doi: 10.2307/749455
- Holt, L. J., Bry, B. H., & Johnson, V. L. (2008). Enhancing school engagement in at-risk, urban minority adolescents through a school-based, adult mentoring intervention. *Child & Family Behavior Therapy*, 30(4), 297-318. doi: 10.1080/07317100802482969
- Hulleman, C. S., & Harackiewicz, J. M. (2009). Promoting interest and performance in high school science classes. *Science*, 326(5958), 1410-1412. doi: 10.1126/science.1177067
- Hulleman, C. S., Godes, O., Hendricks, B. L., & Harackiewicz, J. M. (2010). Enhancing interest and performance with a utility value intervention. *Journal of Educational Psychology*, 102(4), 880. doi: 10.1037/a0019506
- IFT-Nord (2017). Präventionsradar: Kinder und Jugendgesundheit in Schulen. Erhebungswelle 2016-2017. Kiel
- Jadoon NA , Yaqoob R , Raza A , Shehzad MA , Zeshan SC (2010). Anxiety and depression among medical students: a cross-sectional study. *The Journal of the Pakistan Medical Association*, 60(8), 699-702.

- Johnson, M. K., Crosnoe, R., & Elder, G. (2001). Students' attachment and academic engagement: The role of the race and ethnicity. *Sociology of Education*, 74(4), 318 – 340. doi: 10.2307/2673138
- Kashdan, T. B., Feldman Barrett, L., & McKnight, P. E. (2015). Unpacking Emotion Differentiation: Transforming Unpleasant Experience by Perceiving Distinctions in Negativity. *Current Directions in Psychological Science*, 24(1), 10–16. doi: 10.1177/0963721414550708
- Ketonen, E., Dietrich, J., Moeller, J., Salmela-Aro, K., & Lonka, K. (2017, in press). The influence of autonomous and controlled daily goals on positive and negative emotional states: An experience sampling approach. *Learning and Instruction*.
<https://doi.org/10.1016/j.learninstruc.2017.07.003>
- Kim, S.M. & Hovy, E (2004). Determining the sentiment of opinions. *In: Proceedings of the 20th international conference on Computational Linguistics. Stroudsburg, PA, USA: Association for Computational Linguistics, COLING,04.*
- Kochanska, G., Murray, K. T., & Harlan, E. T. (2000). Effortful control in early childhood: continuity and change, antecedents, and implications for social development. *Developmental Psychology*, 36(2), 220-232. doi: 10.1037/0012-1649.36.2.220
- Lang, P. J., Bradley, M. M., Cuthbert, B. N. (1990). Emotion, attention, and the startle reflex. *Psychological Review*, 97(3), 377-395.
- Larson, R. W. (1990). Emotions and the creative process: Anxiety; anxiety, boredom, and enjoyment as predictors of creative writing. *Imagination, Cognition and Personality*, 9(4), 275-292. doi: 10.2190/XT9G-WXRF-BK4M-36AK

- Larson, R. W., & Richards, M. H. (1991). Boredom in the middle school years: Blaming schools versus blaming students. *American Journal of Education*, 99(4), 418-443. doi: 10.1086/443992
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York, NY: Springer Publishing Company.
- LifeData Corp (2016). *RealLife Exp. App.* [Smartphone software] Retrieved from: <https://www.lifedatacorp.com/mobile-app/>
- Little, T. D. (2013). *Longitudinal Structural Equation Modeling (Methodology in the Social Sciences)*. The Guilford Press.
- Locker, J. & Cropley, M. (2004). Anxiety, Depression and Self-Esteem in Secondary School Children: An Investigation into the Impact of Standard Assessment Tests (SATs) and other Important School Examinations. *School Psychology International*, 25(3), 333-345. <https://doi.org/10.1177/014303430404046905>
- Lupien, S. J., de Leon, M., De Santi, S., Convit, A., Tarshish, C., Nair, N. P. V., Thakur, M., McEwen, B., Hauger, R. L., & Meaney, M. J. (1998). Cortisol levels during human aging predict hippocampal atrophy and memory deficits. *Nature Neuroscience*, 1(1), 69-73. doi: 10.1038/271
- Lupien, S. J., McEwen, B. S., Gunnar, M. R., & Heim, C. (2009). Effects of stress throughout the lifespan on the brain, behaviour and cognition. *Nature Reviews Neuroscience*, 10(6), 434-445. doi: 10.1038/nrn2639
- Ma, X. (1999). A meta-analysis of the relationship between anxiety toward mathematics and achievement in mathematics. *Journal for Research in Mathematics Education*, 30(5) 520-540. doi: 10.2307/749772

- Mallow, J. V. (1994). Gender-related science anxiety: A first binational study. *Journal of Science Education and Technology*, 3, 227–238.
- Mann, S., & Cadman, R. (2014). Does being bored make us more creative? *Creativity Research Journal*, 26(2), 165-173. doi: 10.1080/10400419.2014.901073
- Markowitz, D. G. (2004). Evaluation of the long-term impact of a university high school summer science program on students' interest and perceived abilities in science. *Journal of Science Education and Technology*, 13(3), 395-407. doi: 10.1023/B:JOST.0000045467.67907.7b
- Martinen, E.; Moeller, J.; Ranta, M.; Sortheix, F.; Tuominen, H.; Upadyaya, K. & Salmela-Aro, K. (in prep). Which combinations of personal goals do adolescents and young adults pursue? A Co-occurrence network analysis during an eight years follow-up. *Manuscript in preparation*.
- Meijer, Habekothé, & Van Den Wittenboer (2000). Time in bed, quality of sleep and school functioning of children. *Journal of Sleep Research*, 9(2), 145-153. doi: 10.1046/j.1365-2869.2000.00198.x
- Meinhardt, J., & Pekrun, R. (2003). Attentional resource allocation to emotional events: An ERP study. *Cognition & Emotion*, 17(3), 477-500. doi: 10.1080/02699930244000039
- Moeller, J., Ivcevic, Z., & White, A., & Brackett, M. A. (2018). Mixed Emotions: Network Analyses of Intra-Individual Co-occurrences Within and Across Situations. *Emotion*, 18(8), 1106-1121. doi: 10.1037/emo0000419.
- Moeller, J., Salmela-Aro, K., Lavonen, J., & Schneider, B. (2015). Does anxiety in math and science classrooms impair math and science motivation? Gender differences beyond the mean level. *International Journal of Gender, Science, and Technology*, 7(2).

- Mojtabai, R., Olfson, M., Han, B. (2016). National trends in the prevalence and treatment of depression in adolescents and young adults, *Pediatrics*, 138(6), e20161878. doi: 10.1542/peds.2016-1878
- Mousavi, M., Haghshenas, H. & Alishahi, MJ. (2008). Effect of gender, school performance and school type on test anxiety among Iranian adolescents. *Iranian Red Crescent Medical Journal*, 10 (1), 4-7.
- Muthén, L. K., & Muthén, B. (2008 –2015). Mplus user's guide. Los Angeles, CA: Muthén & Muthén.
- National Sleep Foundation (2006). *Sleep in America*. Retrieved from <https://sleepfoundation.org/sleep-polls-data/sleep-in-america-poll/2006-teens-and-sleep>
- Nelson, D. L., & Simmons, B. L. (2003). Health psychology and work stress: A more positive approach. In J. C. Quick & L. E. Tetrick (Eds.), *Handbook of occupational health psychology* (pp., 2, 97-119). Washington, DC: American Psychological Association.
- Noack, P., Kracke, B., Gniewosz, B., & Dietrich, J. (2010). Parental and school effects on students' occupational exploration: A longitudinal and multilevel analysis. *Journal of Vocational Behavior*, 77(1), 50-57. doi: 10.1016/j.jvb.2010.02.006
- OECD (2013). *PISA 2012 Results: Ready to Learn: Students' Engagement, Drive and Self-Beliefs (Volume III)*, PISA, OECD Publishing. Retrieved from <https://www.oecd.org/pisa/keyfindings/pisa-2012-results-volume-III.pdf>
- Ostrove, J.M., Adler, N.E., Kuppermann, M., & Washington, A.E. (2000). Objective and subjective assessments of socioeconomic status and their relationship to self-rated health in an ethnically diverse sample of pregnant women. *Health Psychology*, 19, 613–618. doi: 10.1037/0278-6133.19.6.613

- Owens, J., & Adolescent Sleep Working Group. (2014). Insufficient sleep in adolescents and young adults: an update on causes and consequences. *Pediatrics*, 134(3), e921-e932. doi: 10.1542/peds.2014-1696
- Owens, J. A., Belon, K., & Moss, P. (2010). Impact of delaying school start time on adolescent sleep, mood, and behavior. *Archives of Pediatrics & Adolescent Medicine*, 164(7), 608-614. doi: 10.1001/archpediatrics.2010.96
- Pang B, Lee L, Vaithyanathan S (2002) Thumbs up? Sentiment classification using machine learning techniques. In: *Proceedings of the 2002 Conference on Empirical Methods in Natural Language Processing (EMNLP)*. pp. 79–86.
- Pekrun, R. (2006). The control–value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review*, 18(4), 315–341. doi:10.1007/s10648-006-9029-9
- 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. doi: 10.1037/a0019243
- Pekrun, R., Goetz, T., Titz, T. & Perry, R. P. (2002). Academic emotions in students' self-regulated learning and achievement: A program of qualitative and quantitative research, *Educational Psychologist* 37(2), 91–105. doi: 10.1207/S15326985EP3702_4
- Pekrun, R., & Linnenbrink-Garcia, L. (2012). Academic emotions and student engagement. In S.L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 259-282). Boston, MA: Springer Science & Business Media.

- Perkinson-Gloor, N., Lemola, S., & Grob, A. (2013). Sleep duration, positive attitude toward life, and academic achievement: The role of daytime tiredness, behavioral persistence, and school start times. *Journal of Adolescence*, 36(2), 311-318. doi: 10.1016/j.adolescence.2012.11.008
- Roberts, R. E., Roberts, C. R., & Duong, H. T. (2009). Sleepless in adolescence: prospective data on sleep deprivation, health and functioning. *Journal of Adolescence*, 32(5), 1045-1057. doi: 10.1016/j.adolescence.2009.03.007
- Russell, J. A. & Feldman Barrett, L. (1999). Core Affect, Prototypical Emotional Episodes, and Other Things Called Emotion: Dissecting the Elephant. *Journal of Personality and Social Psychology*, 76(5), 805—819. doi: 0022-3514/99/S3.00
- Salmela-Aro, K., Moeller, J., Schneider, B., Spicer, J., & Lavonen, J. (2016). Integrating the light and dark sides of student engagement with person-oriented and situation-specific approaches. *Learning and Instruction*, 43, 61–70. doi:10.1016/j.learninstruc.2016.01.001
- Salovey, P., & Mayer, J. D. (1990). Emotional intelligence. *Imagination, Cognition and Personality*, 9(3), 185-211. doi: 10.2190/DUGG-P24E-52WK-6CDG
- Schiefele, U. (1996). Topic interest, text representation, and quality of experience. *Contemporary Educational Psychology*, 21(1), 3-18. doi: 10.1006/ceps.1996.0002
- Schimmack, U., Oishi, S., Furr, R. M. & Funder, D. C. (2004). Personality and Life Satisfaction: A Facet-Level Analysis. *Personality and Social Psychology Bulletin*, 30(8), 1062-1075, doi:10.1177/0146167204264292
- Schneider, B., Krajcik, J., Lavonen, J., Salmela-Aro, J., Broda, M., Spicer, J., Bruner, J., Moeller, J., Inkinen, J., Juuti, K. & Viljaranta, J. (2016). Investigating optimal learning

- moments in U.S. and Finnish science classes. *Journal for Research in Science Teaching*, 53(3), 400–421. doi: 10.1002/tea.21306
- Schubert, D. S. (1977). Boredom as an antagonist of creativity. *The Journal of Creative Behavior*, 11(4), 233-240. doi: 10.1002/j.2162-6057.1977.tb00631.x
- Schwartz HA, Eichstaedt JC, Kern ML, Dziurzynski L, Ramones SM, et al. (2013) Personality, Gender, and Age in the Language of Social Media: The Open-Vocabulary Approach. *PLoS ONE* 8(9): e73791. doi:10.1371/journal.pone.0073791
- Selye, H. (1974). *Stress without distress*. Ann Arbor, MI: Lippincott Williams & Wilkins.
- Shaw, A. M., Caldwell, L. L., & Kleiber, D. A., (1996). Boredom, Stress, and social control in the daily activities of adolescents. *Journal of Leisure Research*, 28(4), 274-292.
- Shernoff, D., Knauth, S., & Makris, E. (2000). The quality of classroom experiences. In M. Czikszenmihalyi & B. Schneider (Eds.), *Becoming adult: How teenagers prepare for the world of work* (pp. 141-164), New York: Basic Books.
- Silk, J. S., Steinberg, L., & Morris, A. S. (2003). Adolescents' emotion regulation in daily life: Links to depressive symptoms and problem behavior. *Child Development*, 74(6), 1869-1880. doi: 10.1046/j.1467-8624.2003.00643.x
- Simpkins, S. D., Davis-Kean, P. E., & Eccles, J. S. (2006). Math and science motivation: A longitudinal examination of the links between choices and beliefs. *Developmental Psychology*, 42(1), 70-83. doi: 10.1037/0012-1649.42.1.70
- Takarangi, M. K. T., Garry, M., & Loftus, E. F. (2006). Dear diary, is plastic better than paper? I can't remember: Comment on Green, Rafaeli, Bolger, Shrout, and Reis (2006). *Psychological Methods*, 11(1), 119-122. doi: 10.1037/1082-989X.11.1.119

- Talbot, L. S., McGlinchey, E. L., Kaplan, K. A., Dahl, R. E., & Harvey, A. G. (2010). Sleep deprivation in adolescents and adults: Changes in affect. *Emotion, 10*(6), 831-841. doi: 10.1037/a0020138
- Tugade, M. M., Fredrickson, B. L., Barrett, L. F. (2004). Psychological resilience and positive emotional granularity: Examining the benefits of positive emotions on coping and health. *Journal of Personality, 72*(6), 1161–1190. doi: 10.1111/j.1467-6494.2004.00294.x
- Twenge, J. M. (2014). *Generation me-revised and updated: Why today's young Americans are more confident, assertive, entitled--and more miserable than ever before*. New York, NY: Simon & Schuster.
- Twenge, J. M., Gentile, B., DeWall, C. N., Ma, D., Lacefield, K., & Schurtz, D. R. (2010). Birth cohort increases in psychopathology among young Americans 1938-2007: A cross-temporal meta-analysis of the MMPI. *Clinical Psychology Review, 30*(2), 145-154. doi: 10.1016/j.cpr.2009.10.005
- Twenge, J. M., Zhang, L., & Im, C. (2004). It's beyond my control: A cross-temporal meta-analysis of increasing externality in locus of control, 1960–2002. *Personality and Social Psychology Review, 8*(3), 308-319. doi: 10.1207/s15327957pspr0803_5
- Udo, M. K., Ramsey, G. P., & Mallow, J. V. (2004). Science anxiety and gender in students taking general education science courses. *Journal of Science Education and Technology, 13*(4), 435-445.
- Udo, M. K., Ramsey, G. P., Reynolds-Alpert, S., & Mallow, J. V. (2001). Does physics teaching affect gender-based science anxiety? *Journal of Science Education and Technology, 10*: 237–247.

UNICEF Office of Research (2013). *Child well-being in rich countries: A comparative overview*.

(Innocenti Report Card 11, UNICEF Office of Research, Florence). Retrieved from

https://www.unicef-irc.org/publications/pdf/rc11_eng.pdf

Vansteelandt, K., Van Mechelen, I., & Nezlek, J. B. (2005). The co-occurrence of emotions in daily life: A multilevel approach. *Journal of Research in Personality*, 39(3), 325-335.

doi: 10.1016/j.jrp.2004.05.006

Voelkl, K. E. (1997). Identification with school. *American Journal of Education*, 105(3), 204 –

319. doi: 10.1086/444158

Wang, M. T., & Eccles, J. S. (2012). Social support matters: Longitudinal effects of social support on three dimensions of school engagement from middle to high school. *Child development*, 83(3), 877-895. doi: 10.1111/j.1467-8624.2012.01745.x

Watson, D., Clark, L. A. (1999). *The PANAS-X: Manual for the positive and negative affect schedule-expanded form*. Iowa City, I.A.: University of Iowa.

Watson, D., & Tellegen, A. (1985). Toward a consensual structure of mood. *Psychological Bulletin*, 98(2). 219-235.

White, A., Ivcevic, Z., Moeller, J., Brackett, M. A., & Stern, R. (2018). LGBTQ Adolescents' Positive and Negative Experiences in High School. *Sex Roles*, 79(9-10), 594-608. doi: 10.1007/s11199-017-0885-1

Wilson T, Wiebe J, Hoffmann P (2009) Recognizing contextual polarity: An exploration of features for phrase-level sentiment analysis. *Computational linguistics* 35: 399–433.

Wiklund, M., Malmgren-Olsson, E., Öhman, Bergström, E. & Fjellman-Wiklund, A. (2012). Subjective health complaints in older adolescents are related to perceived stress, anxiety

and gender – a cross-sectional school study in Northern Sweden. *BMC Public Health*, 12(993), 1-13. <https://doi.org/10.1186/1471-2458-12-993>

Wolfson, A. R., & Carskadon, M. A. (1998). Sleep schedules and daytime functioning in adolescents. *Child Development*, 69(4), 875-887. doi: 10.1111/j.1467-8624.1998.tb06149.x

Zeidner, M. (2007). Test anxiety in educational contexts: Concepts, findings. In P. A. Schutz & R. Pekrun (Eds.), *Emotion in education*, (pp. 165-184). Burlington, MA: Academic Press.

Tables

Table 1

How do you feel at school? Top ten open-ended answers in study 1

How do you feel at school?							
1 st response		2 nd response		3 rd response		Overall	
Word	%	Word	%	Word	%	Word	%
Tired	19.62	Tired	12.47	Tired	8.75	Tired	39.27
Stressed	13.30	Stressed	10.51	Stressed	6.81	Stressed	29.41
Bored	11.92	Bored	8.92	Bored	6.81	Bored	26.38
Happy	10.43	Happy	6.92	Happy	6.42	Happy	22.72
Anxious	4.63	Anxious	4.57	Annoyed	4.05	Anxious	12.34
Annoyed	2.74	Annoyed	4.03	Anxious	3.71	Annoyed	10.25
Good	2.58	Sad	2.74	Sad	2.46	Sad	7.29
Sad	2.44	Excited	2.09	Excited	2.06	Lonely	5.26
Alone	1.79	Depressed	1.93	Hungry	2.00	Excited	5.12
Depressed	1.67	Alone	1.90	Alone	1.84	Depressed	4.91

Note. The percentages in the ‘overall’ column refer to participants who reported a specific feelings in at least one of the response fields.

Table 2

Frequency of reported feelings (responses to rating scales) in study 1

	<i>M</i>	<i>SD</i>
<i>PANAS positive</i>		
Happy	51.55	27.66
Proud	48.35	28.86
Cheerful	46.09	27.73
Joyful	44.58	27.67
Lively	43.18	28.01
<i>PANAS negative</i>		
Sad	46.49	31.09
Mad	45.85	30.32
Miserable	45.72	33.28
Afraid	33.17	31.66
Scared	33.17	31.49
<i>Other feelings*</i>		
Stressed	79.83	25.36
Bored	69.51	27.14

Note. * Several other feelings were assessed but are not reported in this article. For a justification of the item

selection for the survey and this article, please see the supplemental materials on pages 8ff.

Table 3

Summary of regression analysis for positive and negative feelings in study 1

<i>Variable</i>	<i>PANAS positive</i>				<i>PANAS negative</i>			
	<i>B</i>	<i>SE(B)</i>	β	<i>p</i>	<i>B</i>	<i>SE(B)</i>	β	<i>p</i>
Male ^a	6.926	0.385	.136***	.000	-7.024	0.397	-.133***	.000
Age ^b	0.522	0.141	.027***	.000	-0.621	0.148	-.032***	.000
SES	2.574	0.096	.209***	.000	-1.999	0.101	-.157***	.000
School type ^c	2.951	0.503	.042***	.000	-0.624	0.530	-.009	.240
Hispanic (dummy) ^d	4.669	0.561	.065***	.000	1.290	0.593	.017*	.030
Black (dummy) ^e	9.420	0.601	.130***	.000	-6.605	0.588	-.088***	.000
Asian (dummy) ^f	4.972	0.601	.061***	.000	-4.319	0.642	-.051***	.000
Multiracial (dummy) ^g	2.140	0.751	.021**	.004	-0.215	0.807	-.002	.790
<i>R</i> ²	.086**				.058**			
<i>Variable</i>	<i>Stressed</i>				<i>Bored</i>			
	<i>B</i>	<i>SE(B)</i>	β	<i>p</i>	<i>B</i>	<i>SE(B)</i>	β	<i>p</i>
Male ^a	-12.483	.44	-.231***	.000	-1.977	.449	-.034***	.000
Age ^b	.355	.153	.018*	.020	-.825	.167	-.038***	.000
SES	-1.207	.104	-.093***	.000	-.831	.114	-.059***	.000
School type ^c	-.743	.548	-.010	.176	-9.297	.631	-.117***	.000
Hispanic (dummy) ^d	-.57	.573	-.008	.320	1.481	.648	.018*	.022
Black (dummy) ^e	-12.4	.739	-.162***	.000	-2.522	.715	-.031***	.000
Asian (dummy) ^f	-2.247	.633	-.026***	.000	-4.201	.731	-.045***	.000
Multiracial (dummy) ^g	-.089	.757	-.001	.907	.612	.886	.005	.489
<i>R</i> ²	.094***				.026***			

Notes. * : $p \leq .05$; ** : $p \leq .01$; *** : $p \leq .000$; ^a coded 1 = male, 0 = female. ^b Age was centered at the mean; ^c coded

0 = public school, 1 = private school; ^d coded 1 = Hispanic, 0 = White, or Black, or Asian, or Multiracial; ^e coded 1

= Black, 0 = White, or Hispanic, or Asian, or Multiracial; ^f coded 1 = Asian, 0 = White, or Hispanic, or Black, or

Multiracial; ^g coded 1 = Bi- or Multiracial, 0 = White, or Hispanic, or Asian, or Black.

Table 4

How do you feel at school? Top ten open-ended answers in study 2

How do you feel at school?							
1 st response		2 nd response		3 rd response		Overall	
Word	%	Word	%	Word	%	Word	%
Stressed	15.01	Stressed	11.89	Happy	7.41	Stressed	31.80
Happy	12.09	Happy	11.11	Tired	7.21	Happy	30.60
Tired	11.31	Tired	10.53	Bored	5.85	Tired	29.04
Bored	11.31	Bored	6.82	Stressed	5.07	Bored	23.98
Anxious	4.68	Anxious	4.87	Anxious	3.70	Anxious	13.26
Sad	2.34	Sad	2.14	Annoyed	2.34	Sad	6.63
Frustrated	0.97	Nervous	1.75	Frustrated	2.34	Annoyed	4.68
Annoyed	0.78	Annoyed	1.56	Sad	2.14	Nervous	4.09
Interested	0.78	Worried	1.17	Angry	2.14	Frustrated	3.70
Nervous	0.58	Excited	0.78	Nervous	1.758	Angry	3.12

Note. The percentages in the ‘overall’ column refer to participants who reported a specific feeling in at least one of the response fields.

Table 5

Descriptives for academic feelings in study 2

	<i>study 2</i>					<i>retrospective measures</i>		<i>study 1</i>		<i>differences between measures</i>		
	<i>ESM measures</i>					<i>retrospective measures</i>		<i>retrospective measures</i>		<i>retro S2 :</i>	<i>retro S1 :</i>	<i>retro S1 :</i>
	<i>(N_{situation-level} = 18,610;</i>					<i>(N = 513)</i>		<i>(N = 21,678)</i>		<i>sit S2</i>	<i>sit S2</i>	<i>retro S2</i>
	<i>N_{person-level} = 472;</i>											
	<i>M</i>	<i>SD</i>	<i>SD</i>	<i>ICC</i>	<i>ICC</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>d</i>	<i>d</i>	<i>d</i>
	<i>situation-</i>	<i>person-</i>	<i>person-</i>	<i>persons</i>	<i>schools</i>							
	<i>level</i>	<i>level</i>	<i>level</i>									
Enthusiastic	.32	.25	.14	.26	.01	.49	.27	-	-	-0.79	-	-
Happy	.47	.25	.15	.25	.01	.61	.24	.52	.28	-0.70	-0.22	0.35
Interested	.35	.26	.14	.23	.00	.50	.25	.50	.26	-0.74	-0.72	0.00
Curious	.27	.23	.14	.27	.00	.45	.26	-	-	-0.86	-	-
Calm	.49	.26	.15	.26	.01	.50	.27	-	-	-0.05	-	-
Relaxed	.46	.26	.15	.25	.01	.47	.27	-	-	-0.05	-	-
Frustrated	.30	.28	.16	.23	.02	.55	.29	.65	.28	-1.07	-1.53	-0.35
Anxious	.34	.27	.19	.32	.01	.59	.30	-	-	-1.00	-	-
Afraid	.17	.21	.13	.27	.02	.31	.29	.33	.32	-0.62	-0.66	-0.07
Tired	.58	.27	.21	.38	.02	.78	.25	-	-	-0.87	-	-
Sad	.22	.23	.16	.32	.03	.40	.27	.46	.31	-0.81	-0.97	-0.21
Bored	.45	.29	.15	.21	.00	.64	.27	.70	.27	-0.87	-1.14	-0.22
Stressed	.46	.28	.22	.36	.01	.76	.25	.80	.25	-1.27	-1.44	-0.16

Note. To bring the items from the different response scales to the same metric, all items were transformed to a range from 0 to 1 using the Proportion of Maximum Scaling ('POMS') method (Little, 2013); Retro = retrospective measures; Sit = situational measures; S1 = study 1; S2 = study 2.

Table 7

Standardized regression coefficients of ESM measures of feelings, regressed on demographics in study 2 (N = 440). Based on between-level estimations in two-level regression analyses

<i>Variable</i>	<i>Tired</i>				<i>Stressed</i>				<i>Bored</i>			
	<i>B</i>	<i>SE(B)</i>	β	<i>p</i>	<i>B</i>	<i>SE(B)</i>	β	<i>p</i>	<i>B</i>	<i>SE(B)</i>	β	<i>p</i>
Gender ^a	.320	4.866	.237***	.000	.380	5.738	.271***	.000	0.058	1.163	0.060	.245
Grade ^b	.013	0.415	.021	.678	-.044	-1.388	-.068	.165	-0.003	-0.123	-0.007	.902
<i>R</i> ²	.057*				.076**				.004			
<i>Variable</i>	<i>Happy</i>				<i>Interested</i>				<i>Curious</i>			
	<i>B</i>	<i>SE(B)</i>	β	<i>p</i>	<i>B</i>	<i>SE(B)</i>	β	<i>p</i>	<i>B</i>	<i>SE(B)</i>	β	<i>p</i>
Gender^a	-.091	-1.834	-.096	.067	-.146	-3.178	-.165**	.001	-0.203	-4.466	-.226***	.000
Grade ^b	-.014	-0.611	-.033	.542	-.017	-0.822	-.042	.411	-0.017	-0.841	-.042	.400
<i>R</i> ²	.011				.030				.054*			
<i>Variable</i>	<i>Enthusiastic</i>				<i>Calm</i>				<i>Relaxed</i>			
	<i>B</i>	<i>SE(B)</i>	β	<i>p</i>	<i>B</i>	<i>SE(B)</i>	β	<i>p</i>	<i>B</i>	<i>SE(B)</i>	β	<i>p</i>
Gender ^a	-.161	-3.405	-.173**	.001	-.189	-3.738	-.191***	.000	-0.188	-3.746	-.192***	.000
Grade ^b	-.021	-0.949	-.049	.343	.033	1.359	.072	.174	0.043	1.841	.094	.066
<i>R</i> ²	.033				.040				.043*			
<i>Variable</i>	<i>Frustrated</i>				<i>Anxious</i>				<i>Afraid</i>			
	<i>B</i>	<i>SE(B)</i>	β	<i>p</i>	<i>B</i>	<i>SE(B)</i>	β	<i>p</i>	<i>B</i>	<i>SE(B)</i>	β	<i>p</i>
Gender ^a	.108	2.059	.107*	.039	.187	3.281	.158**	.001	0.017	0.388	.019	.698
Grade ^b	-.022	-0.907	-.046	.364	-.025	-0.897	-.045	.370	-0.063	-3.279	-.158**	.001
<i>R</i> ²	.013				.026				.025			
<i>Variable</i>	<i>Sad</i>											
	<i>B</i>	<i>SE(B)</i>	β	<i>p</i>								
Gender ^a	.112	2.266	.108*	.023								
Grade ^b	-.026	-1.090	-.053	.276								
<i>R</i> ²	.014											

Notes. * : $p \leq .05$; ** : $p \leq .01$; *** : $p \leq .000$. The regressions were estimated on the between-level (person-level); ^a coded 1 = male, 2 = female; ^b Grade was

centered at the mean and coded 9 = 9th graders, 10 = 10th graders, 11 = 11th graders, and 12 = 12th graders.

Supplemental Materials

Validity check 1: Tables S1 to S3 compare the results for participants who received the invitation to study 1 through different sources.

Table S1: Demographics by recruitment channel of participants in study 1

	Born This Way Foundation Sample		School-specific link; full particip. ^a		General link but surveyed at school		general link surveyed else		School-specific link but no full participation		Test for group differences	
	<i>F</i>	%	<i>F</i>	%	<i>F</i>	%	<i>F</i>	%	<i>F</i>	%	<i>p</i>	<i>Cramer's V</i>
<i>Gender identity</i>												
Male	1131	36.24	1431	41.98	2161	33.82	1143	20.83	386	29.00		
Female	1818	58.25	1917	56.23	4056	63.47	4105	74.81	914	68.67		
Transmale	22	0.70	15	0.44	28	0.44	57	1.04	3	0.23	.000	.088
Transfemale	23	0.74	6	0.18	18	0.28	16	0.29	4	0.30		
Different/Other	127	4.07	40	1.17	127	1.99	166	3.03	24	1.80		
<i>Sexual orientation</i>												
Heterosexual/straight	1403	45.14	2975	89.10	5372	84.83	3786	70.97	1106	86.34		
Gay or lesbian	793	25.51	70	2.10	163	2.57	393	7.37	24	1.87	.000	.224
Bisexual	650	20.91	184	5.51	476	7.52	723	13.55	97	7.57		
Other	262	8.43	110	3.29	322	5.08	433	8.12	54	4.22		
<i>Grade</i>												
9th	616	19.72	1124	30.47	2159	33.75	1815	25.87	313	21.54		
10th	686	21.97	876	23.75	1820	28.45	1738	24.77	412	28.36	.000	.092
11th	840	26.90	832	22.55	1376	21.51	1900	27.08	458	31.52		
12th	981	31.41	857	23.23	1042	16.29	1563	22.28	270	18.58		
<i>School type</i>												
Public school	2683	86.16	2708	79.41	5469	85.64	4831	88.14	747	56.17		
Private School	324	10.40	678	19.88	597	9.35	453	8.26	467	35.11	.000	.171
Other	107	3.44	24	0.70	320	5.01	197	3.59	116	8.72		
<i>Environment</i>												
Large City	667	21.41	1376	40.79	1696	26.55	937	17.50	505	38.14		
Small City	854	27.42	455	13.49	976	15.28	1347	25.15	221	16.69	.000	.141
Suburban Town	1277	41.00	1406	41.68	3418	53.51	2577	48.12	567	42.82		
Rural Place	317	10.18	136	4.03	297	4.65	494	9.23	31	2.34		

Note: *F* = absolute frequency; ^aFull participation means > 200 participants. Convention for interpreting *Cramer's V*: 0.1 = small, 0.3 = medium, 0.5 = large.

Table S-2:

Age and SES by recruitment channel of participants in study 1

	Born This Way Foundation Sample		School- specific link; full particip. ^a		General link but surveyed at school		general link surveyed else		School-specific link but no full participation		MANOVA		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i> (4, 19407)	<i>p</i>	<i>pEta</i> ²
Age	15.78	1.34	16.05	1.33	15.88	1.20	15.8	1.23	16.17	1.17	43.725	0	0.009
SES	5.82	1.80	7.13	2.03	6.64	1.90	6.10	1.86	6.92	2.06	271.713	0	0.053

Note: *F* = absolute frequency; ^aFull participation means > 200 participants.

Table S-3: Emotion Ratings by recruitment channel of participants in study 1

	Born This Way Foundation Sample		School-specific link; full particip. ^a		General link but surveyed at school		general link surveyed else		School-specific link but no full participation		MANOVA		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i> (4, 18075)	<i>p</i>	η_p^2
Happy	45.43	26.63	60.22	28.00	53.85	27.46	46.93	26.68	54.34	27.14	155.363	0.000	0.033
Bored	72.58	26.20	67.40	28.60	67.53	27.47	72.05	25.86	65.13	27.86	46.876	0.000	0.010
Frustrated	71.05	25.45	61.38	29.98	61.09	28.69	69.68	26.02	62.92	28.64	115.693	0.000	0.025
Mad	49.93	29.77	45.36	31.51	41.38	29.89	48.83	29.78	44.19	30.21	62.075	0.000	0.014
Interested	46.54	26.02	56.21	27.47	51.70	25.95	46.99	25.50	54.81	25.56	86.687	0.000	0.019
Afraid	43.20	33.20	27.91	30.21	26.47	28.84	38.14	32.35	29.22	30.17	191.252	0.000	0.041
Lively	38.68	26.94	52.09	29.51	44.67	27.73	38.36	26.51	46.79	27.90	138.276	0.000	0.030
Joyful	39.72	26.14	53.71	29.25	46.46	27.56	39.61	26.12	47.16	27.18	146.85	0.000	0.031
Sad	56.99	30.40	37.40	30.82	40.40	29.73	52.85	30.12	42.04	30.60	273.714	0.000	0.057
Scared	42.77	32.87	27.93	29.88	26.72	28.87	38.05	32.29	29.69	30.22	179.4	0.000	0.038
Cheerful	41.17	26.65	54.29	28.64	47.91	27.49	41.81	26.72	48.27	27.56	120.726	0.000	0.026
Stressed	85.33	20.44	72.55	30.06	76.73	26.50	84.13	22.01	79.44	25.46	138.201	0.000	0.030

Note: *F* = absolute frequency; ^aFull participation means > 200 participants.

Validity check 2: Tables S4 shows that open-ended responses and rated emotion items capture similar experiences.

Table S-4

Sensitivity analysis 2: Rating differences between the group of students who wrote a certain word (e.g. happy) in open answers, and students who did not write that word in their open answers in study 1

RATING SCALES	OPEN ANSWERS					
	Group 1		Group 2		t-Test	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>p</i>	<i>d</i>
	Did not write 'happy'		Wrote 'happy'			
Happy	45.59	26.20	72.30	21.88	.000	-1.11
Sad	50.30	31.07	32.92	27.04	.000	0.60
	Did not write 'stressed'		Wrote 'stressed'			
Stressed	75.93	27.64	89.48	14.57	.000	-0.61
	Did not write 'sad'		Wrote 'sad'			
Sad	44.57	30.58	71.48	26.18	.000	-0.95
Happy	52.54	27.40	38.05	27.25	.000	0.53
	Did not write 'lonely'		Wrote 'lonely'			
Alone	43.07	33.41	83.91	19.26	.000	-1.50
Connected	47.46	28.17	27.80	22.73	.000	0.77
	Did not write 'anxious'		Wrote 'anxious'			
Afraid	31.05	30.94	48.12	32.49	.000	-0.54
Scared	31.11	30.79	47.89	32.43	.000	-0.53
	Did not write 'bored'		Wrote 'bored'			
Bored	65.02	28.09	82.48	18.83	.000	-0.73
Interested	53.31	26.37	42.08	24.23	.000	0.44
	Did not write 'nervous'		Wrote 'nervous'			
Nervous	58.70	30.61	79.78	20.28	.000	-0.81
	Did not write 'depressed'		Wrote 'depressed'			
Cheerful	46.98	27.58	26.73	22.99	.000	0.80

The following text and tables document exploratory and confirmatory factor analyses on ESM items in study 2, to provide more information on the factor structure of the applied measures

We examined the factor structure of the academic emotions measured with ESM assessments in study 2. Since recent studies found that the factor structure of emotions is different on the level of situations and persons (Vansteelandt et al., 2005; Ketonen et al., 2017), we conducted multilevel exploratory and confirmatory factor analyses, with situations (within-level) nested in individuals (between-level), using Mplus.

We did not have clear hypotheses about what factor structure to expect on either level, because only few previous studies have examined that question so far, and none of them examined exactly the same item set we used in this study. We had selected our items with the purpose to capture three dimensions of academic emotions, namely valence (positive versus negative), arousal (high versus low), and approach motivation. Although we expected to find inter-correlations supporting these dimensions, we had no hypotheses about the effect of different levels (situation versus person) on these expected factors, their inter-correlations, and possible correlations among residuals. We therefore started with exploratory factor analyses. Using Mplus, we compared models with one, two, and three factors as well as with unrestricted covariance on both levels with another, in order to identify the factor structure that fitted the data best, using the command “TYPE = TWOLEVEL EFA 1 3 UW* 1 3 UB*;”. The model fit indices and the factor loadings of the final model are reported in Tables S5 and S6. Although a model with three factors on the within-level and three factors on the between-level showed a relatively good model fit in the EFA, several items loaded on more than one factor. On

the within-level, the factors reflected positive valence (e.g., enthusiastic, happy, interested, curious), negative valence (e.g., stressed, frustrated, anxious, sad), and low arousal of both positive and negative emotions (e.g., calm, relaxed, tired, bored). On the between-level, the factors reflected (1) positive valence, (2) negative valence, and (3) high arousal of ambivalent arousal (e.g., interest, curiosity, enthusiasm, fear, anxiety). This factor solution was of limited use for psychometrics due to the facts that the third factor on each level lacked high factor loadings, the highest loading items of factor 3 on each level loaded also strongly on other factors.

Table S-5: *Model fit indices loadings in the multilevel exploratory factor analysis of ESM Data (Study 2)*

Model		<i>RMSEA</i>	<i>CFI</i>	<i>TLI</i>	<i>SRMR</i>	<i>SRMR</i>
within	between				<i>within</i>	<i>between</i>
1	1	.084	.697	.636	.083	.229
2	1	.050	.911	.870	.026	.217
3	1	.050	.911	.870	.026	.217
unrest.	1	.048	.951	.883	.002	.216
1	2	.084	.726	.638	.083	.085
2	2	.060	.876	.817	.044	.085
3	2	.045	.936	.894	.026	.085
unrest.	2	.036	.977	.932	.001	.085
1	3	.086	.742	.624	.083	.049
2	3	.059	.892	.822	.044	.048
3	3	.043	.950	.907	.025	.049
unrest.	3	.025	.991	.967	.001	.047
1	unrest.	.108	.752	.405	.083	.011
2	unrest.	.075	.902	.711	.044	.006
3	unrest.	.054	.960	.850	.025	.003
1	1	.084	.697	.636	.083	.229
2	1	.050	.911	.870	.026	.217
3	1	.050	.911	.870	.026	.217
unrest.	1	.048	.951	.883	.002	.216
1	2	.084	.726	.638	.083	.085

Table S-6

Item loadings in the exploratory factor analysis of ESM Data, Model with 3 within- and 3 between-level factors (Study 2)

	<i>Within-level</i>			<i>Between-level</i>		
	<i>Factor 1 positive</i>	<i>Factor 2 negative</i>	<i>Factor 3 low arousal</i>	<i>Factor 1 positive</i>	<i>Factor 2 negative</i>	<i>Factor 3 high arousal</i>
Enthusiastic	.634	-.258	-.248	.759	-.168	.579
Happy	.644	-.458	-.007	.757	-.416	.114
Interested	.614	-.171	-.287	.802	-.186	.643
Curious	.387	.016	-.243	.533	.114	.728
Calm	.483	-.491	.369	.834	-.538	-.340
Relaxed	.553	-.521	.292	.881	-.565	-.280
Frustrated	-.478	.631	-.081	-.350	.889	.378
Anxious	-.342	.622	-.174	-.312	.819	.361
Afraid	-.233	.494	-.262	-.137	.613	.488
Tired	-.327	.276	.327	-.380	.612	-.152
Sad	-.349	.499	-.088	-.359	.751	.333
Bored	-.419	.210	.410	-.356	.500	-.302
Stressed	-.481	.666	-.018	-.495	.848	.165

Note. Loadings $\geq |.5|$ are marked bold.

Detailed rationales underlying the item selection for retrospective measures in study 1 and ESM measures in study 2

STUDY 1:

The retrospective measures of study 1 were selected with the following in mind:

- (1) We wanted to use a validated scale with good psychometric properties but needed to keep the survey short, which is why we chose the PANAS short form for children.
- (2) In addition, we assessed further emotions that we knew to be relevant to learning based on the previous research on academic emotions (e.g., Goetz et al., 2014; Pekrun, 2006). The positive academic emotions included feeling interested, hopeful, fun, confident, and relieved ($\alpha = .82$). The negative academic emotions included feeling hopeless, stressed, angry, ~~nervous~~, bored, frustrated, and discouraged ($\alpha = .82$). We would also like to point out that several of these items also form part of longer PANAS versions, including the items interested, nervous (Crawford & Henry, 2004; Tuccitto et al., 2010; Watson, Clark, & Tellegen, 1988), as well as confident (Watson & Clark, 1994) and angry, which in the PANAS-X is part of “angry at self” (Watson & Clark, 1994).
- (3) Since this was originally a study on students’ emotional and social experiences at school, the assessment also included items capturing social emotions, which we feel have been a bit neglected in the past emotion research on students’ emotions, which is why it is rather difficult to refer to previous studies for that measure. We assessed emotions that reflect how students feel in social interactions with others. The scale of positive social emotions consisted of the items accepted, respected, connected, and grateful ($\alpha = .80$). The scale of negative social emotions consisted of the items lonely and ashamed (Spearman-Brown Coefficient = .65). We would also like to point out that the item ashamed also forms part of longer PANAS versions than the one used in this study, (Crawford & Henry, 2004;

Tuccitto et al., 2010; Watson, Clark, & Tellegen, 1988), and that the here assessed “lonely” is very similar to the item “alone” that is part of the PANAS-X (Watson & Clark, 1994).

While the aforementioned reasons guided the item selection, the following reasons guided the selection of the items presented in this article:

- (4) The PANAS was selected for the same reason as mentioned above (good psychometric properties, parsimony, ability to provide a composite scores of overall positive and negative emotions)
- (5) The single items bored and stressed were selected because they were among the most frequent open-ended responses, which we aimed to compare to the rated retrospective answers.
- (6) Other items of those originally assessed were not included in this study in order to prevent the article from becoming even more complex.

STUDY 2:

The items in study 2 were selected with three main goals in mind:

- (1) We wanted to be able to test whether findings from study 1 about the most frequent emotions at school would replicate, and if the situational measures of study 2 would find similar prevalences as the open-ended and rated retrospective measures of study 1. Therefore we tried to include as many of the frequent emotions from the study 1 results as measures in study 2. This was for example a reason to include in study 2 the items happy, stressed, bored, anxious, sad, frustrated, interested, and tired.
- (2) At the same time, we wanted to make sure that each of the four valence-arousal constellations would be represented by at least two items, meaning low arousal positive

emotions, low arousal negative emotions, high arousal positive emotions, and high arousal negative emotions. For that purpose, we compared the items that we wanted to assess anyways for the first reason mentioned above with the items that existing validated scales such as the PANAS-X suggest for capturing the four arousal-valence constellations. Several items appear in both lists, such as the items interested, enthusiastic (Tuccitto et al., 2010), happy, sad (see above and Watson & Clark, 1994).

- (3) The items “calm” and “relaxed” were added because we wanted to capture all of the four valence-arousal constellations and both items represent low arousal positive emotions according to the PANAS-X (Watson & Clark, 1994), and according to alternative emotion measures for low arousal positive emotions (Kessler & Staudinger, 2009).
- (4) While there are a few measurement instruments available that would capture these four arousal-valence constellations, they typically do not focus on students’ typical in-school experiences. We therefore chose items for the four valence-arousal constellations that at the same time are considered relevant academic emotions in the previous literature, such as anxiety (Pekrun et al., 2006; which also forms part of the measure for high arousal negative emotions according to Kessler & Staudinger, 2009 and is a frequent problem in students in high schools and higher education), or frustration (Pekrun et al., 2006).
- (5) In addition, we wanted to also capture positive approach motivation with two items, which is why we added “curious” to “interested”, because some studies consider approach motivation a separate dimension next to valence and arousal, and because interest and curiosity are considered particularly relevant to learning processes (e.g. Silvia, 2004; 2005; Schiefele, 2009).

Inter-correlations of all emotion items

Table S-7: Inter-correlations of retrospective emotion ratings in study 1 (above the diagonal) and study 2 (below the diagonal)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Happy ^b	-	.59**	.73**	.74**	.65**	-.40**	-.27**	-.47**	-.23**	-.22**	-.24**	-.27**	-	.53**	-	-	-	-.31**	-
2. Proud ^a	-	-	.56**	.59**	.54**	-.32**	-.16**	-.35**	-.19**	-.18**	-.19**	-.22**	-	.50**	-	-	-	-.24**	-
3. Cheerful ^a	-	-	-	.74**	.68**	-.32**	-.21**	-.39**	-.17**	-.16**	-.22**	-.23**	-	.52**	-	-	-	-.26**	-
4. Joyful ^a	-	-	-	-	.67**	-.32**	-.20**	-.39**	-.16**	-.15**	-.23**	-.25**	-	.53**	-	-	-	-.27**	-
5. Lively ^a	-	-	-	-	-	-.29**	-.16**	-.35**	-.14**	-.14**	-.22**	-.23**	-	.51**	-	-	-	-.24**	-
6. Sad ^b	-.30**	-	-	-	-	-	.50**	.627**	.516**	.51**	.26**	.43**	-	-.20**	-	-	-	.49**	-
7. Mad ^a	-	-	-	-	-	-	-	.516**	.36**	.36**	.34**	.35**	-	-.17**	-	-	-	.55**	-
8. Miserable ^a	-	-	-	-	-	-	-	-	.45**	.44**	.37**	.42**	-	-.32**	-	-	-	.52**	-
9. Afraid ^b	-.10	-	-	-	-	.52**	-	-	-	.79**	.15**	.32**	-	-.08**	-	-	-	.36**	-
10. Scared ^a	-	-	-	-	-	-	-	-	-	-	.15**	.32**	-	-.08**	-	-	-	.36**	-
11. Bored ^b	-.03	-	-	-	-	.14	-	-	.04	-	-	.27**	-	-.36**	-	-	-	.36**	-
12. Stressed ^b	-.23**	-	-	-	-	.38**	-	-	.26**	-	.26**	-	-	-.14**	-	-	-	.55**	-
13. Enthusiastic ^c	.46**	-	-	-	-	-.22*	-	-	.04	-	-.11	-	-	-	-	-	-	-	-
14. Interested ^b	.44**	-	-	-	-	-.08	-	-	.09	-	-.18*	-	.43**	-	-	-	-	-.21**	-
15. Curious ^c	.29**	-	-	-	-	-.02	-	-	.11	-	-.20*	-	.41**	.46**	-	-	-	-	-
16. Calm ^c	.50**	-	-	-	-	-.19*	-	-	-.17	-	-.00	-	.35**	.41**	.24**	-	-	-	-
17. Relaxed ^c	.49**	-	-	-	-	-.31**	-	-	-.23*	-	-.03	-	.44**	.36**	.33**	.75**	-	-	-
18. Frustrated ^b	-.28**	-	-	-	-	.43**	-	-	.37**	-	.34**	-	-.05	-.22**	.05	-.29**	-.32**	-	-
19. Anxious ^c	-.26**	-	-	-	-	.37**	-	-	.28**	-	.29**	-	-.04	-.10	-.10	-.26**	-.17*	.49**	-
20. Tired ^c	-.20*	-	-	-	-	.39**	-	-	.28**	-	.40**	-	-.07	-.18**	-.17	-.25**	-.27**	.41**	.47**

Note: ^a = item was only assessed in study 1; ^b = item was assessed in study 1 and 2; ^c = item was only assessed in study 2. * : $p \leq .05$; ** : $p \leq .01$.

Table S-8: Inter-correlations of situational (ESM) emotion ratings in study 2, with the situation-level (within) above the diagonal and the person-level (between) below the diagonal)

	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>	<i>12</i>	<i>13</i>
1. Enthusiastic	-	.45**	.42**	.29**	.25**	.29**	-.22**	-.14**	-.09**	-.19**	-.17**	-.27**	-.22**
2. Happy	.66**	-	.35**	.17**	.39**	.43**	-.35**	-.24**	-.22**	-.15**	-.31**	-.23**	-.31**
3. Interested	.83**	.61**	-	.39**	.22**	.26**	-.19**	-.10	-.06**	-.15**	-.12**	-.28**	-.18**
4. Curious	.63**	.29**	.77**	-	.11**	.13**	-.07**	.01	.06**	-.08**	-.02	-.13**	-.06**
5. Calm	.40**	.63**	.42**	.15**	-	.53**	-.33**	-.29**	-.26**	-.05**	-.23**	-.06**	-.32**
6. Relaxed	.47**	.69**	.48**	.16**	.97**	-	-.36**	-.31**	-.25**	-.10**	-.25**	-.11**	-.35**
7. Frustrated	-.07	-.37**	-.09	.21**	-.52**	-.53**	-	.36**	.30**	.18**	.36**	.18**	.44**
8. Anxious	-.04	-.30**	-.05	.18**	-.48**	-.48**	.76**	-	.37**	.14**	.29**	.09**	.44**
9. Afraid	.13*	-.23**	.06	.36**	-.39**	-.36**	.64**	.59**	-	.02	.33**	.00	.27**
10. Tired	-.31**	-.26**	-.29**	-.18**	-.27**	-.31**	.44**	.41**	.11*	-	.12**	.29**	.27**
11. Sad	-.10	-.45**	-.14*	.18**	-.51**	-.52**	.74**	.60**	.67**	.34**	-	.12**	.29**
12. Bored	-.38**	-.30**	-.40**	-.20**	-.14*	-.22**	.35**	.29**	.11*	.61**	.34**	-	.20**
13. Stressed	-.24**	-.35**	-.24**	-.03	-.54**	-.57**	.73**	.72**	.41**	.69**	.58**	.43**	-

Note: * : $p \leq .05$; ** : $p \leq .01$.