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# Exploring students' perceived need and preferences for achievement emotion competence training

**Kristina Stockinger** · **Elisabeth Vogl**

**Abstract** Given the importance of achievement emotions for students' academic success and wellbeing, scholars are increasingly seeking to develop effective programs for equipping students with competencies for adaptively managing achievement emotions. To date, however, little is known about what kind of support, if any, students themselves perceive as useful. We thus conducted a needs assessment to explore the degree to which German lower secondary school students ($N = 387$) perceive a need for such training; how this need varies across students, possibly implying different implementation conditions; and their preferences for training formats/content. To this end, students completed a series of self-report measures targeting demographics, achievement emotions, perceived training need, and training preferences. Students' responses were analyzed quantitatively and revealed a discernible need for training; that this need is higher for students with higher levels of negative achievement emotions (e.g., anxiety, disappointment) and relief, and with lower achievement; and discernible trends in students' preferences for training formats, particularly with regard to opportunities for social interaction with peers. Implications for research and designing effective as well as appealing achievement emotion competence trainings are discussed.

**Keywords** Emotion · Emotion regulation · Intervention · Needs assessment · Achievement · Adolescence

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Students' achievement emotions (AEs; i.e., emotions tied to their academic successes or failures; Pekrun 2018), shape their academic lives and personal development. Ideally, students' experiences are filled with positive AEs that promote academic and psychological flourishing, such as enjoyment of learning, or pride over personal achievement. However, students will inevitably face emotionally challenging situations over the course of their schooling, particularly as demands increase, which can take notable tolls especially on those less equipped with skills for handling such challenges. Mounting evidence shows that positive AEs decrease, and negative AEs increase as students progress through the education system, and that negative AEs are reciprocally linked with lower performance. In response, researchers perceive an urgent need to identify classroom practices that benefit students emotionally (Linnenbrink-Garcia et al. 2016), and to develop impactful measures for enhancing students' competencies to actively manage their AEs when difficulties do arise, and have begun to take action accordingly (Di Leo and Muis 2020; von der Embse et al. 2013).

This study explores whether this need for training AE competencies is perceived by students as potential recipients as well. Building on the concept of needs assessment (NA; Rossi et al. 2019) and viewing students as key stakeholders and prime informants for developing effective programs, we explored secondary school students' perceived need for AE training; how this need varies across students; and preferences for training formats. As intervention research targeting AEs continues to make headway, inquiry into students' needs is needed but lacking to date.

In what follows, we review evidence on frequencies and functions of students' AEs that provides the backdrop for current intervention efforts, delineate the concept of NA, and detail our aims and methodology.

## 1 Frequencies and functions of achievement emotions

Students' academic experiences include a variety of positive (e.g., enjoyment, hope, pride, relief) and negative (e.g., anxiety, disappointment, hopelessness, boredom) AEs, but recent research discloses disconcerting distributional patterns. PISA 2015 makes for a particularly compelling case: Cross-nationally, 66% of 15-year-old students reported frequently worrying about poor grades, and 55% reported feeling very anxious before tests even if they are well-prepared (OECD 2017). The numbers at the German national level are equally alarming. The Institute for Therapy and Health Research reports that 40% of German Grade 5–10 students frequently feel stressed[1], and perceive the high importance assigned to achievement to be a prime stressor (IFT-Nord 2019). Studies further suggest that German secondary students are bored 32–58% of classroom instruction time (Nett et al. 2011). Thus, distressingly large portions of (German) high schoolers are struggling emotionally at school.

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[1] Stress is defined as a general state of alertness which prepares an organism for responding to situational demands and viewed as related to, but distinct from, emotions such as anxiety (Frenzel et al. 2020).

Negative AEs markedly increase, while positive AEs decrease, during K-12 education (Meyer and Schlesier 2021; Vierhaus et al. 2016). This trend coincides with changes in students' competence beliefs, and motivation, as well as academic environments including, for instance, increasing demands and performance pressure. Environmental changes are highly salient in students' transitioning from elementary to secondary education, a life event to which students adapt differently well. Meyer and Schlesier (2021) recently found that German students' positive emotions declined, and negative emotions increased after transitioning to secondary school. Thus, at this stage, students may be in particular need of support in building emotional competencies that help them break, or prevent, negative spirals that can ensue when negative AEs persist and positive AEs lack. Furthermore, research indicates that female students may be especially prone to experience negative AEs in mathematics (i.e., the subject considered in the present research; see "The Present Study") and other STEM fields, considering that in comparison to male students, they typically report higher levels of negative, and lower levels of positive AEs in these subjects (see Pekrun 2018; for a summary of research on gender differences in AEs).

AEs can substantially influence students' motivation to learn, knowledge acquisition and, by implication, achievement (Sutter-Brandenberger et al. 2018; Goetz and Hall 2013). Moreover, positive and negative AEs are positively and negatively reciprocally linked with achievement, respectively (see summary in Pekrun 2018; Pekrun et al. 2017). Negative AEs can impair wellbeing as well: Steinmayr et al. (2016) investigated reciprocal relations among test anxiety and wellbeing in German students over time and found that test anxiety (worry-component; e.g., worries about failure; negative self-perceptions) negatively predicted their subsequent wellbeing.

Against this background, the need for programs that foster students' competencies for self-regulating AEs seems indisputable. However, available programs are largely limited to test anxiety and lack evaluation with elementary/secondary school students (Pekrun 2018; von der Embse et al. 2013). Moreover, programs targeting students' social-emotional learning (SEL) emphasize broader life skills, positive youth development, and social skills, but lack components addressing the regulation, determinants, and outcomes of AEs (Goetz et al. 2005). As effective regulation of emotions is person-, emotion-, and context-specific (i.e., contingent upon situational demands and personal resources; Aldao et al. 2015), and the experience as well as regulation of positive and negative emotions largely independent (Green & Salovey, 1999) equipping students with skills for combatting different negative AEs, and for increasing positive AEs that have been found to boost learning and performance (Pekrun 2018; see also Forsblom et al. 2021; for recent evidence in secondary education contexts), is an important line of inquiry for education scholars that can complement and broaden the scope of extant SEL programs. This inquiry should take students' needs and preferences into account from early stages of program development onwards, and for determining implementation conditions.

## 2 Needs assessment: aims and prospects

NA (Rossi et al. 2019) is a critical prerequisite for designing programs, and includes evaluating whether there is a need for a program, as well as appropriate/preferred means of addressing that need, from the perspective of its intended beneficiaries. NA tackles the following issues (Gollwitzer and Jäger 2014; Rossi et al. 2019; Stufflebeam 2003) which informed our research questions: 1) Is a particular program (here: AE training) wanted/needed by students at all (RQ1); 2) Who (i.e., which students) wants/needs it (RQ2); 3) What do they want/need (RQ3). Rossi et al. (2019) argue that social problems, as well as the need and delivery preferences for ameliorative measures, are social constructs defined by objective and subjective criteria. This certainly applies to problems and measures concerning emotions which inherently denote subjective experience. Attending to students' perspectives on training in addition to relying on established theory can thus reveal not only the degree of need for a program (and thus justify its development), but also help specify the target group and inform program design by considering whether/how needs and preferences may vary across subgroups of the target population (cf. RQs 2 and 3). Examining such variation forms an inherent component of NA (Gollwitzer and Jäger 2014; Rossi et al. 2019) and provides a more nuanced picture of needs and preferences that is pivotal for designing measures that are accepted, engaging, and effectively respond to the needs of that target group and potential subgroups (Durlak 2016). NA allows for participatory program development and identifying implementation conditions that reduces reactance and foreseeable impasses, and maximizes participant engagement and program commitment by facilitating the development of tailored programs (Harackiewicz and Priniski 2018).

Supporting these assumptions, research suggests, for instance, that the Context-Input-Process-Product (CIPP) approach to evaluation *commencing* with NA as part of "context evaluation" facilitates the development of effective (educational) programs (for a review, see Zhang et al. 2011). The stress prevention training "SNAKE" for adolescents designed by Beyer and Lohaus (2005) exemplifies how NA can be leveraged for developing effective programs (see Neber and Heller 2002; for a further example targeting a program for gifted students). SNAKE, unlike other evidence-based programs, is explicitly reported to have been developed from an initial, systematic NA (see Beyer 2005; Klein-Heßling et al. 2003; for the published NA protocol and findings). In addressing the question whether training is needed at all (cf. RQ 1), the authors surveyed students (Grades 5–10) on their needs and preferences for training stress management in school, family, and leisure settings. Need for training was gauged via self-reported stress levels and interest in/readiness to participate in training. To elucidate on the question what they want (cf. RQ 3), students also reported on topics they would like to have covered, and preferences for training formats. Furthermore, the authors examined variation in training needs and preferences for different subgroups (cf. RQs 2 and 3) to derive implications for adequately tailoring SNAKE and found that both students' interest in, as well as design preferences for, stress management training significantly varied by gender and grade level (see discussion section). Based on this NA, the authors designed a program that effectively reduces adolescents' stress, improves coping behaviors

(Beyer and Lohaus 2005), and is now offered at secondary schools throughout Germany. Given SNAKE's empirically demonstrated success, we adapted Klein-Heßling et al.'s (2003; Beyer 2005) NA protocol to explore students' needs and preferences for AE training.

## 3 The present study

Little is known about what kind of support, if any, students perceive as useful with regard to training AE competencies. This study takes a first step towards a better understanding thereof. We sampled German academic track Grade 5 and 6 students. As applies to other countries including Austria, students transitioned to secondary school after Grade 4, such that this major transition involving changes in instruction, demands, and reference group is likely still salient. Tracking is largely achievement-based, and these students enter environments with high group-level achievement which impacts individuals' chances at success when evaluation entails social comparison, and can undermine students' self-concepts of ability, a precursor for negative AEs (Pekrun et al. 2019). As such, the population sampled may be at particular risk for AE difficulties (Meyer and Schlesier 2021). At the same time, they are in their early stages of secondary school, an opportune time for early intervention to promote more favorable developmental trajectories.

We adapted Klein-Heßling et al.'s (2003; Beyer 2005) NA protocol and followed established NA recommendations (Rossi et al. 2019; Stufflebeam 2003) to explore three research questions. First, to what extent is there a need for training (RQ1)? Herein, we considered levels of students' experiences of positive and negative AEs, and their perceived need for training. As AEs are domain-specific, and due to time constraints, we focused on the domain of math as one that is evidently emotionally laden and a core school subject (Goetz and Hall 2013; Pekrun 2018). Moreover, as the experience of positive and negative AEs is largely independent (i.e., the presence of one does not imply absence of the other; Green & Salovey, 1999; Pekrun et al. 2011), we assessed positive and negative AEs as potential indicators of training need. We assessed students' perceived need for training in terms of their interest/readiness to partake in, and perceived utility of, AE training.

Second, we asked, how does students' need for training relate to their AEs, gender, grade level, and achievement (RQ2)? It is likely that needs are higher for students who are experiencing higher levels of negative AEs that may impair, and/or lower levels of positive AEs that can boost learning considering prior empirical evidence (Pekrun 2018), as well as lower achievement (i.e., students struggling academically), suggesting they may present a subgroup at particular risk for AE difficulties and require particular attention. Moreover, examining relations between students' AEs and need perceptions provides insight into which AEs may be particularly troublesome and warrant targeted treatment. Furthermore, prior research indicates that both gender (see Pekrun 2018; for a review) and grade level influence students' AEs (Meyer and Schlesier 2021), we examined how students' needs vary by gender and grade level (see Klein-Heßling et al. 2003; for a similar approach).

Third, we asked, what do students want/need in terms of preferences for training formats (RQ3a)? Following established NA recommendations (Rossi et al. 2019; Stufflebeam 2003), we considered core characteristics of training design pertaining to location, duration, content, methods, desired trainer, desired group composition, and mode of delivery including face-to-face versus digital training due to the increasing popularity of e-mental health tools (Huckvale et al. 2020). Questions were adapted from Klein-Heßling et al. (2003; Beyer 2005).

Furthermore, to dig deeper into the question what students need/want, we asked, are students' preferences and gender, grade level, and degree of perceived need related (RQ3b)? Herein, we explored potential variation in students' training preferences as a function of interindividual characteristics to identify potential implementation conditions for program development (see Klein-Heßling et al. 2003; for a review of research on gender/age-related differences in program acceptance, and original evidence for differences in preferences for stress management programs reviewed in the discussion). Practically speaking, such variation can point to the need for grouping participants and/or allowing for sufficient degrees of freedom in program implementation to maximize program engagement and effectiveness.

Given the exploratory nature of our study and lack of prior NA research for AEs, we did not formulate explicit hypotheses. Instead, to interpret and contextualize our findings, we compare them with Klein-Heßling et al.'s (2003) results targeting a related but distinct domain (i.e., adolescent stress management) where applicable.

## 4  Method

### 4.1  Sample

Our sample included 387 academic track (Gymnasium; cf. Austrian "academic secondary school") students in Grade 5 ($N = 246$) or 6 ($N = 141$) from Southern Germany, $M_{age} = 10.8$ years, $SD = 0.73$, 184 female. Students stemmed from three schools invited to participate based on prior collaboration. Classes were eligible for participation if math teachers agreed to host the study during one of their lessons, which was the case for all 12 Grade 5 classes, and seven (of 12) Grade 6 classes (teachers of nonparticipating classes reported being unable to give up a lesson due to scheduled tests or concern for trading in instruction time). Of 532 students attending these classes, informed parental consent was obtained for 436 students (82.5%; cf. Klein-Heßling et al. 2003; for a similar rate). Due to absences during data collection, the final sample comprised 387 students (missing data across datapoints: 3.08%).

### 4.2  Materials and procedure

Students completed paper-pencil-surveys in classrooms, administered in spring 2018 by trained research assistants during a 45-minute lesson. Students were told they would be asked to report on their feelings related to studying, attending class, or taking tests in math, and to give their opinions on a potential training on how to manage such feelings.

Students first answered demographic questions, reported their mid-term math grades issued three weeks prior to our study, and completed a revised version of the Achievement Emotions Questionnaire-Mathematics (AEQ-M; Pekrun et al. 2011) covering joy, pride, anxiety, anger, shame, boredom, and hopelessness. Like the AEQ-R (Pekrun et al. 2021), the AEQ-M-R includes four new AEs: hope, relief, relaxation, and disappointment. AEs are assessed with six items each (reliabilities/ sample items in Table 1) using a five-point scale (1 = *strongly disagree*, 5 = *strongly agree*).

Part II focused on students' needs (items in Table 1), measured in terms of training interest (i.e., readiness to participate; cf. Klein-Heßling et al. 2003) and utility. We also asked for perceived utility of training for classmates, and if students felt they were already acquiring AE competencies in school without further need for training. Students then rated their preferences for different aspects of training format (Table 2) based on five-point scales (1 = *strongly disagree*, 5 = *strongly agree*). We encouraged students to note additional preferences in open-ended items (sample responses in Table S3). Inspection thereof revealed students were mostly reiterating their responses to the closed items, such that our analyses focused on the latter.

### 4.3 Analysis

RQs 1 and 3a called for inspection of levels of AEs, training need, and training preferences. RQs 2 and 3b target relations between students' needs and AEs, characteristics, and training preferences, which we evaluated in terms of magnitude rather than significance. Following Gignac and Szodorai's (2016) empirically derived guidelines for evaluating the magnitude of effect sizes, $r = 0.10$, $0.20$, and $0.30$ were interpreted as small, moderate, and large relations, respectively. We also report Bonferroni-Holm adjusted $p$-values for readers interested in gauging statistical significance for correlational analyses pertaining to these RQs. Due to substantial correlations between several AEs (Table S1), and between training interest and utility ($r = 0.73$) signifying potential (multi-)collinearity, we a priori decided against multiple regression analysis. Instead, we computed bivariate correlations. According to Little's MCAR test, data were missing completely at random ($\chi^2(2959) = 3002.33$, $p = 0.285$) and missings handled using listwise deletion.

The data can be considered hierarchical as participants were nested in classes and schools. Contextual characteristics at both levels may shape students' AEs as well as needs and preferences for training (e.g., in classroom settings). As the number of schools was small, and participation varied substantially across classes, multilevel analysis was not feasible. However, intraclass correlations (ICC) indicated the major portion of variability in AEs, training needs, and preferences was at the within-class level (ICCs < 0.08), suggesting the impact of class membership was limited.

**Table 1** Need for Training

| | (Sample) Item | α | M (SD) | 95% CI | | Skew-ness | Endorse-ment (in %) | N |
|---|---|---|---|---|---|---|---|---|
| | | | | LL | UL | | | |
| *Emotions* | | | | | | | | |
| Joy | I enjoy math class | 0.84 | 3.28 (0.79) | 3.21 | 3.36 | –0.06 | 46.0 | 385 |
| Hope | I am hopeful that I can master the mate-rial | 0.75 | 3.82 (0.74) | 3.75 | 3.90 | –0.48 | 66.4 | 385 |
| Pride | I am proud of myself | 0.83 | 3.59 (0.79) | 3.51 | 3.67 | –0.43 | 54.7 | 385 |
| Relief | I feel relieved when I didn't fail | 0.79 | 4.09 (0.81) | 4.01 | 4.17 | –0.99 | 74.4 | 385 |
| Relaxation | I feel calm in class | 0.89 | 3.46 (0.93) | 3.37 | 3.55 | –0.41 | 51.4 | 385 |
| Anxiety | I worry about under-standing the material | 0.84 | 2.23 (0.86) | 2.14 | 2.31 | 0.83 | 18.3 | 385 |
| Anger | Math homework annoys me | 0.86 | 2.03 (0.87) | 1.95 | 2.12 | 1.08 | 12.2 | 385 |
| Shame | My knowledge gaps embarrass me | 0.89 | 2.09 (0.99) | 1.99 | 2.19 | 1.12 | 15.6 | 385 |
| Disappointment | It disappoints me that I can't keep up in class | 0.85 | 2.28 (0.93) | 2.19 | 2.37 | 0.60 | 19.0 | 384 |
| Boredom | Math homework bores me to death | 0.87 | 1.92 (0.86) | 1.84 | 2.01 | 1.19 | 11.6 | 384 |
| Hopelessness | I feel hopeless when thinking about my math homework | 0.84 | 1.65 (0.75) | 1.50 | 1.80 | 1.51 | 7.4 | 386 |
| *Perceived need* | | | | | | | | |
| Training interest | I would like to take part (item 1)/I can see myself taking part (item 2) | 0.83 | 3.20 (1.12) | 3.09 | 3.31 | –0.21 | 42.9 | 382 |
| Training utility (for self) | AE training would be useful (item 1)/helpful (item 2) for me | 0.87 | 3.06 (1.08) | 2.95 | 3.17 | –0.10 | 35.4 | 382 |
| Training utility (for classmates) | AE training would be useful for my classmates | – | 3.15 (1.01) | 3.05 | 3.25 | 0.04 | 30.3 | 366 |
| Training redundancy | I am learning how to deal with AEs in school, I don't need more training | – | 2.43 (1.25) | 2.30 | 2.56 | 0.51 | 21.1 | 375 |

Endorsement was determined at item-level and indicates proportion of students choosing response cate-gory 4 (*agree*) or 5 (*strongly agree*), based on all students providing a response (i.e., no missing value, see *N*)

**Table 2** Preferences for Training Formats and Characteristics

|  | M (SD) | 95% CI LL | UL | Skew-ness | Endorse-ment (in %) | N |
|---|---|---|---|---|---|---|
| *Location* | | | | | | |
| At school | 3.12 (1.38) | 2.98 | 3.26 | –0.18 | 43.3 | 374 |
| Outside of school | 3.37 (1.40) | 3.27 | 3.51 | –0.39 | 50.8 | 374 |
| *Grade level* | | | | | | |
| Elementary school (grades 1–4) | 2.77 (1.36) | 2.63 | 2.91 | 0.25 | 30.0 | 367 |
| Current grade (grade 5 or 6) | 4.03 (1.01) | 3.93 | 4.13 | –0.11 | 76.1 | 372 |
| Grade 7 or later | 2.96 (1.39) | 2.82 | 3.10 | 0.07 | 35.8 | 372 |
| *Time* | | | | | | |
| During school hours | 3.89 (1.42) | 3.75 | 4.03 | –1.00 | 69.4 | 373 |
| In my free time | 2.28 (1.42) | 2.14 | 2.42 | 0.75 | 22.7 | 370 |
| *Content* | | | | | | |
| What are emotions? | 2.64 (1.21) | 2.52 | 2.76 | 0.27 | 22.8 | 372 |
| How can I recognize/identify emotions? | 3.15 (1.27) | 3.02 | 3.28 | –0.21 | 43.5 | 368 |
| What causes different emotions? | 3.21 (1.26) | 3.08 | 3.39 | –0.30 | 45.5 | 369 |
| How can emotions influence learning/achievement? | 3.76 (1.25) | 3.63 | 3.89 | –0.89 | 66.9 | 366 |
| How can I deal with emotions related to studying/testing? | 3.96 (1.31) | 3.83 | 4.09 | 1.07 | 71.4 | 367 |
| *Trainer* | | | | | | |
| A teacher | 2.93 (1.28) | 2.80 | 3.06 | 0.01 | 34.0 | 373 |
| A psychologist | 3.29 (1.38) | 3.15 | 3.43 | –0.44 | 53.2 | 370 |
| Parents | 2.14 (1.34) | 2.00 | 2.28 | 0.89 | 16.4 | 373 |
| Other adolescents (e.g., older students) | 2.90 (1.40) | 2.76 | 3.04 | 0.01 | 37.5 | 373 |
| A female person | 3.13 (1.21) | 3.01 | 3.25 | –0.20 | 34.4 | 369 |
| A male person | 2.74 (1.15) | 2.62 | 2.86 | 0.06 | 20.3 | 369 |
| None, I want to learn about this on my own | 2.08 (1.22) | 1.96 | 2.20 | 0.93 | 15.7 | 370 |
| *Group composition* | | | | | | |
| Group consisting of girls only | 2.38 (1.15) | 2.26 | 2.50 | 0.59 | 26.4 | 375 |
| Group consisting of boys only | 2.25 (1.48) | 2.10 | 2.40 | 0.72 | 25.1 | 375 |
| Group consisting of girls *and* boys | 3.60 (1.29) | 3.47 | 3.73 | –0.58 | 57.2 | 374 |
| Group consisting of participants that I know | 4.17 (1.12) | 4.06 | 4.28 | –1.39 | 78.8 | 372 |
| Group consisting of participants that I *don't* know | 1.71 (0.98) | 1.16 | 1.80 | 1.40 | 6.8 | 370 |
| Alone, that is, without other participants | 1.97 (1.25) | 1.84 | 2.10 | 1.06 | 14.6 | 376 |
| With my parents present | 1.93 (1.18) | 1.81 | 2.05 | 1.18 | 12.3 | 375 |
| Without my parents present | 3.48 (1.33) | 3.35 | 3.61 | –0.53 | 54.7 | 375 |
| *Format* | | | | | | |
| Alone, by computer | 2.23 (1.22) | 2.10 | 2.36 | 0.72 | 16.1 | 360 |
| By computer if I can connect with others | 2.90 (1.38) | 2.76 | 3.04 | 0.09 | 37.3 | 359 |
| Alone, using an app | 2.35 (1.30) | 2.22 | 2.48 | 0.54 | 21.2 | 358 |
| Using an app if I can connect with others | 2.85 (1.44) | 2.70 | 3.00 | 0.10 | 38.2 | 356 |
| In a face-to-face setting | 3.69 (1.34) | 3.55 | 3.83 | –0.75 | 61.9 | 357 |

**Table 2** (Continued)

| | M (SD) | 95% CI LL | UL | Skew-ness | Endorse-ment (in %) | N |
|---|---|---|---|---|---|---|
| *Methods/Activities* | | | | | | |
| Reading texts | 2.69 (1.23) | 2.56 | 2.82 | 0.22 | 25.0 | 356 |
| Watching films/videos | 3.89 (1.14) | 3.77 | 4.01 | −0.98 | 70.1 | 355 |
| Group work | 3.72 (1.19) | 3.60 | 3.84 | −0.76 | 63.4 | 355 |
| Games (e.g., role playing) | 3.99 (1.13) | 3.87 | 4.12 | −1.09 | 73.4 | 354 |
| *Conditions (I would take part only if ...)* | | | | | | |
| I got a chance to talk about my worries/concerns | 3.76 (1.21) | 3.63 | 3.89 | −0.82 | 65.2 | 359 |
| I didn't have to share personal things about myself | 3.34 (1.24) | 3.21 | 3.47 | −0.21 | 44.7 | 358 |
| I got some form of certification for my participation | 2.35 (1.33) | 2.21 | 2.49 | 0.69 | 20.7 | 358 |
| My friends also participated | 3.88 (1.19) | 3.76 | 4.00 | −1.00 | 70.8 | 360 |
| My classmates also participated | 3.28 (1.22) | 3.15 | 3.41 | −0.32 | 44.3 | 359 |
| Nobody would find out about my participation | 2.06 (1.17) | 1.94 | 2.18 | 1.01 | 12.6 | 358 |

Endorsement was determined at item-level and indicates proportion of students choosing response category 4 (*agree*) or 5 (*strongly agree*), based on all students providing a response (i.e., no missing value, see *N*)

## 5 Results

### 5.1 Need for training (RQ1)

On average, students' positive AEs outweighed their negative AEs (Table 1). Over 50% endorsed feeling hopeful, proud, relieved, or relaxed in math, and close to half reported enjoying their math-related studies. Distributions for negative AEs were positively skewed, reflecting low endorsement. However, nearly one fifth of participants (strongly) agreed to feeling anxious or disappointed in math, indicating that some students may indeed be struggling. Moreover, among positive AEs, relief was most strongly endorsed; as detailed in the discussion, it is questionable whether this pattern is favorable. While correlations were mostly small, there girls tended to report lower levels of positive AEs (except relief), and higher levels of anxiety and hopelessness (Table S1). Positive AEs (except relief) were negatively, and anxiety, anger, and hopelessness positively related to grade level. Boredom was more prevalent among Grade 5 students.

Furthermore, over 40% expressed (strong) interest in AE training, and over one third felt AE training would be (very) useful for themselves. Moreover, one third of students perceived AE training as (very) useful for their classmates. About one fifth reported they were already learning how to manage AEs in school and additional training was not necessary, with over 50% (strongly) disagreeing with this statement. About 82% of students also indicated not having received any prior AE training.

## 5.2 Correlates of perceived training need (RQ2)

Neither gender nor grade level correlated with training interest or utility for self (Table 3). However, negative AEs except boredom, as well as relief, positively correlated with training interest and, to a slightly greater degree, training utility. Relations were small to moderate, but imply links between AEs (except joy, hope, and pride) and perceived need for support. Math achievement was negatively related to training utility, but not interest, indicating that students with lower grades perceive a higher need for AE training, but may not necessarily be more inclined to participate, making it all the more important to identify what kinds of training features might be particularly appealing to students.

## 5.3 Training preferences (RQ3)

Preferences for training features (Table 2) did vary, but several trends can be detected (RQ3a). With over 70% of students (strongly) agreeing, most discernible trends emerged for training with familiar peers (group composition) or their friends (conditions), and for learning how to deal with negative AEs that arise while studying or taking tests (content) via games/playful activities or watching films (method). Moreover, 76.1% (strongly) felt their current grade level was ideal for training.

Furthermore, over two thirds of participants (strongly) endorsed training in face-to-face format, and just over one third expressed (strong) desire to train via digital solutions enabling connection with others. In contrast, working alone via digital solutions was (strongly) endorsed by only one fifth of students (app) or less (computer). Training with group work (strongly) resonated with over 63% of respondents (methods), while comparably few expressed wanting to learn on their own, without a trainer (15.7%) or other participants (group composition; 14.6%).

Other factors (strongly) endorsed by at least half the participants included training during school hours (time) and outside of school (location), although over 40% also endorsed training at school. Moreover, students seem to prefer instruction led by psychologists (trainer) rather than teachers or parents, as well as to train in groups consisting of boys and girls, preferably without parents present (group composition). The majority also expressed willingness to participate if they would be able to share worries with others, but about 45% indicated not wanting to share personal information (conditions). Anonymity in participation (conditions) was not viewed as particularly important.

Results for RQ3b (Table S2) further suggest that preferences do, to some degree, vary for different groups of students. Largest correlations emerged for gender-specific differences in group composition preferences for female- and male-only groups (similar but less pronounced trends for trainer gender). Boys more strongly endorsed mixed groups. Gender differences in preferences for the remaining factors were small, but point to slightly higher preferences for digital formats among boys, and for discussing personal worries among girls. Grade-level differences in preferences were, overall, rare. In comparison to Grade 5 students, those in Grade 6 more strongly endorsed training without parents, at a later stage (Grade 7+), and outside of school.

**Table 3** Correlations between Perceived Need, Emotions, and Student Characteristics

|  | Training interest | | | Training utility | | |
|---|---|---|---|---|---|---|
|  | r | p | p_adjusted | r | p | p_adjusted |
| Gender (0 = male, 1 = female) | 0.07 | 0.173 | 0.0083 | 0.06 | 0.221 | 0.0167 |
| Grade level (5th vs. 6th grade) | –0.10 | 0.094 | 0.0071 | –0.08 | 0.138 | 0.0010 |
| Math achievement (grade) | –0.09 | 0.084 | 0.0063 | –0.20 | 0.000 | 0.0036 |
| Joy | 0.02 | 0.763 | 0.0250 | –0.06 | 0.213 | 0.0125 |
| Hope | –0.06 | 0.236 | 0.0125 | –0.09 | 0.070 | 0.0083 |
| Pride | 0.04 | 0.406 | 0.0167 | –0.02 | 0.661 | 0.0250 |
| Relief | 0.22 | 0.000 | 0.0036 | 0.25 | 0.000 | 0.0039 |
| Relaxation | –0.07 | 0.201 | 0.0010 | –0.19 | 0.000 | 0.0042 |
| Anxiety | 0.16 | 0.002 | 0.0042 | 0.28 | 0.000 | 0.0046 |
| Anger | 0.10 | 0.048 | 0.0056 | 0.17 | 0.001 | 0.0071 |
| Shame | 0.14 | 0.007 | 0.0046 | 0.24 | 0.000 | 0.0050 |
| Disappointment | 0.21 | 0.000 | 0.0039 | 0.31 | 0.000 | 0.0056 |
| Boredom | –0.00 | 0.937 | 0.0500 | 0.01 | 0.862 | 0.0500 |
| Hopelessness | 0.11 | 0.037 | 0.0050 | 0.21 | 0.000 | 0.0063 |

Training utility refers to perceived utility for self only. Higher grades indicate better performance. The $r$ between boredom and training utility is based on $N = 381$. For all other $r$s, $N = 382$. For each $r$, exact as well as Bonferroni-Holm adjusted $p$-values for gauging statistical significance are reported

Students with higher training interest and utility, on average, indicated stronger desire to learn about diverse aspects of AEs (all content options listed) using diverse methods, including text reading. They were also even more inclined to train now, at their current grade level, with psychologists, in face-to-face settings, and to discuss personal worries (Table S2). Moreover, students with higher training interesting and utility also indicated slightly higher readiness to train in their free-time and with their parents present.

# 6 Discussion

This study explored students' need and preferences for training AE competencies. Such evidence is pivotal for designing engaging and effective interventions. We begin our discussion by summarizing and comparing our findings with Klein-Heßling et al.'s (2003) NA on adolescent stress management, and reflect on implications for training design.

## 6.1 Training need

Although students' levels of math-related AEs suggest they were, on average, faring well, they communicated a discernible need for training, and the majority did not feel they were already acquiring emotional skills in school. Over one third reported high training interest and utility, and both were higher for students with higher

levels of negative AEs and relief. These findings align with Klein-Heßling et al.'s (2003) NA showing that adolescents' stress levels are positively related to their interest in training stress management. Furthermore, they imply that interventions targeting AE competencies are warranted also from students' perspectives, and that AE profiles can be used to identify who may be in particular need for support. As the most strongly endorsed positive AE in our data, relief may be important to consider: In the AEQ-M-R, relief pertains to completing activities perceived as aversive, and achievement outcomes perceived as unexpected success/missed failure, implying a substantial portion of students may have low or miscalibrated perceptions of competence, or strategically lower expectations of success to downregulate anticipated negative AEs related to failure. It is thus questionable whether frequent relief is desirable, especially when considering that, as in prior research (e.g., Pekrun et al. 2011), it was the only positive AE that, like all negative AEs examined, was negatively related to achievement. Of note, the lack of systematic relations between other positive AEs (i.e., enjoyment, hope, pride) and training needs seems surprising considering that evidence points to positive effects of these emotions on students' learning and academic performance (Forsblom et al. 2021; Pekrun 2018). In light of these patterns, it is important to emphasize that the present data may at least in part be shaped by students' beliefs about the functions of specific AEs for learning. It is possible that students are well aware of negative effects of negative AEs, but less aware of positive effects of positive AEs on learning (given that the former have generally received more attention in educational research and practice; cf. Pekrun 2018), leading them to perceive a stronger need for training when negative AEs are experienced frequently. Future research should examine students' implicit theories pertaining to functions of AEs to shed light on these issues.

Gender and grade level were uncorrelated with training interest and utility, suggesting these variables are less useful indicators of training need. In Klein-Heßling et al.'s (2003) NA, however, girls and Grade 5–7 students were more interested in training stress management than boys and Grade 8–10 students, respectively. Grade-level differences in AEs aligned with prior longitudinal research, but were not too pronounced, likely due to developmental proximity of Grade 5 and 6 students.

## 6.2 Training preferences

Variation in training preferences notwithstanding, our data point to several design factors to attend to for increasing program acceptance. One factor pertains to students' need for social connectedness: Ratings clearly indicate that the majority of participants—irrespective of gender or grade level—preferred to learn about AEs in group settings involving familiar peers, as well as guided instruction provided by psychologists rather than less "neutral" others such as teachers or parents. These preferences were even more pronounced, potentially reflecting higher urgency, for students with higher levels of training interest and utility, corresponding to Klein-Heßling et al.'s (2003) NA.

Preferences for face-to-face versus digital training further underscore the importance of providing opportunities to connect with others during training: Face-to-face settings affording direct social interaction appealed most to students, while digital

formats providing opportunities to interact with others appear to be more appealing than those lacking such opportunities. Although boys reported slightly more openness to digital formats than girls, one message seems clear: AE training should, from the perspective of lower secondary school students, include activities that involve social exchange among students, and between students and trainers, as well as playful, game-like approaches.

Of note, extant treatments targeting test anxiety (e.g., Suhr-Dachs and Döpfner 2015; von der Embse et al. 2013), cater to some of these preferences by offering group-based, or combined individual and group-based intervention, in face-to-face settings. As such, these interventions offer helpful starting points for developing programs that target competencies for managing a broader range of AEs which have largely been neglected in intervention development so far (see Linnenbrink-Garcia et al. 2016). In contrast, broader SEL trainings such as RULER (Brackett et al. 2019) which may also adhere to some of these preference patterns, do not specifically address AEs, and evidence for their effectiveness in supporting adaptive AEs and their regulation is lacking.

Our data also suggest students are open to training in mixed-gender peer groups, such that class-based training may be viable. Moreover, while Grade 6 students were more open to training in later grade levels as well, the data suggest that, overall, students perceive their current grade levels as suitable for AE training. Comparative perspectives from younger and older students would be helpful for further evaluating these ratings. However, they suggest that training at this level may come at just the right time. This may apply particularly to those already struggling emotionally and in need of early intervention (cf. RQ1 results; students expressing higher training interest/utility expressed stronger desire for "immediate" training), but also for general prevention that prepares learners for navigating future academic challenges.

Gender and grade-level differences in preferences were small, and sometimes diverge from patterns reported by Klein-Heßling et al. (2003). For instance, girls assigned more importance to being able to talk about their worries than boys, similar to Klein-Heßling et al. However, both assigned equally low importance to remaining anonymous with regard to participation, while this was substantially more important to male adolescents surveyed by Klein-Heßling et al. (2003). Lack of grade-level differences may also be attributable to developmental proximity of Grade 5 and 6 students, but suggest preferences hold across these grade levels.

### 6.3 Limitations and directions for future research

While this study is, to our knowledge, the first to explore students' perspectives on AE training, the following limitations should be considered when interpreting its findings and for conducting future research.

First, while we surveyed nearly 400 students from different classes and schools, a more comprehensive understanding of training needs from students at different types of secondary schools, as well as from culturally diverse educational contexts is needed, as different contexts may necessitate different support (Meyer and Schlesier 2021; see Pekrun 2018; for a summary of cross-cultural AE research). Such efforts

can help gauge the degree to which the present insights generalize across different student bodies. It is likely that the findings apply to students in similar education systems based on achievement tracking as well, including Austria, for instance, but empirical evidence is needed. Relatedly, examining training needs and preferences at different levels of education can, in conjunction with developmental research on AEs, provide further insight into optimal timing for training.

Second, this study targeted general trends in training needs and preferences by examining which design features were rated as desirable by the majority of students, based on the assumption that AE training benefits all students. However, as needs and preferences vary, solely attending to such trends may not equally cater to all students' needs, or lack thereof. As it stands, the question of how much personalization is needed for maximizing program impact, and minimizing unwanted side effects, while maintaining feasibility, requires more research. As our data suggest that AEs are related to training needs and preferences, one solution may be to create modules for specific AEs that imply different maladaptive competence and value perceptions (Pekrun 2018), such as lacking meaning leading to frequent/intense boredom, doubting one's competence triggering anxiety, or strategically underestimating one's competencies to safeguard against disappointment. Such personalization relates to designing targeted interventions that improve those psychological processes most relevant to individuals' "problems" (Harackiewicz and Priniski 2018).

Third, needs and preferences for AE training may be contingent upon individual differences beyond those considered. Differences in prior knowledge and regulatory skills are particularly pertinent to consider: Training needs and preferences regarding contents are likely driven by what AE competencies students already (perceive to) have at their disposal. Insight into such factors can further inform program tailoring.

Fourth, future NAs should consider students' AEs in different subject domains. Our choice to measure math-related AEs was guided by prior research documenting that AEs are domain-specific and math is a highly emotional subject. However, as implied by domain-specificity, it is likely that participants' AEs differ across subjects, with some students struggling more in other domains. It is thus possible that training needs differ by subject, which is not reflected in our data, given that we asked students to report on their training needs more generally (i.e., perceived training need was not explicitly restricted to mathematics). Thus, whether insights from "global" NA apply equally across subjects needs to be tested.

Fifth, need for training may indicate an intention to participate, but cannot be equated with guaranteed actual participation (Altschuld and Watkins 2014). Relatedly, what students prefer may not automatically be what is most effective in terms of efficient attainment of desired outcomes, but should increase readiness to participate (Rossi et al. 2019), charging future intervention research with the important task of balancing students' wishes with feasibility and effectiveness considerations.

Sixth, future research should also consider perspectives on training needs and, in particular, training design held by stakeholders other than students as "end-users", such as teachers, parents, and personnel intended to be involved in program delivery, to facilitate the development of consensual programs and maximize implementation effectiveness and feasibility (Gollwitzer and Jäger 2014; Stufflebeam 2003). This

will also require systematic integration of multisource NA data (see Watkins and Altschuld 2014; also for further critical reflection on improving NA research).

## 7 Conclusion

Students perceive a need for AE training, and considering their need for relatedness is vital for their willingness to participate. These trends can be used to guide the design of interventions that are broadly accepted by different students and that can be integrated into broader SEL programs targeting the promotion of positive youth development. As research in this field continues to gain momentum, students' perspectives on training design should be considered in more depth and integrated with evaluation of the relative effectiveness of different approaches to increase participation and help ensure students receive the kind of support they need.

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