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### Conference Presentations

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Graf, E., Donath, J. L., Botes, E., Voracek, M., & Goetz, T. (2023, May 4–5). *Relationships between discrete emotions and political learning: A cross-disciplinary systematic review and meta-analysis* [Paper presentation]. Annual Meeting of the American Educational Research Association (AERA), online.

Graf, E., Bieleke, M., Donath, J. L., Goetz, T., Murano, D., & Stempfer, L. (2022, March 9–11). *Ursachen und Wirkungen von Emotionen in der Politischen Bildung* [Paper presentation]. 9. Tagung der Gesellschaft für Empirische Bildungsforschung (GEBF), Bamberg, Deutschland (online).

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## 1. Introduction

Several recent events have demonstrated that political issues are inextricably linked to emotions: Almost simultaneously with the start of my dissertation project in 2020, COVID – a worldwide health crisis in need of urgent political decisions – struck. Citizens around the globe were suddenly confronted with *surprising*, *worrying*, and at times conflicting information about the virus and related political discussions and policies. In 2021, pictures of the attack on the US capitol after Donald Trump lost the election rapidly went around the world, revealing the *anger* and aggression of people storming the capitol and the *despair* of people watching on the news what was happening. Numerous global climate strikes year by year have revealed *hope* and *anxiety* among many young citizens walking on the streets to fight for measures to combat the climate crisis. While these are some very striking and visible events, emotions from *boredom* to *enthusiasm*, *curiosity* to *confusion*, and *anger*, are involved when citizens deal with political matters. They are central factors influencing citizens' judgments, participation, and – the focus of this dissertation – political learning (Brader & Marcus, 2013; Redlawsk & Mattes, 2022).

Though studies from political psychology have investigated the role of emotions in political learning, for example, how enthusiasm and anxiety can motivate citizens to seek out new information (Redlawsk et al., 2007), little is known about emotions experienced by adolescents (Barrett & Pachi, 2019) and during learning in the context of civic education at schools. Current political topics, such as those mentioned above, are frequently addressed and discussed in civic education at schools (Martens & Gainous, 2013; Siegel-Stechler, 2021). Thereby, discussions and thus the classes can get particularly emotional (Garrett et al., 2020). The lack of research on emotions in civic education is somewhat surprising, given the many studies investigating academic emotions in other domains (Camacho-Morles et al., 2021).

A central theory in this context is the control-value theory (Pekrun, 2006; Pekrun et al., 2023), which aims to explain what factors (*antecedents*) predict the experience of discrete academic emotions, and how they relate to learning and learning outcomes (*effects*). Building on the theory's assumptions about antecedents and effects of emotions experienced in achievement settings, numerous studies have highlighted that emotions are important factors influencing the learning process. Discrete emotions like enjoyment, anger, or boredom experienced in class or during learning activities are associated with students' motivation, learning strategies, and learning

outcomes, such as exam scores and grades (Pekrun et al., 2011, 2023). Whether assumptions of the control-value theory also apply to the context of political learning, and specifically civic education at school, which differs in various aspects from other learning domains (e.g., less achievement focus, high amount of informal learning, diverse formats, and aims), has not yet been examined.

The current dissertation thus aims to test whether assumptions about antecedents and effects of emotions apply to the context of political learning. Specifically, I aimed to systematically synthesize current evidence on associations between emotions and political learning and further investigate antecedents and effects of emotions experienced by students in civic education. Given the current tendencies of democratic decline (Lührmann & Lindberg, 2019), understanding how emotions contribute to political learning and thus informed citizens who can evaluate political processes, are willing to participate, and stand for their political rights is highly important. Adolescents are thereby of particular interest, as this age period is known as a sensitive phase for political development (Sears & Brown, 2013) due to cognitive changes (e.g., critical thinking, moral reasoning, etc.) and due to gaining relevant political rights (e.g., eligibility to vote). It is usually characterized by increasing political interest and efficacy (Arens & Watermann, 2017) and a maturation of political values (Rekker et al., 2015). Further, though the role of schools has long been neglected, recent studies highlight the effectiveness of civic education, particularly for disadvantaged groups (Deimel et al., 2020; Neundorf et al., 2016). Understanding how emotions contribute to learning in civic education can help teachers to deal with different emotions involved when students learn about politics and boost civic learning at schools.

The dissertation is structured as follows: First, I review the literature on academic emotions, focusing on the control-value theory and its assumptions about antecedents and effects of emotions. Further, I discuss characteristics of civic education at school and research from political psychology and educational sciences, which address the role of emotions in political learning. After specifying the aims of this dissertation, the three studies are summarized: The first study uses meta-analytic techniques to systematically synthesize current evidence on associations between emotions and political learning. The second and third study investigate antecedents and effects of emotions in civic education. Finally, the results of these three studies and their implications for future research and practice are discussed.

### **1.1. Academic Emotions**

Emotions are, without a doubt, companions of everyday life, shaping one's daily experience. It is, therefore, not surprising that emotions are also a central aspect of learning. Emotions experienced in the academic context (e.g., in schools and at university) and, more broadly, during the learning process are called academic emotions (Pekrun et al., 2002). Research on academic emotions started focusing on test anxiety in the early 1930s and expanded to various discrete emotions and educational settings, especially in the last 20 years (Goetz et al., 2023). Academic emotions are not only central in explaining academic achievement but also to one's career aspirations (Krannich et al., 2019), learning motivation (Pekrun et al., 2011), and health problems (Pekrun et al., 2023).

In contrast to more general feelings or moods, emotions are characterized by an object focus. This means that usually, emotions are elicited by or targeted at a concrete object. Among academic emotions, four emotion types that primarily differ in their object focus are usually differentiated (Goetz et al., 2023; Pekrun & Loderer, 2020): (1) achievement, (2) epistemic, (3) topic, and (4) social emotions. Achievement emotions (e.g., enjoyment, anxiety, and boredom) are experienced in achievement settings, focusing on achievement activities themselves (e.g., homework, in-class activities) or results of these activities (e.g., grades on a test; Goetz et al., 2023). Epistemic emotions focus on the knowledge-generating aspects of learning, for example, surprise or curiosity experienced when processing novel information (Muis, Psaradellis, et al., 2015; Vogl et al., 2019). Topic emotions are emotions associated with the specific topic one is dealing with during the learning process (e.g., emotions triggered by a political event; Pekrun & Loderer, 2020). Finally, social emotions are focused on other persons involved in the learning context, for example, envy towards one's peers' abilities (Hareli & Weiner, 2002). Whereas achievement and epistemic emotions directly pertain to the learning task, topic and social emotions can indirectly affect the learning process – the latter also directly if the learning task is characterized by social interactions (Pekrun & Loderer, 2020).

#### **1.1.1. The Control-Value Theory: Explaining Antecedents and Effects of Academic Emotions**

The control-value theory is a central theory aiming to explain antecedents and effects of emotions in the academic context (Pekrun, 2006; Pekrun et al., 2023). Thereby, cognitive appraisals

of control perceived in an achievement situation (e.g., “Do I feel competent to participate in this activity?”) and value attributed to the learning activity or aimed achievement (e.g., “Is it personally important for me to understand this issue?”) are central proximal *antecedents* of emotions experienced in this context. Distal antecedents, for example, the teaching context and individual dispositions, affect these proximal antecedents. To explain the *effects* of emotions on learning and achievement, the control-value theory incorporates the cognitive-motivational model (Pekrun et al., 2002; Pekrun & Perry, 2014), allowing assumptions about how emotions categorized along the dimensions of valence (positive versus negative) and arousal (activating versus deactivating) affect the learning process and outcomes. In short: While positive-activating emotions (e.g., enjoyment) positively influence learning, negative-deactivating emotions (e.g., boredom) inhibit the learning process. Negative-activating emotions (e.g., anger, anxiety) typically show more complex patterns of associations. For example, they may increase task-irrelevant thinking (e.g., worries) while increasing extrinsic motivation (Pekrun et al., 2023). Additionally, the theory addresses recursive effects, for example, effects from achievement to cognitive appraisals.

The control-value theory was primarily developed to explain when and which achievement emotions are experienced and how they relate to learning. However, it has also been applied to epistemic emotions (Muis, Psaradellis, et al., 2015). Thus, the control-value theory received broad support from evidence from various contexts, ranging from different subject domains (e.g., foreign language learning; Shao et al., 2020; physical education; Simonton et al., 2017), specific learning environments (technology-based learning environment; Loderer et al., 2020) to informal learning (Beymer et al., 2022). Despite the broad support for the control-value theory, it has never been applied to the context of learning about politics.

## **1.2. Learning in the Political Domain: Political Learning and Civic Education**

To understand the concept of political learning, it may be helpful first to define the term “political” itself. Though definitions differ in how broad politics is perceived (from “politics is what government does” to “the personal is political”; Hay, 2002, p. 69), a basic understanding is that politics refers to all actions aiming at or contributing to decisions concerning the society (Caramani, 2020; Meyer, 2003). Thus, political learning is the process of acquiring relevant knowledge and skills to understand, judge, and participate in these decisions. It is a lifelong process (Biesta, 2011) and takes place in various contexts (e.g., intentional versus incidental; Schugurensky,

2006), settings (e.g., individual learning, for instance through processing information from the mass media; Barabas et al., 2014; or through interactive processes, for instance through discussions and accompanying reflections; Moeller & de Vreese, 2019), and formats (e.g., formal, non-formal, and informal; Schugurensky, 2006). These processes can occur during early socialization at home and throughout adults' daily life (Sears & Brown, 2013) but can also be part of students' school experiences or, specifically, civic education at school.

Though it was long questioned whether schools affect civic learning (Campbell, 2019), recent systematic reviews showcase the growing evidence of the effects of civic education while highlighting the diversity in approaches and outcomes (Donbavand & Hoskins, 2021; Geboers et al., 2013; Teegelbeckers et al., 2023). Civic learning at school occurs in diverse settings, ranging from more formal, planned lessons to informal learning via discussing current affairs or extracurricular activities. Civic education can be taught based on a specific curriculum, as a single subject, or in combination with related subjects (e.g., history). Further, civic education is often defined as a cross-curricular theme, thereby included in teaching regular subjects (e.g., language classes) or participative processes at schools (Schulz et al., 2018). These different formats and methods sometimes have differential effects on outcomes (e.g., political knowledge, efficacy, or participation; Dassonneville et al., 2012; Martens & Gainous, 2013). They are thus of great relevance to meeting the broad goals of civic education (Teegelbeckers et al., 2023).

Scholars mainly differentiate between four core democratic competencies which are aimed to be enhanced through civic education at schools: (1) transfer knowledge and understanding of basic democratic concepts, (2) enhance civic skills relevant for engagement with societal issues, for example, decision making, discussion skills, or monitoring and evaluation of government decisions, (3) mediation of core democratic values and motivation, including also civic identity (Carretero et al., 2016), attitude development (Teegelbeckers et al., 2023), and motivational aspects like political interest and efficacy (Alscher et al., 2023), and (4) civic action – if not through direct experience in participatory processes (Carretero et al., 2016; Teegelbeckers et al., 2023), by increasing student's volition for civic action (Alscher et al., 2023). Several studies have investigated whether schools can meet these goals and have revealed promising results for various formats of civic education at schools (for reviews, see Campbell, 2019; Geboers et al., 2013; Teegelbeckers et al., 2023). Investigating the role of emotions in these contexts could help to understand these learning processes deeper.

### 1.3. Emotions and Political Learning

When looking at emotions in the context of political learning, two branches of the research literature can be differentiated: (1) the role of emotions during basic political information processing as a major theme in political psychology (e.g., Marcus et al., 2000; Redlawsk et al., 2007; Valentino et al., 2008), and (2) philosophical or qualitative approaches towards emotions in civic education in educational sciences (e.g., Garrett et al., 2020; Keegan, 2021; Wehner, 2019). Both highlight the emotionality involved in political matters and their relevance for political learning. Emotions are not only constantly experienced when dealing with political matters. They are also highly relevant when it comes to understanding and dealing with political apathy or distrust in democracy.

A well-known theory looking at emotions in political information processing is the Affective Intelligence Theory (AIT), which aims to explain how emotions are involved in political judgment, and also includes assumptions about the effects of emotions on learning about politics (Marcus et al., 2000). AIT differentiates between three affective dimensions termed enthusiasm, anxiety, and anger. The experience of enthusiasm, anxiety, and anger ranges depending on the experience of failure versus success, familiarity versus uncertainty, and norm compliance versus violation. While enthusiasm and anger are thought to come along with reliance on habits, anxiety interrupts this default system and thus enables learning in terms of deliberative information processing (Marcus, 2023). Though there is some support for this theoretical notion (e.g., on political knowledge and information seeking; Park, 2015; Redlawsk et al., 2007; Valentino et al., 2008), a recent review reported mixed results (Redlawsk & Mattes, 2022). Given the complexity of the association between negative-activating emotions and learning mentioned in the control-value theory (Pekrun et al., 2023), investigating the role of multiple discrete emotions above and beyond the focus of AIT is highly relevant.

Because research drawing on AIT primarily focuses on adult citizens, little is known about emotions experienced by adolescents in this context (Barrett & Pachi, 2019). This is quite surprising, given that adolescence is a sensitive phase for political development, where many foundations for later political engagement are set (Sears & Brown, 2013). The philosophical and qualitative approaches from educational sciences offer preliminary indications of the relevance of emotions experienced by this target group, particularly in civic education at schools. While it has

formerly been common for teachers to impede any emotional content in civic education (Besand, 2015), current researchers recommend addressing – or even directly using emotions tied to political topics in civic education. Emotions are essential to attract interest in political matters in civic education (Wehner, 2019) and could help reduce apathy and adolescents' often described distant perspectives on politics (White et al., 2000; Zukin et al., 2006). Specifically during discussions of current, contested political topics, emotions are expressed and reported by students (Garrett et al., 2020; Håkansson & Östman, 2019; Knight Abowitz & Mamlok, 2019; Manzel, 2016) and are a significant motivator for political action (Knight Abowitz & Mamlok, 2019). Allowing students to experience emotions in the context of civic education enables teachers to address how emotions are used, for example, in political communication, and thus foster critical affective literacy among students (Keegan, 2021). Based on this recent turn from excluding to including emotions in civic education, systematic evidence is desperately needed on when and which emotions are experienced and how they relate to political learning. Said differently, with the words of Keegan (2021, p. 17):

*“In order to raise critical awareness of emotion, theories are needed that explain how emotions function in civic education, how emotions can motivate different forms of civic engagement, and how emotion-based civic discourses regulate who is deserving of “concern” and “tolerance.”*

The discussed literature from political psychology and educational sciences on the role of emotions in political and civic learning highlights the importance of emotions in this context. Since emotions and associated psychological mechanisms on antecedents and effects have not been systematically investigated in this context until now, there is a need for a theory that explains when emotions occur and how they relate to political learning. Research on academic emotions, particularly the control-value theory, offers a promising framework for investigating emotions experienced in the context of political learning due to the broad support it has received from research in other domains. Specifically, *achievement*, *epistemic*, and *topic emotions* could be highly relevant emotions in the context of political learning.

Regarding *achievement emotions*, class-related activity emotions might be specifically relevant in civic education, as learning mainly takes place directly in class and less via homework or tests (especially if it is not taught in a single subject). Further, like *epistemic emotions* elicited by novel scientific information challenging one's prior beliefs, political information might elicit

epistemic political emotions if characterized by similar features (e.g., novelty, contrasting information to one's attitudes). Finally, while achievement and epistemic emotions directly pertain to learning (Pekrun & Loderer, 2020), *topic emotions* might also be relevant. Like learning in science education (Sinatra et al., 2014), political topics are often very controversial, closely connected to one's identity and beliefs, and thus very emotional. For example, Wansink and colleagues (2023) have shown that students associated different emotions with the topic of "Black Pete," a tradition in the Netherlands criticized in the light of colonialism and slavery, depending on their attitudes towards it. Also, students' general feelings about politics are related to students' initiation of political discussions in class (Bayram Özdemir et al., 2016) and thus of relevance for political learning.

#### **1.4. Aims of the Dissertation**

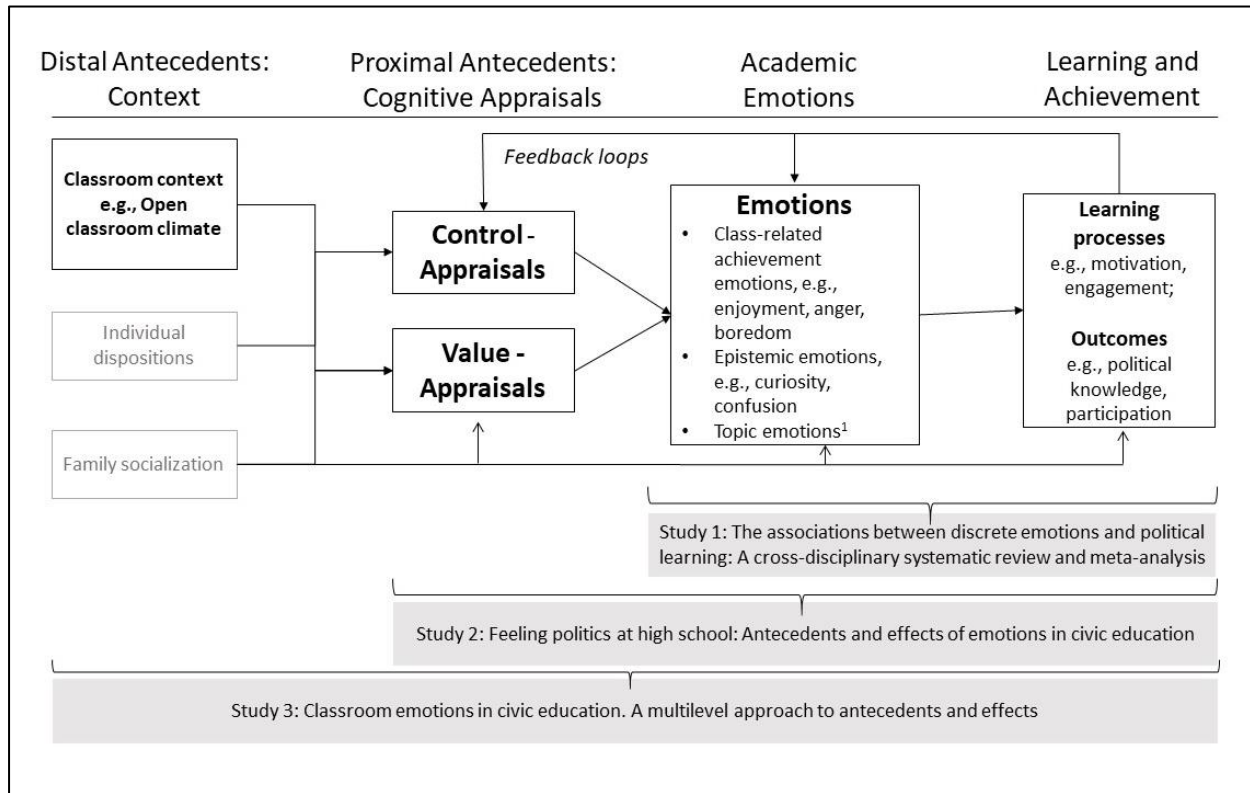
The aim of this dissertation was to analyze the role of emotions experienced during political learning by investigating their antecedents and associations with learning and learning outcomes. Based on the broad evidence for the relevance of emotions for learning (Loderer et al., 2020), mixed evidence for relations in the context of politics (Redlawsk & Mattes, 2022) and a lack of studies looking at adolescents (Barrett & Pachi, 2019), we can further distinguish between two main objectives: First, together with my collaborators, we asked what we do know about how emotions experienced in the context of politics are related to political learning. We address this question by synthesizing associations reported in prior studies within a common theoretical framework of control-value theory using methods for systematic reviews and meta-analysis in Study 1. Second, and again based on control-value theory, we aimed to investigate antecedents and effects of emotions experienced in civic education. This question was analyzed in two studies focusing on different target groups and the formats of civic education at school. In Study 2, we investigated achievement and epistemic emotions experienced in a cross-curricular civic education context among high school students<sup>1</sup> in Austria. We extended this research with a second sample

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<sup>1</sup> Upper secondary school: Full-time schools for students in grade 10 to 13 where they graduate with a certificate that allows them to subscribe to University. Schools of the academic track („Gymnasium“, usually grade 9 to 12) and schools with a vocational diploma in addition to the certificate (“BHS“, usually grade 9 to 13) were both included.

and a distal antecedent in Study 3: Now looking at emotions experienced in single-subject civic education classes, we investigated how the classroom climate, which has been identified as a central predictor of a variety of civic education outcomes (Campbell, 2019), is related to emotions experienced. Further, we analyzed whether emotions relate to and mediate associations between an open classroom climate and the outcomes political knowledge and participation. With these two studies, the current dissertation not only extends current evidence on emotions to the population of adolescents but also proves the applicability of the control-value theory, which has rarely been investigated in learning about social studies in a new domain.

Figure 1 provides an overview of the theoretical model underlying this dissertation and investigated concepts. In sum, this dissertation investigates the open classroom climate as a potential distal (Study 3) and control- and value appraisals as proximal antecedents (Study 2). Regarding outcomes of civic learning, I mainly focus on the component of political knowledge (Study 1-Study 3). Political knowledge is essential for democratic functioning, “influencing everything from turnout and vote choice to a person’s level of tolerance and the organization of his or her political beliefs” (Barabas et al., 2014, p. 840). Already among adolescents, political knowledge positively predicts expected and future political participation (Barrett & Pachi, 2019). Civic and political knowledge is thus highly relevant to the other aims and outcomes of civic education. Further, in my Study 3, I additionally include students’ intention to participate in politics in the future. Citizens’ participation is a central element of democracies, as only through active participation one’s interests can be communicated to the democratic decision-making process. Though political knowledge and participation are often associated (Barrett & Pachi, 2019), cognitive learning does not necessarily come with behavioral changes (Donbavand & Hoskins, 2021). Extending the current research to this more motivational and behavioral outcome of civic education is a significant advantage.

**Figure 1***Theoretical Framework and Study Overview*

*Note.* The figure of theoretical Framework is adapted from Pekrun (2006). Investigated concepts are displayed in bold.

<sup>1</sup> According to control-value theory, topic emotions do not directly pertain to learning but are relevant emotions experienced in the learning process (Pekrun & Lodeerer, 2020). As emotions focused on politics and their association with learning are investigated in Study 1, they might include topic emotions and are thus displayed together with other academic emotion types in this figure.

## 2. Synopsis of the Publications

### 2.1. Emotions and Political Learning Across Contexts: Synthesizing Current Evidence

Graf, E., Donath, J. L., Botes, E., Voracek, M., & Goetz, T. (2023). *The associations between discrete emotions and political learning: A cross-disciplinary systematic review and meta-analysis* [Manuscript submitted for publication]. Department of Developmental and Educational Psychology, University of Vienna.

- Submitted on August 11, 2023
- Results of this study were presented at AERA 2023 (online)

Whether *hope* towards one's supported candidate, *enthusiasm* about a won election, *outrage* regarding a recent new policy, or *boredom* during a repetitive discussion on a political topic that one has already gone through a thousand times - emotions are omnipresent in the context of politics. Since the 1980s, emotions have become a central concept investigated in psychology and political science (Brader & Marcus, 2013). Though studies examining emotions and political learning have risen in recent years, we lack a systematic synthesis of current evidence embedded in a common theoretical framework. Therefore, the first study of my dissertation aimed to systematically search for studies analyzing the association between discrete emotions and political learning. Specifically, we aimed to grasp which discrete emotions have been analyzed so far and analyze, based on control-value theory (Pekrun, 2006), how they relate to learning in the political context.

The challenge lies in the significant heterogeneity introduced by the cross-disciplinary character of the field and the diverse learning contexts to be considered. Political learning often occurs in informal settings, so we included various concepts to approach learning behavior. We included empirical, quantitative studies investigating associations between discrete emotions focusing on politics and at least one of four learning aspects (political information seeking, attention to politics, political discussions, and political knowledge). Based on the cognitive-motivational model included in control-value theory (Pekrun & Perry, 2014), we expected positive

associations between positive-activating emotions (e.g., enthusiasm) and learning and negative associations between negative-deactivating emotions (e.g., boredom) and learning.

After a systematic literature search through various databases and additional sources (e.g., conference proceedings), studies were screened, coded, and analyzed using multilevel random-effects models. The final sample included 66 studies, of which 41 (259 effect sizes) could be used for the quantitative synthesis. Most studies were based on US samples (71%) and adults (53%) or university and college students (32%). We found 19 discrete emotions investigated in the studies, with most effect sizes focused on anxiety (32%), anger (19%), and enthusiasm (15%). Our analysis revealed small positive associations ( $r = .05$  to  $.13$ ) for activating emotions of both negative (especially anger) and positive valence (e.g., enthusiasm, only in cross-sectional designs). Only a few effect sizes were based on deactivating emotions, for which we did not find significant associations. Overall, the results partially support expectations from the control-value theory and highlight the role of activating emotions for learning. At the same time, the lack of studies investigating adolescents, who are in a sensitive phase of their political socialization (Sears & Brown, 2013) and target group of political learning at schools, underlines the need for future studies in this field.

## 2.2. Antecedents and Effects of Emotions Experienced in Cross-Curricular Civic Education Contexts

Graf, E., Goetz, T., Bieleke, M., & Murano, D. (2022). Feeling politics at high school: Antecedents and effects of emotions in civic education. *Political Psychology*.  
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- Part of the results of this study were presented at EARLI 2021 (online) and GEBF 2022

Building on the identified lack of research on adolescents and the context of political learning in schools, the second study investigated students' emotions experienced in civic education. The study aimed to test associations between discrete emotions and cognitive appraisal (as proximal antecedents of emotions) and further effects in civic education (engagement, intrinsic and extrinsic motivation, political knowledge), thereby testing fundamental propositions of the control-value theory (Pekrun, 2006). To meet these goals, we adapted and developed existing scales from the academic emotions literature and applied them to civic education, specifically to the cross-curricular context applied in Austrian schools of the academic track<sup>2</sup>. This cross-curricular context, meaning addressing social and political content in regular subjects (e.g., discussing current hot topics like climate change and activism in biology or analyzing a political speech in language classes), challenges the measure of academic emotions as there is no clear frame of reference. Given the domain-specificity of academic emotions, assessing emotions focused on the domain of interest is essential. We address this by (1) measuring classroom emotions focused on situations when social and political issues are discussed and (2) measuring epistemic emotions when information about social and political issues are handled in school. We hypothesized that control and value appraisal relate positively to positive-activating emotions (e.g., enjoyment) and negatively to boredom and confusion. For negative-deactivating emotions, we expected negative associations with control and a positive association with negative value. Finally, we expected positive associations for positive-activating and epistemic emotions and learning and the reverse for negative-deactivating emotions.

Using online questionnaires including self-report scales and a knowledge test, we assessed a broad range of proximal antecedents (e.g., political interest, different value appraisals, internal political & citizenship self-efficacy), classroom- and epistemic political emotions, as well as learning processes and outcomes (e.g., student's engagement in politics, intrinsic and extrinsic motivation, political knowledge). The data of 596 students ( $M_{\text{age}} = 17.1$ , 75 % female) from 34 classes of grade ten and higher and 12 schools were then analyzed using latent variable modeling.

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<sup>2</sup> BHS (= Berufsbildende Höhere Schule, z.B. HTL, HLW) and AHS (= Allgemeinbildende Höhere Schule)

After evaluating the newly developed and adjusted scales, we calculated latent correlations to test associations between emotions and their antecedents and outcomes.

We found broad support for the control-value theory in this study, specifically for positive-activating and negative-deactivating emotions. Positive-activating emotions like enjoyment, pride, and hope, but also epistemic emotions like curiosity and surprise were positively related to cognitive appraisals ( $r = .33$  to  $.79$ ,  $p < .001$ ) and outcomes ( $r = .16$  to  $.76$ ,  $p < .004$ ). In contrast, negative-deactivating emotions like hopelessness and boredom showed correlations in the opposite directions (appraisals:  $r = -.14$  to  $-.74$ ,  $p < .029$ ; outcomes:  $r = -.20$  to  $-.52$ ,  $p < .001$  [exception: association between hopelessness and extrinsic motivation]). Interestingly, the epistemic political emotion confusion mirrored in its correlational patterns ( $r = -.15$  to  $-.34$ ,  $p < .014$ ) broadly correlations of negative-deactivating emotions. The results of the negative-activating emotions of anger, anxiety, and shame were much more complex. This complex pattern is in line with prior studies showing, for example, a positive association of negative-activating emotions with extrinsic motivation in contrast to negative associations with intrinsic motivation (Pekrun et al., 2011) and studies from political psychology showing differential effects of anxiety and anger (Huddy et al., 2007).

This study's main contribution to the field is the newly developed scales, which should boost the analysis of emotions in the political context and a new perspective on epistemic emotions: First, we assessed epistemic emotions focused on political information, applying the concept to the political context. Second, we used trait measures for epistemic emotions, showing highly reliable measures and associations to related concepts, indicating the trait-like functioning of these discrete emotions. Third, we address the component structure typically used in conceptualizing emotions (e.g., Lange & Zickfeld, 2021) and when measuring trait-like achievement emotions (Bieleke et al., 2021; Pekrun et al., 2011) and apply it to epistemic emotions. As shown for achievement emotions, components might vary in relevance depending on the situation and outcome (Roos et al., 2021). This opens up venues for future research on the functioning of this specific type of emotion.

### 2.3. Class-Related Emotions in Civic Education as a Single-Subject: Investigating the Classroom Climate as Distal Antecedent and Outcomes of Civic Education

Graf, E., Stempfer, L., Muis, K. R., & Goetz, T. (2023). *Classroom emotions in civic education: a multilevel approach to antecedents and effects* [Manuscript submitted for publication]. Department of Developmental and Educational Psychology, University of Vienna.

- Submitted on July 13, 2023
- Part of the results of this study will be presented at EARLI 2023 in Thessaloniki

Knowing the relevance of students' emotions experienced in civic education, as shown in Study 2, raises the question of how distal antecedents contribute to the experience of these emotions and whether results transfer to other outcomes of civic education. From the perspective of control-value theory (Pekrun, 2006), relevant distal antecedents are individual dispositions, teacher characteristics, and contextual factors such as students' perception of the classroom climate. In civic education, the social setting in which controversial issues are discussed is of great relevance, and the classroom climate during such discussions has been identified as an essential element of successful civic learning (Campbell, 2008; Martens & Gainous, 2013). Therefore, students' perception of the classroom climate might be a relevant distal antecedent of emotions experienced in this context. This study thus aimed to investigate whether and how the classroom climate is related to enjoyment, shame, anxiety, and boredom and whether these emotions construct an indirect path to outcomes of civic learning, specifically, political knowledge and participation.

In contrast to Study 2, we focused on emotions experienced in civic education as a single subject in vocational schools, thereby extending our evidence on emotions and political learning to a new format of civic education and the often overlooked target group of vocational school students. The sample included 1,119 students from grade 10 and onwards, with a mean age of 18.26 ( $SD = 2.57$ ). Topic emotions and the frequency of discussions were included as control variables in additional analyses. As our primary variable of interest was conceptually located at the classroom level, we conducted doubly-latent multilevel structural equation models to test the

proposed associations. These models allow measurement and sampling error to be taken into account and to utilize the within- and between-variance separately to test the proposed hypotheses. We found significant positive associations between an open classroom climate and enjoyment and the opposite for boredom on both levels. Further, open classroom climate was negatively related to anxiety at the within level, while our hypothesis on shame was not supported. Interestingly, while shame and anxiety related negatively to political knowledge, our analysis revealed opposing effects in our model on political participation. For behavioral rather than cognitive outcomes, activating emotions might thus be of particular relevance. Finally, we found a significant positive indirect effect from open classroom climate to participation through enjoyment and a negative indirect effect through anxiety at the student level. Additional analyses revealed that results broadly hold when including control variables. All topic emotions were related positively to their respective classroom emotion. Whereas topic anxiety related positively to both outcome variables, topic boredom showed negative associations.

Overall, results reveal the relevance of the open classroom climate as a distal antecedent for emotions experienced in civic education. Further, we show again the importance of emotions for learning outcomes of civic education. As we could only find some support for the expected indirect effects, future studies could investigate other distal antecedents, such as teaching methods used in civic education, and extend the research to other formats of civic education. They are also highly relevant for civic education teachers, as they show possible pathways on how the emotions experienced in the class are shaped. Setting rules for and carefully moderating discussions of political and social issues might help shape a positive classroom climate, fostering emotions like enjoyment and reducing emotions like boredom. At the same time, it shows that negative-activating emotions would need more or less regulation depending on the outcome aimed.

### **3. Discussion**

The present dissertation aimed to investigate the role of emotions during political learning. I thereby built on the control-value theory (Pekrun, 2006) and tested its assumptions about antecedents and effects of emotions in the context of political learning. Based on a systematic review and meta-analysis and two studies including novel data about civic education in Austrian schools, I provide strong support for associations proposed by the control-value theory. Regarding

antecedents, a classroom climate characterized by openness to current topics and diverging arguments and control- and value appraisals revealed clear patterns of associations to emotions, specifically mainly positive associations with positive-activating emotions (e.g., enjoyment, curiosity) and negative associations with negative-deactivating emotions (e.g., boredom, confusion). Further, while previous research mainly emphasized the advantages associated with positive-activating emotions (e.g., Camacho-Morles et al., 2021; Loderer et al., 2020), we find – depending on the outcome considered – also some support for positive associations for negative-activating emotions (e.g., anger in Study 1, shame and anxiety in Study 3).

The results extend theoretical assumptions to concepts rarely investigated in this framework (negative value, epistemic emotions, topic emotions) and provide novel insights into differential associations, specifically regarding negative-activating emotions (e.g., anxiety and anger). Furthermore, the dissertation contributes to the mediation hypothesis involved in the control-value theory. While a mediation from distal antecedents to emotions via control- and value appraisals (Goetz et al., 2020; Simonton et al., 2017), from proximal antecedents to outcomes (e.g., achievement) via emotions (Shao et al., 2020), and additionally including learning process (Chevrier et al., 2019; Stark et al., 2018) has been shown in previous research, Study 3 provides first insights into the indirect association from classroom climate as a distal antecedent to academic outcomes via experienced emotions in class.

Further, the results of the dissertation extend prior research on emotions in politics to adolescents, who are in a formative period of their political development (Rekker et al., 2015; Sears & Brown, 2013; Shehata & Amnå, 2017) and rarely investigated in prior studies (Barrett & Pachi, 2019; see also results of Study 1 of this dissertation). By focusing on civic education at schools, I thus contribute to a timely educational domain, which has received increased attention in recent years (Campbell, 2019; Donbavand & Hoskins, 2021) and is, in the light of the democratic crisis (Lührmann & Lindberg, 2019), of great societal relevance. The studies included in this dissertation are the first systematic investigation of discrete emotions in this context. The results are meaningful to teaching civic education at schools and have critical pedagogical implications. In what follows, I first discuss the results' implications for emotion theories, specifically the control-value theory (Pekrun, 2006). Second, I transfer presented results towards implications for research and practice in civic education and conclude with limitations and pathways for future research.

### 3.1. Implications for Theories on Emotions

This dissertation mainly builds on literature about academic emotions and the control-value theory of achievement emotions (Pekrun, 2006), which includes assumptions about antecedents and the effects of emotions experienced in achievement settings. In addition to the broad support for the assumptions of the theory mentioned before, my analyses extend the applicability of assumptions of the control-value theory from achievement emotions to emotions focused on the knowledge-generating aspects of learning and cognitive processing of information, called epistemic emotions (Muis, Pekrun, et al., 2015; Muis, Psaradellis, et al., 2015). While prior studies revealed the first evidence of cognitive appraisals of control and value as relevant antecedents of epistemic emotions (Muis, Psaradellis, et al., 2015), the current results of Study 2 support this notion also regarding the emotions of curiosity, surprise, and confusion focused on political information processing. Regarding associations between emotions and learning processes, we found that epistemic political emotions, measured here as trait emotions with different emotional components, show similar relation patterns as achievement emotions. Precisely, while curiosity and surprise were related positively to engagement, motivation, and knowledge, confusion mirrored the negative associations of hopelessness and boredom. Additionally, by developing new reliable self-report scales to measure epistemic emotions where items address different emotional components (e.g., affective, cognitive, motivational component), we show that the underlying theoretical structure of emotions is also applicable to this type of academic emotions. These results propose that the control-value theory can be applied to trait-like epistemic emotions focused on political information processing.

Though the cognitive-motivational model allows precise predictions about how positive-activating and negative-deactivating emotions relate to learning processes and outcomes (Pekrun et al., 2002), prior research allowed fewer predictions for negative-activating emotions. This, for example, is evident in variable motivational and behavioral effects of negative-activating emotions like anxiety in technology-based learning environments (Loderer et al., 2020). Future studies should investigate whether systematic variance could be explained by the learning outcomes considered. For example, combining the results of the studies included in this dissertation with prior evidence suggests that negative-activating emotions might play a motivational role in more behavioral outcomes (e.g., engagement and participation). In contrast, they can have detrimental effects on cognitive outcomes (e.g., strategy use, knowledge).

The combined results of the studies further support the importance of differentiating emotions by their object focus (Pekrun et al., 2023; Pekrun & Stephens, 2012). This dissertation includes studies on three types of academic emotions: classroom, epistemic, and topic emotions. While achievement- and epistemic emotions revealed similar patterns to political learning (Study 2), some paths from topic emotions to outcomes were divergent from observed paths of the same emotion focused on the activities in class (Study 3). Emotions observed in the meta-analysis (Study 1) were focused on politics, mainly on political campaigns, candidates, or specific policy issues (e.g., the H1N1 flu epidemic). Given the positive associations between negative-activating emotions with learning outcomes in these two studies (anger in Study 1, anxiety and shame in Study 3), it might be that emotions associated with the topic tend to relate positively to learning and thus contribute to the complex patterns usually observed if not differentiating between achievement or epistemic and topic emotions. The positive association in the case of topic emotions might be explained by increased arousal and attention due to the activating characteristic of these emotions.

Further, the results only partly support expectations proposed by the Affective Intelligence theory (Marcus et al., 2000). Although we find some support for a positive association between political topic anxiety and learning in Study 3, results of the meta-analysis found, in contrast to the propositions of the theory, no associations for anxiety. The main focus of the theory is on the political decision-making process (Redlawsk et al., 2007). However, there has been ample criticism regarding decisions about candidate evaluations before (Ladd & Lenz, 2008, 2011) and mixed results regarding its propositions (Redlawsk & Mattes, 2022). Also, some studies drawing on the theory and focusing on learning found results directly opposite to its assumptions, specifically positive relations between anger and enthusiasm and cognitive elaboration but no relations with fear (Lee & Choi, 2018). It might be that AIT is only applicable if considering highly contested topics, where motivated reasoning is likely involved. As it focuses only on a few discrete emotions, it might be fruitful to combine it with theories on epistemic emotions and conceptual change (Muis et al., 2018) if investigating the role of political emotions in these contexts.

Finally, considering Keegan's (2021) notion of critical affective literacy, this dissertation contributes by explaining how emotions function in civic education. With Studies 2 and 3, I provide first insights into how discrete emotions are associated with learning processes like motivation and engagement and outcomes like knowledge and participation. Future studies are encouraged to

investigate further “*how emotions can motivate different forms of civic engagement*” (Keegan, 2021, p. 17) by inspecting psychological mechanisms and other outcomes of civic education, like civic identity and value development. Due to the cognitive-motivational mediation model (Pekrun et al., 2002), the control-value theory offers a well-fitting framework to investigate further these processes in civic education and, thus, our understanding of the role of emotions in political learning.

### **3.2. Strengths, Limitations, and Pathways for Future Research**

The current dissertation provides a comprehensive synthesis of how emotions relate to political learning in various contexts and novel insights into the role of emotions during civic education at upper secondary schools. By drawing samples of schools from the academic and vocational track, thus different school types, demographic target groups, and even formats of civic education, it is possible to conclude that results are stable and transferable to other contexts. For example, basic patterns of associations – specifically for positive-activating and negative-deactivating emotions – were consistently found in both civic education contexts. Still, there is a need to investigate associations in other contexts further. As civic education is always situated in a specific country context which often differs in their political systems (e.g., legal voting age, average turnout at elections) and approaches to civic education (Schulz et al., 2018), it is of great interest whether results would replicate in other countries. It would be fruitful to evaluate adapted and developed measurement instruments (e.g., the epistemic political emotions scale; Study 2) across countries and further investigate the newly applied emotional component structure. Future studies could further broaden the focus of the current dissertation by including other formats (e.g., participation at school or service learning; Campbell, 2019; Youniss, 2011) and aims of civic education (e.g., value and attitude development, actual participative behavior; Carretero et al., 2016; Teegelbeckers et al., 2023).

Given the lack of studies investigating emotions in the context of political learning among adolescents, this dissertation provides a first approach to this vital topic using cross-sectional data and sophisticated statistical methods in line with current standards in educational psychology (e.g., latent variable modeling, multilevel analysis). Still, the cross-sectional design of Studies 2 and 3 limits the possibility of drawing causal conclusions. As results of Study 1 from the synthesis of effect sizes in experimental designs imply that there is some causality from emotions (i.e., anger)

to learning involved, it would be promising to use longitudinal and (quasi-)experimental designs (e.g., intervention studies) in future to investigate antecedents and effects of emotions in this context. This is even more apparent due to the general lack of controlled trials in civic education (Donbavand & Hoskins, 2021). In their systematic review of which educational techniques foster political engagement, Donbavand and Hoskins (2021) only found 25 studies that met the inclusion criteria. Consequently, including emotions in such experimental designs could be a promising aim for future research.

In addition to longitudinal studies, experience sampling could broaden current results by investigating state emotions. While recently increasingly used in psychological research and related disciplines (Wrzus & Neubauer, 2023), to our knowledge, it has not yet been applied to civic education. It could provide insights into associations of state emotions with their antecedents and effects and an ecologically valid assessment of when and about what specific social and political topics civic education takes place at schools. Further, it would allow possibilities to analyze how topic and classroom emotions are interrelated more specifically. Though self-report measures used in the current study best assess subjective experience (Goetz et al., 2023), combining experience sampling with observational or physiological data could help to understand emotional processes in the civic education classroom deeper.

Further, it would be interesting to investigate social factors in the classroom when discussing political and social issues at school. Discussions were central in Studies 1 and 2, and the frequency of reported discussions about political and social issues at schools seems to have increased in recent years (Aichholzer et al., 2020)<sup>3</sup>. Thereby, polarization in the classroom is associated with the classroom climate (Knowles, 2020) and, consequently, emotions and civic learning. Social aspects, for example, whether one's opinion constitutes a majority or minority position in the classroom or whether one is perceived as an opinion leader and related emotions could be highly important in this context. Future studies could extend the focus of the current

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<sup>3</sup> According to recent data from Austria, age significantly correlates with the frequency of discussing politics, with younger voters reporting more frequent discussions about national politics and elections ( $r = .37$ ,  $p < .001$ ,  $N = 2,676$ ) and other political and social issues ( $r = .08$ ,  $p < .001$ ,  $N = 2,676$ ) during their school time (own analysis; Aichholzer et al., 2020).

dissertation from achievement, epistemic, and topic emotions to social emotions experienced in these contexts, for example, by using statistical approaches like social network analysis.

### **3.3. Emotions and Civic Education: Implications for Practice**

Drawing on the results of this dissertation, I would like to highlight two important implications for teaching civic education. First, civic education teachers are encouraged not to be afraid of civic education getting emotional. Prior studies have shown that teachers sometimes hesitate to confront students with controversial issues (e.g., participation in a study on Black Pete; Wansink et al., 2023). However, the strongest negative associations of emotions with political learning found in our studies are about boredom. In contrast, activating emotions – sometimes even of negative valence (e.g., anxiety) – are positively associated with motivation, engagement, knowledge, and participation and can thus contribute to fostering students' interest and future engagement in politics. Consequently, addressing emotions in civic education can help to catch students' attention who otherwise feel distanced from democracy and politics (Wehner, 2019). At the same time, it is essential to note that students within a class might differ greatly in the emotions they experience. This can be seen by within-class variance in Study 3 or different emotions towards a controversial topic depending on one's opinion and background. For example, Wansink and colleagues (Wansink et al., 2023) have shown that emotions reported differed depending on whether students identified as opponents or proponents and their skin colors. Schools are often the most diverse context one is confronted with in one's lifespan, with a broad range of ideological diversity (McLeod et al., 2010). In this context, it is even more critical to offer an open climate where everyone can be heard and experience positive emotions independent of their associated emotion related to the topic.

Second, teachers could focus and provide space for different emotions depending on the outcome aimed for. First and foremost, positive-activating emotions should generally be aimed for, as the results of this dissertation almost consistently show positive associations with learning. Providing a positive and open classroom climate and fostering students' feelings of political efficacy and intrinsic value of understanding and participating in social and political matters are promising mechanisms for achieving this. Further, to motivate students for more behavioral outcomes, such as getting active to participate in politics, addressing possible negative-activating emotions such as anxiety or anger can help. However, teachers need to be careful not to enhance

the unintended effects of these emotions, such as a negative effect on institutional trust (Erhardt et al., 2021).

### **3.4. Conclusion**

In her didactic essay, Besand (2015) wrote that the emotional process involved in learning seems to be a missed topic in the discussion about civic education. This starkly contrasts emotion research in other disciplines, which has recently gained broad attention (Camacho-Morles et al., 2021; Goetz et al., 2023). Though emotions are increasingly mentioned in philosophical and qualitative papers and of focal interest in political didactics (e.g., “Emotions and civic education” was the topic of the 2023 annual meeting of the Society for Political Didactics and Political Youth and Adult Education, GPJE), a systematic investigation of their antecedents and effects on political learning was still missing. This dissertation provides the first quantitative investigation of several discrete emotions, including achievement, epistemic, and topic emotions. Drawing on control-value theory, I show that the classroom climate, control- and value appraisals are essential antecedents of experienced achievement and epistemic emotions and that emotions are associated with motivational, behavioral, and cognitive learning processes and civic education outcomes. Future studies can further investigate the role of emotions by using developed scales and extending the presented results to new contexts and methodological approaches. Finally, civic educators are encouraged to be open to emotionally discussed political topics and to recognize the importance of emotions in political learning. Knowing the antecedents of emotions may enable them to stimulate the experience of positive and activating emotions in civic education, thereby motivate for political learning.

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## 5. Publications of the Dissertation

### 5.1. Study 1

**Graf, E., Donath, J. L., Botes, E., Voracek, M., & Goetz, T. (2023). *The associations between discrete emotions and political learning: A cross-disciplinary systematic review and meta-analysis* [Manuscript submitted for publication]. Department of Developmental and Educational Psychology, University of Vienna.**

- Submitted on August 11, 2023
- Results of this study were presented at AERA 2023 (online)

#### Author Contributions (CRediT Statement)

Conceptualization: Elisabeth Graf; Data curation: Elisabeth Graf, Johanna Lowis Donath, Elouise Botes; Formal Analysis: Elisabeth Graf; Methodology: Elisabeth Graf, Martin Voracek; Johanna Lowis Donath; Supervision: Thomas Goetz; Visualization: Elisabeth Graf; Writing – original draft: Elisabeth Graf; Writing – review & editing: Elisabeth Graf; Johanna Lowis Donath, Elouise Botes, Martin Voracek, Thomas Goetz;

#### Note

The study was preregistered via prospero (ID: [CRD42020211220](https://www.crd42020211220)). Data, accompanying analysis scripts, and supporting information are available via [OSF](https://osf.io). Results of this study were presented at AERA 203 (online).

### Abstract

In recent decades, researchers' interest in the role of emotions in individual political learning has grown. However, it is still unclear whether and how discrete emotions are associated with political learning. Through a cross-disciplinary systematic review and multilevel meta-analysis, we aimed to review which discrete emotions have been analyzed in the context of political learning so far and meta-analytically synthesize how these emotions relate to political learning. We address this question by synthesizing associations between discrete emotions and various aspects of learning about political matters, such as political attention, information seeking, discussions, knowledge, and knowledge gain. The final dataset included 66 publications with 486 effect sizes, involving more than 100,000 participants. Most of the effect sizes were based on negative-activating emotions (64%; mainly anxiety, 31%, and anger, 19%) and positive-activating emotions (32%; mainly enthusiasm, 15%). We uncovered small positive associations ( $r = .05$  to  $.13$ ) for activating emotions, of both negative (especially anger) and positive valence (e.g., enthusiasm, only in cross-sectional designs), but no associations for deactivating emotions. We discuss theoretical implications and recommend future research to include previously unconsidered emotions in order to extend existing findings.

*Keywords:* emotions, political learning, political knowledge, meta-analysis

### **The associations between discrete emotions and political learning: A cross-disciplinary systematic review and meta-analysis**

Emotions undoubtedly play a role in political activism, political campaigns and political learning (Brader & Marcus, 2013). It has been speculated that emotions may even trump rationality in politics, with Westen (2007) remarking that “In politics, when emotion and reason collide, emotion invariably wins” (p. 35). This role of emotions in politics was long neglected in research, but interest in this field has rapidly increased since the 1980s (Brader & Marcus, 2013). The increased research attention may be due to the emotionally laden political events of recent years, with studies examining emotions regarding the Brexit referendum (Nadeau et al., 2021; Vasilopoulou & Wagner, 2022), the Trump election campaigns (Hoewe & Parrott, 2019; Ford et al., 2019), and public threats caused by pandemics (Albertson & Gadarian, 2015, Wang & Ahern, 2015) and climate change (Chadwick, 2015; Furlong & Vignoles, 2021).

Particularly, there is a great number of studies addressing questions on whether and how emotions are related to different aspects of political learning, such as political attention, information seeking or political knowledge. Building on different theoretical perspectives on emotions and mainly focusing on a few negative discrete emotions (Brader & Marcus, 2013; Crigler & Just, 2012), these studies emphasize that when looking at political learning, the role of emotions should not be overlooked. However, there are a wide variety of approaches, study designs and even results. For example, while studies quite consistently show positive relations between anxiety and an increase of political knowledge (e.g., Marcus & MacKuen, 1993; Valentino et al., 2008), results are less clear when it comes to attention to politics (e.g., Huddy et al., 2007; Just et al., 2007 versus Marcus et al., 2000) and information seeking (e.g., Park, 2015; Redlawsk et al., 2007; Valentino et al., 2008).

The wide variety of studies have rarely been considered in a common theoretical framework on learning, and to the best of our knowledge, no systematic review or meta-analysis emotions and political learning has been conducted. Learning about politics takes place in various settings and frequently in informal contexts. It requires learners’ attention to political matters, and further involvement, for example, via discussions or seeking for more information, in order to result in gaining political knowledge. A prominent theory on the role of emotions in learning is the control-value theory of achievement emotions (Pekrun, 2006). The control-value theory

details what factors may contribute to the experience of emotions during learning, and how they affect learning processes and outcomes. It is broadly supported by research from other domains (e.g., foreign language learning: Shao et al., 2020) and has recently also been investigated in informal learning contexts (Beymer et al., 2022). Although it has rarely been applied to the political context, it can serve as a theoretical framework for this meta-analysis due to its focus on learning and its incorporation of a broad range of discrete emotions. As outlined in more detail below, the theory suggests that while some emotions foster learning due to increased attention and motivation, others can be detrimental for the learning process.

The aims of this study were twofold: First, we reviewed which emotions were currently analyzed in the context of political learning. Second, we aimed to analyze whether and how discrete emotions are related to political learning by using meta-analytic methods to synthesize reported associations between discrete emotions and learning. Specifically, we encompass a broad perspective on learning, including processes like attention to politics, discussions, information seeking, and outcomes like knowledge, and knowledge gain. Previous research has argued that emotions are central to politics (e.g., ‘politics is inherently social and emotional’ [Crigler and Just, 2012, p. 211]; ‘key feature of politics’ [Lynggaard, 2019, p. 1201]) and that political learning is crucial in the making of informed political decisions and political participation (Schlozman et al., 2018). As such, a detailed overview on the functioning of emotions in this context is of great relevance for political communication, political educators and in general, the functioning of democracy. For example, emotional political information can help to decrease preexisting knowledge-gaps on political matters (Bas & Grabe, 2015). Additionally, by synthesizing existing studies into a thorough overview of the cross-disciplinary research, this meta-analysis reveals blind spots to be addressed in future research and builds a basis for further theory development in the field.

## **Emotions**

Researchers have established various theories in order to define emotions and conceptualize their functioning. Emotions are frequently considered to be multi-component constructs with affective, cognitive, motivational, expressive-behavioral, and physiological components (e.g., Crigler & Just, 2012; Lange & Zickfeld, 2021; Pekrun, 2006). In contrast to general moods or feelings, emotions are typically characterized by an object focus (Crigler & Just, 2012; Pekrun,

2006; Pekrun et al., 2023), thus related to an event, a situation, action, or physiological object (Pekrun et al., 2023). Emotions in politics are thus triggered or focused on political aspects, such as political leaders or current events (Capelos & Chrona, 2018). Political emotions, for example, might be experienced while watching a heated debate between candidates before election day, reading a newspaper article about a recent corruption scandal, or when running into a protest of climate activists on the street. They can be conceptualized as situational, short-term responses to stimuli (i.e., state emotions) or trait-like measures similar to personality traits (Crigler & Just, 2012).

Generally, theories applied on emotions experienced in the context of politics differ in whether they see emotions on a single valence dimension (e.g., positive versus negative emotions) or as discrete emotions (e.g., anger and anxiety; Brader and Marcus, 2013). Which perspective fits best to explain emotional processes is often dependent on the specific research question at hand. Nevertheless, recent theoretical developments tried to combine both (i.e., a dimensional and discrete perspective on emotions; Dreisbach, 2022; Lange & Zickfeld, 2021). While different (i.e., discrete) emotions can be distinguished in terms of semantic concepts of prototypical patterns of emotional experience (Russell & Barrett, 1999), some emotions are more similar to one another (e.g., distress and frustration) and therefore also more similar in their functioning. Two important dimensions used to distinguish the affective basis of emotions are valence and arousal, thereby placing emotions on a two-dimensional space between unpleasant and pleasant experience and with low to high arousal (Russell, 1980). To illustrate, enthusiasm is typically experienced positively (i.e., pleasant) and is activating (i.e., high arousal), anxiety is experienced negatively (i.e., unpleasant) and is activating (i.e., high arousal), and boredom is experienced negatively (i.e., unpleasant) and deactivating (i.e., low arousal).

The intertwined nature of emotion and cognition (Dreisbach, 2022), suggests that emotions play a crucial role when learning. Emotions are an integral component of the learning process, as they can attract our attention towards the object to be learned (e.g., emotions like surprise; Muis et al., 2018). However, emotions can also act as a barrier for this attention (e.g., if experiencing boredom; Pekrun et al., 2010). One theory specifically developed to explain the role of emotions for learning is the control-value theory (Pekrun, 2006; Pekrun et al., 2023), that primarily focuses on achievement emotions in academic setting and aims to explain their antecedents and effects on learning. Similar to the before-mentioned two-dimensional taxonomy of the circumplex-model (Russell, 1980; Russell & Barrett, 1999), control-value theory suggests that in order to explain

learning, differentiating emotions along the dimensions of activation (activating versus deactivating) and valence (positive and negative) can provide fruitful insights (Pekrun, 2006). Specifically, it proposes that positive-activating emotions are positively related, and negative-deactivating emotions negatively related to learning, with observations about positive-deactivating and negative-activating emotions being more complex (Pekrun, 2006).

### **Learning about Politics**

Political learning is a complex and multi-faceted construct. Like politics itself (e.g., see Hay, 2002), it can be conceptualized broadly (e.g., including a variety of political competencies and attitudes on societal topics) or more narrowly (e.g., focusing on specific competencies, core political themes). In our work, we define political learning as the process of acquiring political knowledge. Essential aspects of political knowledge are what the government is (i.e., political structures) and does (i.e., policy issues on which public decisions are made), knowledge about political actors and their positions (e.g., political leaders and parties) as well as knowledge about related fields like political history (Delli Carpini & Keeter, 1993). We focus on political knowledge as it is highly relevant to other civic competencies, like participation (Schlozman et al., 2018). Political knowledge impacts not only whether one participates or not, but also “the quality of political decision making, and thus ... the quality of citizenship” (Delli Carpini, 2009, p. 41). Consequently, it is critical for democracies to understand when and how citizens acquire political knowledge.

Learning about politics is a lifelong process and takes place in various contexts. Basic foundations are settled in early childhood through socialization with family and peers and civic education at schools (Schlozman et al., 2008). Thereby, schools play a major role in citizens’ political development, on the one hand directly through civic education, but also indirectly through fostering knowledge and skills relevant to lifelong political learning (Niemi & Junn, 1998; Ichilov, 2003). Civic education can be conceptualized as an institutional form of political knowledge acquisition (Ichilov, 2003), which includes both formal (i.e., lessons specifically aimed to teach about political matters) and informal political learning, such as learning by discussing politics in class (Deimel et al., 2020; Losito et al., 2021; Galston, 2001). During adulthood, informal political learning continues to be highly relevant. Specifically, citizens learn across their lifespan through incidental and self-directed (i.e., intentional) exposure to political information (Schugurensky &

Myers, 2003). Political learning across all these contexts occurs when citizens pay attention to mass media (Barabas et al., 2014), actively seek political information (Redlawsk et al., 2007), or engage in political discussions with friends (Moeller & de Vreese, 2019).

### **Emotions Experienced in the Context of Politics and Learning**

Studies on the role of emotions in learning about politics have primarily focused on enthusiasm, anxiety, and anger (Brader & Marcus, 2013). These three emotions are at the heart of the affective intelligence theory, which is widely used in studies on emotions in politics and seeks to explain how emotions influence political information processing, judgement, and behavior (Marcus, 2000; Redlawsk & Mattes, 2022). It distinguishes between two fundamental emotional systems: disposition and surveillance. The surveillance system, which is activated by threat and causes anxiety, is assumed to facilitate learning by interrupting reliance on political habits (e.g., partisan heuristics during political decisions; Marcus et al., 2000; Marcus, 2013). Though this theory makes assumptions about how anxiety, anger, and enthusiasm relate to political learning, it appears to be less useful for explaining relationships between emotions and learning across a broader range of discrete emotions.

Political learning is often investigated in the context of (mock) election campaigns or focused on specific policy issues. In line with before mentioned attention as a function of emotions, both anxiety and enthusiasm have been shown to positively relate to interest in political campaigns and attention to political news (Marcus et al., 2000). However, other studies could not replicate this relation (Huddy et al., 2007), whilst others still found a negative relation between anxiety and political attention (Otto et al., 2020). Anger has often been shown to relate negatively to information seeking (e.g., Redlawsk et al., 2007; Valentino et al., 2008), with enthusiasm and anxiety positively affecting information seeking (Redlawsk et al., 2007). Similarly, studies have shown positive relations of anxiety with the discussions of politics with friends, family, co-workers and neighbours (Huddy et al., 2007). The most consistent findings have been shown regarding emotions and political knowledge gains about politics, with mainly positive relations reported between anxiety and an increase of political knowledge (Marcus & MacKuen, 1993; Marcus et al., 2000; Nadeau et al., 1995; Park, 2015; Valentino et al., 2008).

Given the at times contradicting results and increasing number of studies looking at the role of emotions in political learning, it seems to be high time to thoroughly summarize the existing

literature and investigate whether there is systematic variance in reported effect sizes. Prior reviews on the topic focused more generally on the antecedents and various functions of emotions in politics (e.g., also for political behavior like participation or decision taking; Brader & Marcus, 2013; Groenendyk, 2011, Redlawsk & Mattes, 2022) or emotions in political communication in general (Crigler & Just, 2012). While the latter is the only review reporting a systematic literature search on emotions and politics, until now and to the best of our knowledge, no systematic quantitative synthesis of the effect sizes found in empirical studies on emotions and political learning has been published. While we know that emotions are experienced frequently in the context of politics (Crigler & Just, 2012), and they can foster or even prevent us from learning related processes, there is no existing extensive overview on political emotions and their association with political learning.

### **The Present Research: Aims of the Systematic Review and Meta-Analysis**

With this study, we attempt to fulfill various objectives. First, we aimed to gather a sufficient overview of which emotions are included in existing studies on political learning. Second, we synthesize these studies using multilevel random-effects models in order to find out if, and indeed which, emotions are related to political learning. Thereby, we include both cross-sectional and experimental designs, as both investigate the main research question but from different approaches. While cross-sectional studies are able to catch possible recursive effects, experimental designs are able to identify causal mechanisms involved. We apply a theoretical framework novel for this context by analysing results through the lens of the control-value theory of achievement emotions (Pekrun, 2006). More specifically, when categorizing emotions in (1) positive-activating, (2) positive-deactivating, (3) negative-activating, and (4) negative-deactivating emotions, we expect that positive-activating emotions (e.g., enthusiasm) are related to increased political learning and learning outcomes, while negative-deactivating emotions (e.g., boredom) are related to less political learning and learning outcomes. For positive-deactivating (e.g., relaxation) and negative-activating emotions (e.g., anxiety, anger), consequences for learning are not that clear, as it often depends on the specific emotion or learning aspect considered (Pekrun et al., 2011; for the political context, see Huddy et al., 2007 who show different associations between anxiety and anger with, for example, news consumption).

Based on control-value theory, we hypothesise the following:

**Hypothesis 1** Positive-activating emotions (e.g., enthusiasm) are positively associated with learning.

**Hypothesis 2** Negative-deactivating emotions (e.g., boredom) are negatively associated with learning.

Further, we tested, in exploratory analysis, how negative-activating emotions (e.g., anger and anxiety), as well as discrete emotions, are related to learning. Finally, we took an exploratory approach to test for possible moderators. According to Lipsey (2009), study descriptors such as extrinsic matters, study methods and procedures, and substantive matters are typically considered as moderators in meta-analyses. First, in addition to publication status, we included country and discipline as extrinsic matters. Effect sizes might differ depending on the political systems and associated roles of citizens in a country. Disciplinary affiliation might indirectly affect effect sizes through applied theoretical frameworks and methods common within a discipline (Lipsey, 2009). It is of special relevance for the current meta-analysis due to its cross-disciplinary approach. Regarding study methods and procedures, we included sample size, sampling method, type of measurement, and target population. Third, as substantive aspects, we included central emotion characteristics addressed in prior studies using the control-value theory (state vs. trait emotions; Bieg et al., 2014; object focus; Muis et al., 2018; type of discrete emotion; Pekrun et al., 2023). Finally, as we subsumed multiple learning categories to one effect size measure, the learning category itself was used as a moderator, as well as a dummy for whether the learning measure focuses specifically on attitude-(in)congruent information (see emotions and motivated reasoning, e.g., confirmation bias during information seeking; Wollebæk et al., 2019)

## Open Practices

The current study was preregistered via Prospero in October 2020. Data and accompanying analysis scripts are available via [OSF](#). Data were processed and analysed in R (R Core Team, 2022), utilizing mainly the following packages: revtools (Westgate, 2019) for identifying and removing duplicates after the literature search, tidyverse (Wickham et al., 2019) for data wrangling; esc (Lüdtke, 2019) and metafor (Viechtbauer, 2010) for effect size calculation; metafor (Viechtbauer, 2010), dmetar (Harrer et al., 2019), and pema (van Lissa et al., 2022) for the analysis; and metaviz (Kossmeier et al., 2020), meta (Balduzzi et al., 2019), and robvis (McGuinness, 2019) for visualization.

## **Methods**

### **Inclusion and Exclusion Criteria**

The aim of this meta-analysis was to identify studies assessing the associations between emotions experienced in the context of politics and political learning. Therefore, the main inclusion criteria was that studies conducted an empirical analysis and reported at least one quantitative outcome on the relation between a discrete emotion and political learning. We included both experimental and observation studies, but separated them in the quantitative analysis. Only studies including emotions focusing specifically on politics (e.g., a political candidate, policy issue, or political process) were considered as relevant. Emotions were either analyzed as discrete emotions (e.g., enjoyment, anger, anxiety) or as a common emotion measure which could be categorized to be either positive-activating, positive-deactivating, negative-activating or negative-deactivating. Emotions could be measured via self-report scales or, in the case of experimental studies, induced by an experimental manipulation. Concerning the outcomes, we focused on the learning process about politics in everyday life and its most important concepts in the literature. Specifically, we included studies on political information seeking, attention to politics, political discussions, political knowledge, and a knowledge gain.

Studies which could not be obtained in full text, or were duplicates based on the same data and measures, or which did not report a relation between emotions and learning were excluded. For studies with the same data source and measures, the one with the more recent publication date was included. Additionally, for quantitative synthesis, studies which did not supply adequate measures (e.g., non-bivariate, partial effects; Aloe, 2014), or which did not measure emotion and learning at the same time point were excluded. A detailed description of the concepts, inclusion, and exclusion criteria is available in the supplemental file, section A.

### **Information sources**

The aim of the search strategy was to conduct a thorough search that allowed for the detection of published and unpublished work related to the topic. The systematic literature search was based on several databases (i.e., PsycINFO, IBSS, ERIC, ProQuest Dissertation and Thesis, ProQuest Education and Politics Collection), with a search string in English and German including a large number of discrete emotions, combined with phrases used for the defined learning concepts and the word ‘politics’ (see supplemental file, section A). Additionally, we consulted conference

proceedings of the main conferences across disciplines (i.e., annual meetings of the International Society of Political Psychology (ISPP), American Political Science Association (APSA), International Communication Association (ICA), American Educational Research Association (AERA), Society for Empirical Educational Research (GEBF), and the Society for Civic Education Didactics and Civic Youth and Adult Education (GPJE), and the bi-annual meeting of and European Association for Research on Learning and Instruction (EARLI)) and used pertinent articles and authors for citation search and author consultation. Finally, an additional search focused on core journals of the disciplines related to the topic (Political Psychology, Journal of Social and Political Psychology, Cognition and Emotion, Political Communication, and Journal of Affective Science). The full search strategy can be found in the supplemental file, section A.

### **Deviation from study protocol**

It should be noted that during the search process, the search string and strategy detailed in the first preregistration was revised (i.e., search within titles *and* abstract), in order to gain more accurate search results. Additionally, due to resource restrictions, only a subsample of search results was double screened. Finally, some variables were added in the coding (e.g., percentage of male and female participants, discipline).

### **Study Selection**

Search results ( $k = 358$ ) were screened with regards to the inclusion and exclusion criteria by the first author, and two subsamples were double coded after training by the second author. If the decision could not be based on title and abstract, the full text was consulted. A first unsupervised double-coded sample ( $k = 35$ ) revealed an intercoder agreement of 77 % ( $\kappa_w = .74$ ), which increased to 85 % ( $\kappa_w = .63$ ) in a second round ( $k = 20$ ). Unclear cases were resolved by joint discussion and arriving at consensus.

### **Data Collection**

The studies included were coded on three levels: (1) publication level, (2) study level, and (3) effect size level. We coded the type, aim of the publication (e.g., journal article, book, dissertation, etc.), and main theoretical approach at publication level. Whereas publication type and discipline were coded in pre-defined categories (see supplemental file, section B), the aim and theoretical approach was openly coded and only used for the qualitative synthesis. On study level (relevant if one publication reports several studies), data source (if not using primary data), study

design (e.g., experimental), sampling (e.g., random, convenience) and sample characteristics (e.g., number of participants, country, age and percentage of male and female participants) were coded. Additionally, we assessed characteristics of study quality, for example, whether response rate and missing data handling were reported. Finally, regarding effect size, details about the emotion and learning measurements (type of measurement, e.g., behavioral or self-report; number of items used, reliability, mean and standard deviation if applicable) and their association were coded. If no standardized bivariate relation was reported, the public data (if available) were used, and authors consulted to add effect sizes. Ten percent of the studies ( $N = 8$ ) were double coded by the first and third authors. The agreement rate for most of the variables was satisfying (Krippendorff's  $\alpha > .70$  for 71 % of the variables,  $M = .73$ ,  $SD = .45$ ). Disagreement was discussed to clarify underlying reasons for the remaining variables and if necessary, coding revised. The full codebook with a detailed description of each variable can be found in the supplemental file (section B), and the corresponding agreement rates for double coding are displayed in Table C1 in the supplemental file (section C).

### **Methods for Assessing Risk of Bias**

For quality assessment, study design, sampling strategy, reported response rates, missing values, and reliability measures were assessed. For experimental studies, allocation of participants was additionally included in the quality assessment. Based on common thresholds used in the literature (e.g., Graham, 2008; Reed et al., 2008; Moosbrugger & Kelava, 2012), we categorized studies into low risk of bias, unclear (if information was missing), and high risk (see section D of the supplemental file for details of categorization).

### **Summary Measures**

In order to calculate effect sizes, all statistics were converted to correlation coefficients. We standardized effect sizes into correlation coefficients and converted them to Fisher's z-scale. The R script used for effect size calculation is available via OSF.

### **Methods for Synthesis**

Effect sizes were synthesized separately for cross-sectional and experimental designs for each emotion(group)-learning relation. We separated our analysis by research designs as underlying research questions usually differ fundamentally (effect versus relationship; Borenstein & Hedges, 2019). We categorized studies as experimental if either emotions themselves were

induced, or if the study included an experimental condition and emotions were measured after the manipulation, thus if reported emotions depend on the experimental condition (e.g., threat manipulation). Furthermore, we conducted separate analyses focusing on the discrete emotions enthusiasm, anger, and anxiety, as they are studied more frequently in the context of politics (Brader & Marcus, 2013) and a sufficient number of effect sizes were available to be synthesized. We used multilevel random-effects models, which allowed us to account for dependency in the data (i.e., if more than one effect size stemmed from the same authors/dataset). Specifically, we added random effects for effect size-ID and data-ID, the latter corresponds to the study level (with the exception of two study-pairs, where the same data but different measures were used and therefore assigned the same data-ID). Additionally, we used the Knapp-Hartung adjustment to account for non-normal distribution of coefficients (Assink & Wibbelink, 2016). In line with suggestions by Assink and Wibbelink (2016), we performed tests for heterogeneity for within-study variance and between-study variance separately, using log-likelihood-ratio tests in which we compare models where the variance on a respective level is fixed to zero with the model where it is freely estimated. A significant amount of heterogeneity implies a moderator analysis is needed in order to identify possibly explanations for the observed variance.

As no a priori hypotheses concerning moderators were formulated in our preregistration, we took an exploratory approach to identify possible moderators. With a high number of coded variables (i.e., possible moderators) accompanied by only a small number of studies and effect sizes included in the models, Bayesian regularized meta-analysis (BRMA) is a suitable method to identify relevant moderators whilst avoiding overfitting. It allows to select relevant moderators by shrinking small regression coefficients towards zero using regularization priors (van Lissa et al., 2022). We use the R-package *pema* (van Lissa et al., 2022) to estimate three-level mixed effects models with a minimum of 2,000 iterations and a horseshoe prior for each emotion group and design. We included the variables' sample size, publication status (0 if coded as conference paper or thesis, 1 if coded as journal article, book, or book chapter), discipline, target population, country, sampling, type of emotion measure, state vs. trait emotion measure, object focus of emotion measure, type of discrete emotion, learning category, a dummy for whether the learning measure focuses attitude-(in)congruent information, and type of learning measure in the model (for coding details, see Supplemental File, Appendix C). Models were checked for convergence according to their *R*<sub>hat</sub>, effective sample size, and using parameter trace plots (van Lissa et al., 2022).

## **Publication Bias and Selective Reporting**

In order to assess the possibility of publication bias, we (1) tested whether publication status moderates the effect size in the multilevel random-effects model, (2) visually inspected funnel plots, and (3) used an adaption of Egger's regression test suitable for meta-analyses with dependencies in effect sizes (Rodgers & Pustejovsky, 2021). For the funnel plots, we calculated the mean values in order to show only one effect size per study. For Egger's regression test, we excluded studies from unpublished sources (dissertations, theses, and conference papers). We used the inverse sample size as a moderator in the multilevel random-effects model, which is a more suitable measure of precision if using correlations as a common effects measure (Viechtbauer, 2020). Due to the low number of studies available for models on negative-deactivating emotions, the publication bias analyses were not applied to this emotion group.

## **Results**

### **Study Selection**

From the systematic literature search, 358 publications were screened for inclusion and exclusion criteria, of which 80 were coded and 66 included in the final dataset. Thus, this study included 66 publications reporting 78 studies and 486 effect sizes, of which 36 publications (42 studies, 259 effect sizes) could be used for the quantitative synthesis and calculation of overall effects (for details, see Figure 1, PRISMA flow chart).

### **Study Characteristics**

The systematic search with various sources utilized revealed mainly journal articles (68%), almost all from peer reviewed journals. Additionally, we managed to find and access eight conference papers and six unpublished dissertations or theses. Four studies came from book chapters and three monographs on the topic were included. Publications were predominantly produced within the last 20 years (see Figure 2) and, based on the first authors' affiliations, within departments of political science (55%) and communication science (35%). Additionally, a majority of the studies was conducted in the US (71%) and mainly focused on adults (53%) or university and college students (32%). Table F1 in the supplemental file (Section E) provides a summary of the aims and measures of included studies.

Figure 1

PRISMA flow chart about the number of studies resulting from the literature search

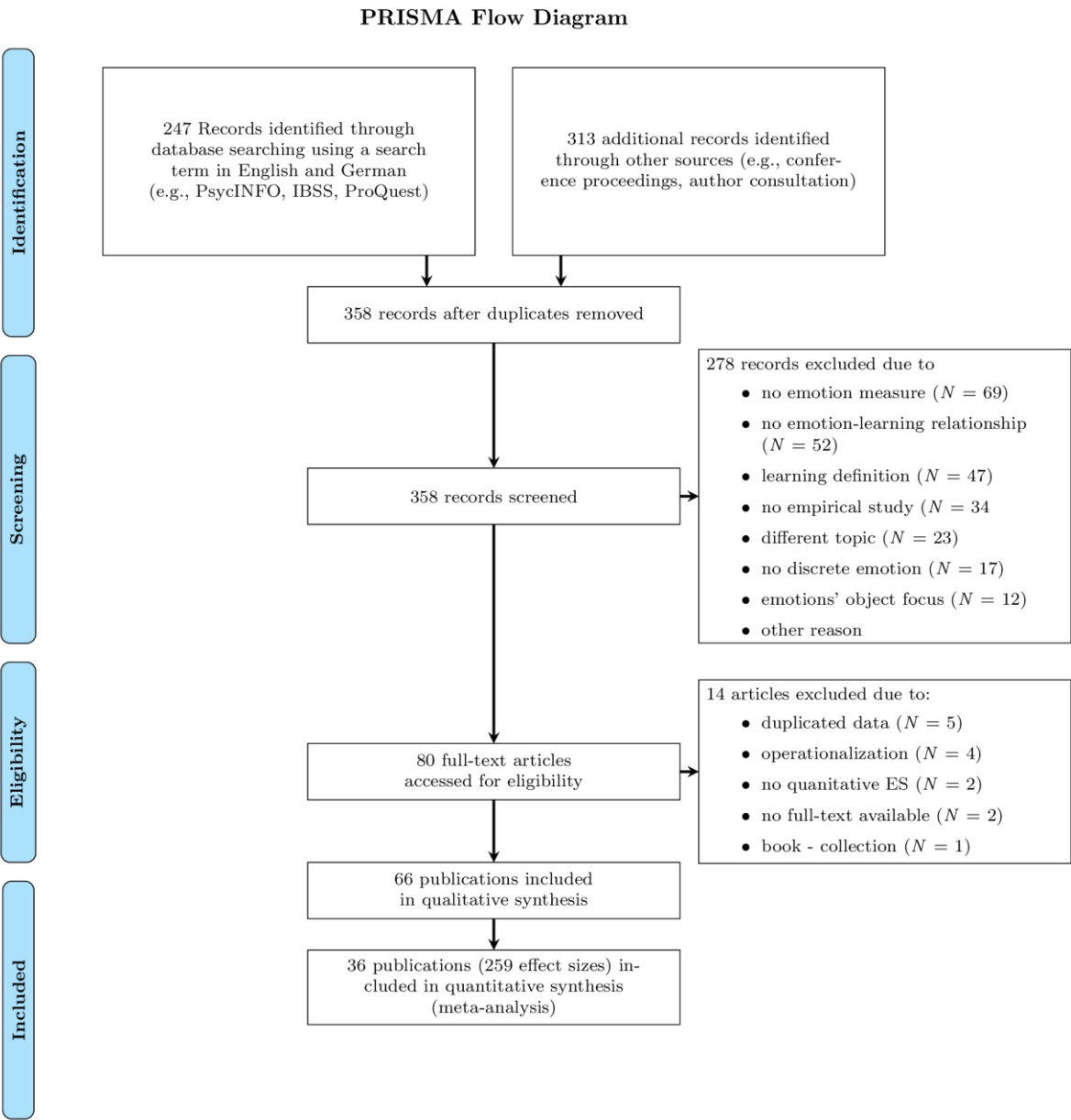
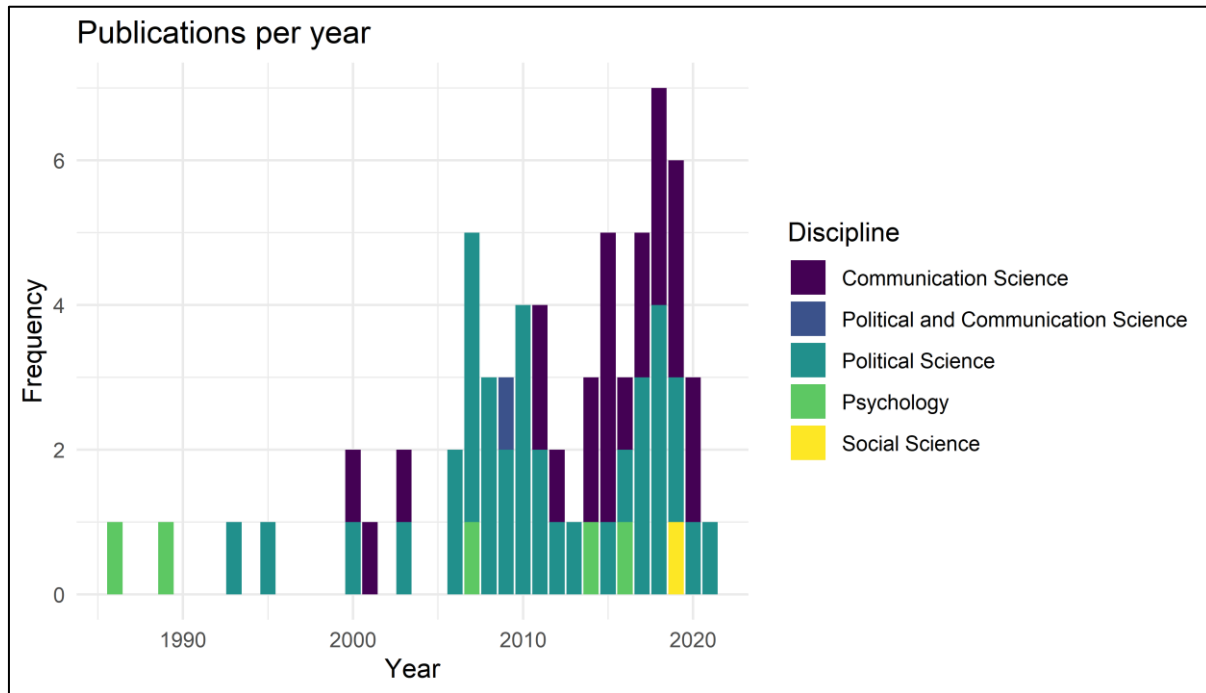


**Figure 2***Number of Publications per Year and Discipline*

The studies included in the meta-analysis are characterized by a considerable heterogeneity in methodological approaches and reporting standards. The majority of the studies utilized experimental designs (54%), followed by cross-sectional studies (27%), and longitudinal (17%) studies, which included specific designs like dynamic process tracing environments (e.g., Ditonto et al., 2017). Regarding reporting standards, from 486 coded effect sizes, 170 were only available in an unstandardized format. For 13 studies (10 publications), we could use published data to calculate bivariate standardized statistics, and additionally received bivariate standardized statistics for 12 studies (10 publications) from contacted authors.

We identified 19 discrete emotions in the studies (see Figure 3). However, the vast majority of the effect sizes focused on anxiety (32%), anger (19%), and enthusiasm (15%). Emotions were mainly analyzed in the context of elections, with a focus either on the campaign (33%) or on candidates (16%). Specific policy issues, for example immigration, health issues, or terrorism, were addressed by 30% of the effect sizes. A small number of emotions were assessed with a focus on a political event (5%) or the general political situation (4%). These emotions were largely assessed with self-report measures (78% of effect sizes). In experimental designs, authors either used self-

report emotion measures after the experimental manipulation (62%), the assignment to the experimental groups (35%) or a combination of both to calculate the effect sizes. To manipulate emotions, researchers utilized texts in combination with images (e.g., Ryan, 2012; Clifford & Jerit, 2018; Lamprianou & Ellinas, 2019) and videos (e.g., Kim, 2016) or videos alone (e.g., Sirin et al., 2011; Brader, 2006). Brader (2006), for example, created professional political ads including images and music to induce enthusiasm or fear, which additionally varied in how evocative they were. Others utilized prompts with a task to recall and describe in detail an emotional situation or write or list thoughts, for example describing something during a campaign that made one feel angry or enthusiastic (Valentino et al., 2008; 2009, Ditonto et al., 2017), or a prompt to list worries about a specific policy issue (e.g., immigration; Albertson & Gadarian., 2015; Gadarian & Albertson., 2007).

In terms of learning processes, 40% of the effect sizes investigated the relations between emotions and information seeking, 24% focused on attention to politics, 15% on discussions, and eleven percent each on knowledge and knowledge gain<sup>4</sup>. Studies utilized various methods to assess learning, ranging from self-report questions (63%), behavioral measures (17%; especially with information seeking), to knowledge tests (21%) either based on general political knowledge or specific information provided during the studies.

## **Results of Individual Studies**

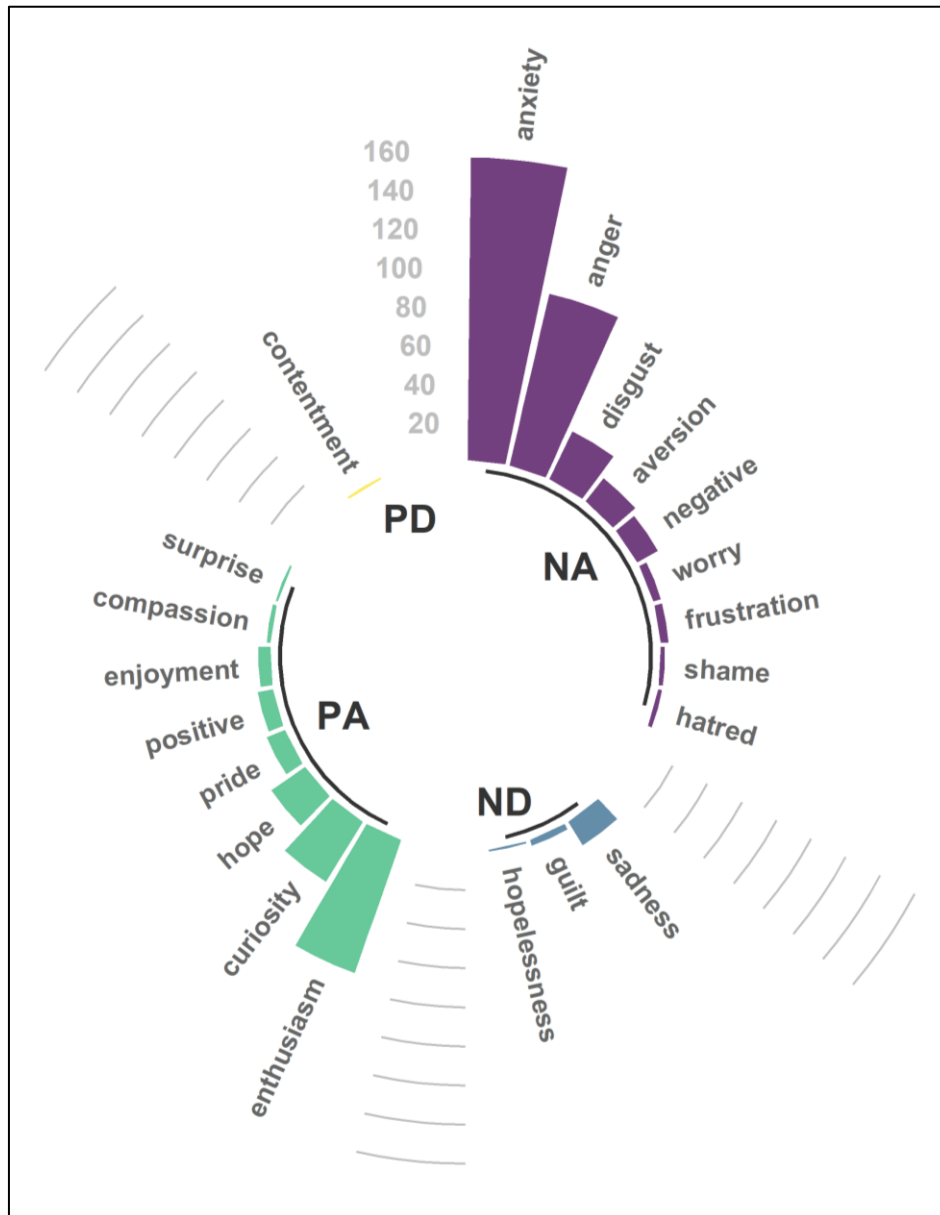
Results of individual studies are summarized in Table F1.

## **Synthesis of Results**

For synthesizing effect sizes, we first conducted multilevel random-effects models for each group of emotions (positive-activating, negative-activating), and for the discrete emotions enthusiasm, anger, and anxiety. Both analyses were conducted for studies with cross-sectional and experimental designs separately.

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<sup>4</sup> In the preregistration and initial codebook, we differentiated between knowledge gain and information acquisition. However, as both address and increase in knowledge and we had difficulties to clearly differentiate between them, we collapsed both to one group

**Figure 3***Number of Effect Sizes per Emotion*

*Note.* NA = negative-activating emotions ( $N = 311$ ), ND = negative-deactivating emotions ( $N = 18$ ), PA = positive-activating emotions ( $N = 156$ ) and PD = positive-deactivating emotions ( $N = 1$ ).

## Associations between Emotions and Learning from Cross-Sectional Studies

### Positive-activating emotions.

Details about the estimated models are displayed in Table 1. In line with hypothesis 1, the model based on positive-activating emotions (e.g., enthusiasm, hope, curiosity) revealed an overall positive association between emotions and learning ( $r = .13$ , 95% *CI* [.06, .19]). Enthusiasm showed a small positive association with learning in cross-sectional designs ( $r = .10$ , 95% *CI* [.01, .19]; see Figure G1 in section G of the supplemental file).

### Negative-deactivation emotions.

Our second hypothesis, which assumed negative associations between negative-deactivating emotions and learning, was not supported ( $r = .03$ , 95% *CI* [-.16, .22]), but results should be interpreted with caution as the model is based on only three effect sizes.

### Negative-activating emotions.

The overall correlation between negative-activating emotions and learning was small and positive ( $r = .05$ , 95% *CI* [.01, .09]). However, as shown in figure G2, there was a great variation of effect sizes. The model on anxiety did not reveal a significant overall association between anxiety and learning ( $r = .03$ , 95% *CI* [-.02, .07]). In contrast, anger revealed a small positive overall correlation with learning ( $r = .06$ , 95% *CI* [.01, .12]).

## Associations between Emotions and Learning from Experimental Studies

### Positive-activating emotions.

Our model, including effect sizes from positive-activating emotions and experimental design, did not reveal a significant overall correlation ( $r = .06$ , 95% *CI* [-.12, .23]). The same finding holds for the model on enthusiasm ( $r = .00$ , 95% *CI* [-.06, .07]). For this model, only five publications including ten effect sizes about enthusiasm were included (see Figure G3).

### Negative-deactivating emotions.

Again, we could use only few effect sizes to test hypothesis 2 on negative-deactivating emotions, which was not supported ( $r = .00$ , 95% *CI* [-.22, .23]).

### Negative-activating emotions.

Similar to the model on cross-sectional designs, we found a small, positive overall correlation between negative-activating emotions and learning in experimental designs ( $r = .06$ , 95% *CI* [.01, .11]). Regarding discrete emotions, no significant association could be found for anxiety ( $r = .06$ , 95% *CI* [-.04, .15]), but a small positive effect for anger ( $r = .11$ , 95% *CI* [.03, .19]).

**Table 1**

#### *ML-Random-Effects Model Results*

| Model                          | <i>k</i> | <i>N</i> | <i>r</i> | CI            | <i>t</i> ( <i>df</i> ) | <i>p</i> | % Variance ( <i>I</i> <sup>2</sup> ) |               |               |
|--------------------------------|----------|----------|----------|---------------|------------------------|----------|--------------------------------------|---------------|---------------|
|                                |          |          |          |               |                        |          | Level1                               | Level 2       | Level 3       |
| <i>Cross-sectional Designs</i> |          |          |          |               |                        |          |                                      |               |               |
| Pos.-Act. Emotions             | 12       | 42       | .128     | [.061, .194]  | 3.846 (41)             | .000     | 5.768                                | <b>38.251</b> | <b>55.981</b> |
| Enthusiasm                     | 6        | 19       | .101     | [.008, .191]  | 2.288 (18)             | .034     | 4.918                                | <b>60.576</b> | 34.506        |
| Neg.-Act. Emotions             | 22       | 83       | .049     | [.009, .089]  | 2.407 (82)             | .018     | 7.279                                | <b>32.795</b> | <b>59.926</b> |
| Anxiety                        | 19       | 45       | .027     | [-.019, .072] | 1.188 (44)             | .241     | 7.692                                | <b>27.607</b> | <b>64.702</b> |
| Anger                          | 12       | 32       | .061     | [.006, .116]  | 2.257 (31)             | .031     | 8.370                                | <b>49.334</b> | 42.296        |
| Neg.-Deact. Emotions           | 2        | 3        | .032     | [-.160, .222] | 0.721 (2)              | .546     | 28.143                               | 0.000         | 71.857        |
| <i>Experimental Designs</i>    |          |          |          |               |                        |          |                                      |               |               |
| Pos.-Act. Emotions             | 6        | 16       | .057     | [-.120, .231] | 0.685 (15)             | .504     | 5.810                                | <b>10.982</b> | <b>83.207</b> |
| Enthusiasm                     | 5        | 10       | .002     | [-.064, .068] | 0.054 (9)              | .958     | 60.333                               | 39.667        | 0.000         |
| Neg.-Act. Emotions             | 19       | 104      | .061     | [.013, .108]  | 2.537 (103)            | .013     | 11.900                               | <b>52.135</b> | <b>35.965</b> |
| Anxiety                        | 16       | 45       | .055     | [-.036, .146] | 1.219 (44)             | .230     | 7.017                                | 0.787         | <b>92.196</b> |
| Anger                          | 13       | 25       | .109     | [.029, .188]  | 2.797 (24)             | .010     | 20.060                               | 0.000         | <b>79.940</b> |
| Neg.-Deact. Emotions           | 3        | 10       | .004     | [-.223, .231] | 0.043 (9)              | .967     | 14.896                               | 0.000         | <b>85.104</b> |

*Note.* *k* = Number of studies with unique datasets, *N* = Number of effect sizes; Variance on level 1 refers to the sampling variance, level 2 to the variance within studies using the same data, and level 3 to the variance between studies. Significant variability in the variance between effect sizes and studies is displayed in bolt.

## **Moderator Analysis**

Heterogeneity tests revealed significant variance within and between studies for the models on positive-activating and negative-activating emotions (see Table 1: significant variance components are displayed in bold; detailed model results can be found in the supplemental file, section H [Table H1 and H2]). We therefore proceeded to moderation analysis with these models. All estimated BRMA models indicated convergence, with  $R^2$  close to 1, sufficient effective sample sizes and well-mixed parameter trace plots. As shown in Table I1, we could not identify any relevant moderator from the included variables.

## **Assessment of Internal Validity of Individual Studies**

A visual summary of the quality assessment of included studies is displayed in figure D1 (see section D in the supplemental file). While almost half of the studies (41%) used random sampling (or comparable techniques, e.g., online sampling service aiming a representative sample), a similar amount is based on convenience sampling (44%). Studies using experimental designs mainly relied on random allocation to experimental and control groups. Regarding response rate, missing values and measurement error, the risk of bias remains broadly unclear (62-92%) due to poor reporting standards.

## **Publication and Reporting Bias**

We used publication status as a moderator in order to test whether reported effect sizes were dependent on the status of the manuscript. The test was not supported for any of the models (see Table 2). Results of the adapted Egger's regression test are shown in Table 3. The inverse of the sample size was included as a moderator in the multilevel models as a measure of precision. We found significant, negative effects in the model of negative-activating emotions of cross-sectional designs, indicating funnel-plot asymmetry (see Figure J1 in section J of the supplemental file). Thus, studies with lower precision (i.e., smaller sample size) had larger effect sizes. For experimental designs, the same occurred in models of positive-activating emotions and anxiety (see Figure J2).

**Table 2***Moderator Analysis of Publication Status*

| Model                          | Predictor | <i>k</i> | <i>N</i> | estimate | se    | <i>t</i> (df) | <i>p</i> | CI              |
|--------------------------------|-----------|----------|----------|----------|-------|---------------|----------|-----------------|
| <i>Cross-Sectional Designs</i> |           |          |          |          |       |               |          |                 |
| Pos.-Act. Emotions             | Intercept | 12       | 42       | 0.134    | 0.071 | 1.882 (40)    | .067     | [-0.01, 0.277]  |
|                                | Status    |          |          | -0.005   | 0.082 | -0.064 (40)   | .950     | [-0.171, 0.161] |
| Enthusiasm                     | Intercept | 6        | 19       | 0.115    | 0.141 | 0.82 (17)     | .423     | [-0.182, 0.413] |
|                                | Status    |          |          | -0.015   | 0.150 | -0.102 (17)   | .920     | [-0.331, 0.301] |
| Neg.-Act. Emotions             | Intercept | 22       | 83       | 0.072    | 0.040 | 1.782 (81)    | .079     | [-0.008, 0.152] |
|                                | Status    |          |          | -0.031   | 0.047 | -0.658 (81)   | .513     | [-0.124, 0.062] |
| Anxiety                        | Intercept | 19       | 45       | 0.012    | 0.052 | 0.237 (43)    | .814     | [-0.092, 0.117] |
|                                | Status    |          |          | 0.018    | 0.058 | 0.309 (43)    | .759     | [-0.099, 0.134] |
| Anger                          | Intercept | 12       | 32       | 0.090    | 0.110 | 0.819 (30)    | .419     | [-0.135, 0.315] |
|                                | Status    |          |          | -0.031   | 0.114 | -0.273 (30)   | .787     | [-0.264, 0.202] |
| <i>Experimental Designs</i>    |           |          |          |          |       |               |          |                 |
| Pos.-Act. Emotions             | Intercept | 6        | 16       | -0.125   | 0.205 | -0.61 (14)    | .552     | [-0.566, 0.315] |
|                                | Status    |          |          | 0.218    | 0.225 | 0.972 (14)    | .348     | [-0.264, 0.7]   |
| Enthusiasm                     | Intercept | 5        | 10       | -0.130   | 0.109 | -1.189 (8)    | .269     | [-0.381, 0.122] |
|                                | Status    |          |          | 0.141    | 0.113 | 1.251 (8)     | .246     | [-0.119, 0.402] |
| Neg.-Act. Emotions             | Intercept | 19       | 104      | -0.024   | 0.089 | -0.273 (102)  | .785     | [-0.2, 0.152]   |
|                                | Status    |          |          | 0.092    | 0.092 | 0.996 (102)   | .321     | [-0.091, 0.275] |
| Anxiety                        | Intercept | 16       | 45       | -0.005   | 0.137 | -0.034 (43)   | 0.973    | [-0.28, 0.271]  |
|                                | Status    |          |          | 0.067    | 0.145 | 0.462 (43)    | 0.646    | [-0.226, 0.36]  |
| Anger                          | Intercept | 13       | 25       | -0.079   | 0.153 | -0.516 (23)   | 0.611    | [-0.395, 0.237] |
|                                | Status    |          |          | 0.201    | 0.158 | 1.271 (23)    | 0.216    | [-0.126, 0.527] |

*Note.* *k* = Number of studies with unique datasets, *N* = Number of effect sizes; Status indicated the publication status, with 1 = published and 0 = unpublished.

**Table 3***Results of Egger's Regression Test*

| Model                          | Predictor    | <i>k</i> | <i>N</i> | estimate | se     | <i>t</i> (df) | <i>p</i> | CI                 |
|--------------------------------|--------------|----------|----------|----------|--------|---------------|----------|--------------------|
| <i>Cross-Sectional Designs</i> |              |          |          |          |        |               |          |                    |
| Pos.-Act.                      | Intercept    | 9        | 36       | 0.067    | 0.076  | 0.886 (34)    | .382     | [-0.087, 0.222]    |
| Emotions                       | Inverse of N |          |          | 32.458   | 31.403 | 1.034 (34)    | .309     | [-31.361, 96.277]  |
| Enthusiasm                     | Intercept    | 5        | 18       | 0.130    | 0.099  | 1.32 (16)     | .205     | [-0.079, 0.339]    |
|                                | Inverse of N |          |          | -14.209  | 40.905 | -0.347 (16)   | .733     | [-100.923, 72.505] |
| Neg.-Act.                      | Intercept    | 16       | 69       | 0.082    | 0.030  | 2.709 (67)    | .009     | [0.022, 0.143]     |
| Emotions                       | Inverse of N |          |          | -26.206  | 12.438 | -2.107 (67)   | .039     | [-51.032, -1.38]   |
| Anxiety                        | Intercept    | 15       | 38       | 0.073    | 0.034  | 2.147 (36)    | .039     | [0.004, 0.142]     |
|                                | Inverse of N |          |          | -27.111  | 13.826 | -1.961 (36)   | .058     | [-55.152, 0.93]    |
| Anger                          | Intercept    | 11       | 31       | 0.105    | 0.041  | 2.553 (29)    | .016     | [0.021, 0.19]      |
|                                | Inverse of N |          |          | -25.044  | 16.229 | -1.543 (29)   | .134     | [-58.236, 8.148]   |
| <i>Experimental Designs</i>    |              |          |          |          |        |               |          |                    |
| Pos.-Act.                      | Intercept    | 5        | 13       | 0.371    | 0.114  | 3.269 (11)    | .007     | [0.121, 0.621]     |
| Emotions                       | Inverse of N |          |          | -64.448  | 23.702 | -2.719 (11)   | .020     | [-116.615, -12.28] |
| Enthusiasm                     | Intercept    | 4        | 9        | 0.111    | 0.091  | 1.216 (7)     | .264     | [-0.105, 0.326]    |
|                                | Inverse of N |          |          | -20.476  | 17.836 | -1.148 (7)    | .289     | [-62.652, 21.7]    |
| Neg.-Act.                      | Intercept    | 17       | 80       | 0.106    | 0.034  | 3.14 (78)     | .002     | [0.039, 0.174]     |
| Emotions                       | Inverse of N |          |          | -6.549   | 5.013  | -1.306 (78)   | .195     | [-16.529, 3.432]   |
| Anxiety                        | Intercept    | 14       | 38       | 0.184    | 0.061  | 3.015 (36)    | .005     | [0.06, 0.307]      |
|                                | Inverse of N |          |          | -22.444  | 8.406  | -2.67 (36)    | .011     | [-39.492, -5.396]  |
| Anger                          | Intercept    | 12       | 24       | 0.087    | 0.069  | 1.265 (22)    | .219     | [-0.056, 0.23]     |
|                                | Inverse of N |          |          | 5.673    | 8.510  | 0.667 (22)    | .512     | [-11.976, 23.323]  |

*Note.* *k* = Number of studies with unique datasets, *N* = Number of effect sizes;

## Discussion

We present the first cross-disciplinary systematic review and meta-analysis specifically focusing on the role of emotions in political learning. Prior general reviews on emotions in politics (Brader & Marcus, 2013; Crigler & Just, 2012; Groenendyk, 2011) published around ten years ago already noted an increase in interest in the topic. This trend appears to have continued since then, particularly in the age of emotionally laden political events such as public health crisis (e.g., H1N1 or the most recent COVID pandemic) or the Trump election. Thus, it has been high time to systematically search and analyze which emotions are currently investigated, and how they relate to political learning.

### Positive Associations between Emotions and Learning

The aim of this study was to analyze which emotions have been investigated in the literature on political learning (systematic review) and analyze how they are associated with learning in the context of politics (meta-analysis). Our hypotheses based on control-value theory (Pekrun, 2006) were partially supported, and we found very interesting results regarding negative-activating emotions in our exploratory analysis. The first hypothesis, that positive-activating emotions were positively related to learning, was partly supported by cross-sectionally designed studies. Only few experimental studies focusing on positive emotions were available ( $k = 6$ ;  $N = 16$ ), with correlations mainly representing null-effects. The great attention to negative emotions (e.g., anger or anxiety) compared to positive emotions has also been noticed in prior reviews (Crigler & Just, 2012). Given the predominance of deficit-view studies in psychology research, where the focus has mainly been on the negative and symptomatic (Fredrickson, 2004), it is not surprising that very few studies centering positive emotions have been conducted. A positive psychology research approach placing the focus on positive emotions in political learning (Seligman & Csikszentmihalyi, 2014) may be a fruitful avenue for future research.

For negative-activating emotions we did not have predefined hypotheses, as relations often vary depending on the emotion and facet of learning (Pekrun et al., 2011). Interestingly, negative-deactivating emotions were positively related to learning in both, experimental and cross-sectional, study designs. In contrast to studies of political psychology which usually highlight the benefits of anxiety rather than anger for political learning (for example, see affective intelligence theory, Marcus et al., 2000), we found positive, though small, associations between

anger and learning. Though in the academic context anger is often found to increase task-irrelevant thinking, it can also increase motivation if success is expected (Pekrun & Stephens, 2012). The positive association is consistent with the classification of anger as an approach emotion and its mobilizing effect for political participation (Redlawsk & Mattes, 2022; Elliot et al., 2013). Anger, thus, motivates for political action and can increase learning. Anger-related learning, on the other hand, may be focused on information and arguments to defend one's own political attitudes (Redlawsk & Mattes, 2022).

The hypothesis on negative-deactivating emotions was not supported, but models were based on very few effect sizes and studies. This reveals one of the blind spots of the current research, since there is only a limited number of studies with focus on deactivating emotions. Though, for example, boredom is a recurring theme in qualitative studies on civic education and civic engagement among youth (e.g., Kahne & Middaugh, 2008; Zukin et al., 2006), we could not find any study including boredom when looking at political learning. A recent study has already revealed a negative association between boredom, hopelessness, or confusion experienced during discussions of political and social issues in class and student's engagement, motivation, and knowledge (Graf et al., 2023). Therefore, investigating and further tackling these deactivating emotions specifically related to political objects seems of great relevance in order to foster informed and active citizenship.

### **Blind spots in the literary landscape on emotions and political learning**

Our systematic literature search revealed a number of blind spots in the landscape of existing evidence. First, the majority of the study is based on the US (70%), only 12% of the studies are including non-western countries. Predominance of western, educated, industrialized, rich, and democratic samples in psychological research has often been criticized (i.e., WEIRD-samples Henrich et al., 2010), which seems to apply to the current meta-analysis, too. As political context might be of great relevance to citizen's experienced emotions and their learning motivation, diversifying targeted samples is a major task for future research.

Most studies identified were based on adults. Studies on adolescents and school students, who are in a critical period of their political socialization (Sears & Brown, 2013), are few and far between. The limited number of studies focusing on political emotions among youth has already been noticed by Barrett and Pachi (2019). This limits the generalizability of the current findings,

as emotions in the context of politics might play a specific role for adolescents during the impressionable years of political learning. Moreover, a great amount of political learning takes place in formal settings of civic education at school (Schlozman et al., 2018), a context where the role of emotions with a few exceptions (e.g., Bayram Özdemir et al., 2016; Graf et al., 2023) has been overlooked entirely. We therefore implore researchers who conduct studies on civic education to include emotions as an important aspect of the learning process.

### **Implications for Theory, Practice, and Future Studies**

Overall, results are partly in line with the control-value theory (Pekrun, 2006), and at first sight contradict assumptions of the affective intelligence theory (Marcus et al., 2000), one of the main theories applied for emotions in politics. Of all 66 studies included in this systematic review, 42 refer to the theory of affective intelligence in their literature review. While one of the core assumptions of the theory is that anxiety in contrast to anger is the main driver of political learning by interrupting habits and heightened alertness to new information (Marcus et al., 2000) we did not find overall associations for anxiety, but slight positive associations for anger. One explanation might be that we were interested in bivariate relations in the current study, therefore not controlling for shared variance and mutual effects of anger and anxiety. Additionally, for experimental designs Egger's regression test has shown that models on anxiety are affected by publication asymmetry. Surprisingly, it seems that in this meta-analysis, specifically small (imprecise) studies with positive relations between anxiety and learning are missing. We can only speculate about the reason for this pattern. It could be due to excluding studies that did not report standardized effect sizes. If correcting for missing studies in the estimated overall effect size, it seems that anxiety could reveal similar associations as anger. Linking back to the theory, this would mean that all types of activating emotions seem to relate to learning. The high number of experimental designed studies conducted even imply causal paths from negative-activating emotions to learning processes.

According to Lupia (2016), civic educators (e.g., teachers, journalists, or campaign leaders) need to attract voters' attention in order to facilitate political learning, which can be achieved through addressing voters' fears and aspirations. This already addresses the motivational role of emotions for learning, which is supported with our results on negative-activating emotions, specifically, anger, and associations of positive-activating emotions with learning. For example,

Otto et al. (2020) found in their experience sampling studies that anger correlated positively with attention towards political news, while contentment even had negative lagged effects on attention. Therefore, civic educators may specifically address citizens' activating emotions in order to capture their attention and stimulate further engagement with new information. Still, researchers and civic educators need to be cautious of possible unintended side-effects of emotion-induced learning, as for example anger has been shown to negatively relates to institutional trust (e.g., Erhardt et al., 2021) and positively with populist attitudes (e.g., Rico et al., 2017).

Though we could not identify moderators to the overall effects in this meta-analysis, we found considerable variation between these effect sizes. We encourage future studies to look further into possible moderators and identify under which circumstances, and for which populations these effects occur. For example, in the study of Bas and Grabe (2015) the inclusion of emotions in political texts showed promising results to decrease knowledge gaps between higher and lower educated groups. Though politically sophisticated individuals are more likely to experience emotions in politics (Miller, 2011), it might be that less sophisticated individuals learn more once the emotions are experienced and their attention focuses on politics. Additionally, characteristics of the learning outcomes, such as the quality of discussions or the breadth of information searched for might be possible moderators to consider in future.

Finally, a great challenge for the cross-disciplinary synthesis was diverging reporting standards. Many effect sizes were excluded as only unstandardized betas from multivariate regression were reported. We recommend future studies to include descriptive and bivariate measures in their manuscripts, no matter whether published or unpublished. These measures are essential for research synthesis and allow a less biased assessment of an overall effect size. Additionally, basic sample characteristics and quality measures such as missing data handling and reliability of included measures were missing in a considerable amount of the studies included. This limited our possibilities for moderator analysis and the assessment of the risk of bias of the current meta-analysis. In line with the APA journal reporting standards for quantitative studies (American Psychological Association, 2019), we recommend future studies to:

- Report basic demographic characteristics of the sample(s), at least including age and gender.

- Report the sampling method, response rate, number of missing values, and if applicable, any exclusions and discuss how this might affect results of the study.
- Describe in detail the measures used, ideally with at least one sample item to illustrate the measurement. We additionally recommend providing the full study material, for example via an online appendix.
- Assess and report reliability measures of included variables of interest.
- Provide descriptive characteristics of variables of interest, including mean and standard deviation and bivariate correlations between these variables.

## Conclusion

The results of this cross-disciplinary systematic review and meta-analysis emphasize the important role of emotions for political learning. The findings imply that political educators and communicators should not keep emotions unaddressed when targeting political learning. In particular, positive-activating emotions like enthusiasm and negative-activating emotions like anger can help to raise attention and keep citizens informed about current political matters. The role of emotion in political learning should therefore not be underestimated.

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## SUPPLEMENTAL MATERIAL

The associations between discrete emotions and political learning: A cross-disciplinary meta-analysis and systematic review

### **Content**

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## **Appendix A Search Strategy**

This chapter describes the search strategy planned for the systematic review and meta-analysis on the associations between discrete emotions and political learning. It was developed before pre-registration and includes literature search within databases, citations, conference proceedings, bibliography and consultation of authors. Search strings were pre-tested in various databases. The search was conducted in winter 2020/2021. Any updates during the research process deviating from the initially planned search are documented here.

### **1. Literature Search within Databases**

The literature search was conducted in the databases PsycInfo, IBSS, ERIC, ProQuest Dissertation and Thesis, ProQuest Education and Politics collection using two different English and one German search term.

#### **1.2. Search terms**

Search terms are based on emotions and terms used in prior literature, i.e. in scales on achievement emotions (Pekrun et al., 2011) and epistemic emotions (Pekrun et al., 2017) and the literature on emotions in politics (reviews on emotions and politics: Groenendyk, 2011; Marcus & MacKuen, 1993; studies on political learning: Park, 2015; Valentino et al., 2008). Additionally, we added relevant controlled vocabulary from the thesauri of ProQuest and PsycInfo (controlled vocabulary for “emotions”, “learning”, “politics” and “civic education”). We combined these terms for the following English and German search strings.

Search String for PsycInfo (Search within titles and abstracts, no other restrictions)

| No. | Search String                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A1  | (Emotion* OR affective OR "negative affect" OR<br><br>anxiety OR fear OR enthusiasm OR anger OR pride OR hope OR shame OR<br>hopelessness OR sadness OR curiosity OR surprise OR enjoyment OR confusion OR<br>frustration OR boredom OR worry OR satisfaction OR disgust OR happiness OR<br><br>anxious OR fearful OR enthusiastic OR angry OR proud OR hopeful OR hopeless<br>OR sad OR curious OR surprised OR enjoyed OR confused OR frustrated OR bored<br>OR worried OR satisfied OR disgusted OR happy OR afraid OR uneasy OR<br><br>apathy OR grief OR hate OR loneliness OR sympathy OR rage OR hostility OR<br>agitation OR antipathy OR dislike OR disappointment OR distress OR doubt OR<br>embarrassment OR euphoria OR gratitude OR guilt OR regret OR suspicion OR<br><br>apathetic OR lonely OR sympathetic OR hostile OR antipathetic OR disappointed OR<br>embarrassed OR euphoric OR grateful OR guilty OR suspicious) |
| A2  | ("political learning" OR "civic learning" OR "citizenship education" OR "information<br>seeking" OR "information acquisition" OR "attention to politics" OR "political<br>discussions" OR "political knowledge" OR "learn about politic*" OR "learn about<br>civic*" OR "search for information" OR "discuss politic*" OR "discussion of<br>politic*" OR "seek information")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| A3  | A1 ADJ10 A2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| A4  | Politic*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| A5  | A3 AND A4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

Search String for IBSS, ERIC, ProQuest Dissertation and Thesis, ProQuest Education and Politics collection (Search within titles and abstracts, no other restrictions)

| No. | Search String                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B1  | (Emotion* OR affective OR "negative affect" OR<br>anxiety OR fear OR enthusiasm OR anger OR pride OR hope OR shame OR<br>hopelessness OR sadness OR curiosity OR surprise OR enjoyment OR confusion OR<br>frustration OR boredom OR worry OR satisfaction OR disgust OR happiness OR<br>anxious OR fearful OR enthusiastic OR angry OR proud OR hopeful OR hopeless<br>OR sad OR curious OR surprised OR enjoyed OR confused OR frustrated OR bored<br>OR worried OR satisfied OR disgusted OR happy OR afraid OR uneasy OR<br>apathy OR grief OR hate OR loneliness OR sympathy OR rage OR hostility OR<br>agitation OR antipathy OR dislike OR disappointment OR distress OR doubt OR<br>embarrassment OR euphoria OR gratitude OR guilt OR regret OR suspicion OR<br>apathetic OR lonely OR sympathetic OR hostile OR antipathetic OR disappointed OR<br>embarrassed OR euphoric OR grateful OR guilty OR suspicious) |
| B2  | ("political learning" OR "civic learning" OR "citizenship education" OR "information<br>seeking" OR "information acquisition" OR "attention to politics" OR "political<br>discussions" OR "political knowledge" OR "learn about politic*" OR "learn about<br>civic*" OR "search for information" OR "discuss politic*" OR "discussion of<br>politic*" OR "seek information")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| B3  | B1 NEAR/10 B2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| B4  | Politic*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| B5  | B3 AND B4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

Search Term for PsycInfo, IBSS, ERIC, ProQuest Dissertation and Thesis, ProQuest Education and Politics collection (Search within titles and abstracts, no other restrictions)

| No. | Search String                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| C1  | (Emotionen OR Affekt OR Gefuehle OR<br>Angst OR Furcht OR Enthusiasmus OR Aerger OR Stolz OR Hoffnung OR Scham<br>OR Hoffnungslosigkeit OR Traurigkeit OR Neugierde OR Ueberraschung OR Spass<br>OR Verwirrung OR Frust OR Langeweile OR Sorge OR Zufriedenheit OR Ekel OR<br>Freude OR Furcht OR<br>Aengstlich OR furchterregt OR enthusiastisch OR veraergert OR hoffnungsvoll OR<br>hoffnungslos OR traurig OR neugierig OR ueberrascht OR lustig OR freudig OR<br>verwirrt OR frustriert OR gelangweilt OR besorgt OR zufrieden OR ekelhaft OR<br>gluecklich OR unwohl OR<br>Apathie OR Trauer OR Hass OR Einsamkeit OR Mitleid OR Wut OR Feindseligkeit<br>OR Aufregung OR Abneigung OR Enttaeuschung OR Stress OR Zweifel OR Scham<br>OR Euphorie OR Dankbarkeit OR Schuld OR Bedauern OR<br>Apathisch OR wuetend OR feindselig OR einsam OR aufgereggt OR abgeneigt OR<br>enttaeuscht OR gestresst OR zweifeln OR schaemen OR euphorisch OR dankbar OR<br>schuldig) |
| C2  | (Lernen OR Wissen OR Informationssuche OR Aufmerksamkeit OR Diskussionen<br>OR Politikunterricht OR "Politische Bildung")                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| C3  | C1 AND C2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| C4  | (Politik OR politisch)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| C5  | C3 AND C4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## **2. Citation Search**

### **2.2. Citation Search (backwards)**

Papers cited by reviews (Brader & Marcus, 2013; Groenendyk, 2011) which specifically address the research question were included in the meta-analysis.

### **2.3. Citation Index (forwards): via web of knowledge, Scopus and Google Scholar**

A central theory for emotions and political learning often cited in political science is the Theory of Affective Intelligence (Marcus et al., 2000). Although the theory mainly focuses on political judgement, it also makes important predictions on concepts like information seeking and learning (Brader, 2011). Therefore, we expected a large number of papers on the topic to refer to this theory, even if they use a different perspective (e.g. appraisal theories, as for example in Huddy et al., 2007). Google scholar results show 2,037 citations of the book. The results were filtered again by using the search term on learning and the remaining articles were screened for inclusion and exclusion criteria. Additionally, the citation index of papers directly referring to political learning were analyzed:

- Marcus, G. E., & MacKuen, M. B. (1993). Anxiety, enthusiasm, and the vote: The emotional underpinnings of learning and involvement during presidential campaigns. *American Political Science Review*, 87(3), 672–685.
- Nadeau, R., Niemi, R. G., & Amato, T. (1995). Emotions, Issue Importance, and Political Learning. *American Journal of Political Science*, 39(3), 558. <https://doi.org/10.2307/2111644>
- Valentino, N. A., Hutchings, V. L., Banks, A. J., & Davis, A. K. (2008). Is a Worried Citizen a Good Citizen? Emotions, Political Information Seeking, and Learning via the Internet. *Political Psychology*, 29(2), 247–273. <https://doi.org/10.1111/j.1467-9221.2008.00625.x>

## **3. Author Search/Consultation**

There are some researchers at the University of Vienna working in the field of political psychology and political communication, and more specific also emotions. As a starting point, we

contacted them whether they know important (non-published) works on the topic or researchers working on it.

#### **4. Conference Proceedings**

Some conference papers and proceedings might already be found when searching the databases. Additionally, we searched in conference proceedings of the following conferences:

- Annual Meeting of the International Society of Political Psychology
- APSA (American Political Science Association)
- EARLI (European Association for Research on Learning and Instruction)
- ICA (International Communication Association)
- AERA (American Educational Research Association, added during revision in 2023)
- GEBF (Society for Empirical Educational Research, added during revision in 2023)
- GPJE (Society for Civic Education Didactics and Civic Youth and Adult Education, added during revision in 2023)

#### **5. Bibliography**

Further, we screened for publications in bibliographies of researchers who published frequently on the topic, e.g. George Marcus, Eric Groenendyk.

##### **5.2. Hand-searching of key-journals**

- Political Psychology
- Journal of Social and Political Psychology
- Cognition and Emotion
- Political Communication
- Journal of Affective Science (special issue on emotions in Socio-Political contexts planned for mid 2021)

## References

- Brader, T. (2011). The Political Relevance of Emotions: “Reassessing” Revisited. *Political Psychology*, 32(2), 337–346. <https://doi.org/10.1111/j.1467-9221.2010.00803.x>
- Brader, T., & Marcus, G. E. (2013). Emotion and Political Psychology. In L. Huddy, D. O. Sears, & J. S. Levy (Eds.), *The Oxford handbook of political psychology* (pp. 156–204). Oxford University Press.
- Groenendyk, E. (2011). Current Emotion Research in Political Science: How Emotions Help Democracy Overcome its Collective Action Problem. *Emotion Review*, 3(4), 455–463. <https://doi.org/10.1177/1754073911410746>
- Huddy, L., Feldman, S., & Cassese, E. (2007). On the Distinct Political Effects of Anxiety and Anger. In W. R. Neuman (Ed.), *The Affect Effect: Dynamics of Emotion in Political Thinking and Behavior* (pp. 202–230). University of Chicago Press;
- Marcus, G. E., & MacKuen, M. B. (1993). Anxiety, enthusiasm, and the vote: The emotional underpinnings of learning and involvement during presidential campaigns. *American Political Science Review*, 87(3), 672–685.
- Marcus, G. E., Neuman, W. R., & MacKuen, M. (2000). *Affective intelligence and political judgment*. University of Chicago Press.
- Park, C. S. (2015). Applying “Negativity Bias” to Twitter: Negative News on Twitter, Emotions, and Political Learning. *Journal of Information Technology & Politics*, 12(4), 342–359. <https://doi.org/10.1080/19331681.2015.1100225>
- Pekrun, R., Goetz, T., Frenzel, A. C., Barchfeld, P., & Perry, R. P. (2011). Measuring emotions in students’ learning and performance: The Achievement Emotions Questionnaire (AEQ). *Contemporary Educational Psychology*, 36(1), 36–48. <https://doi.org/10.1016/j.cedpsych.2010.10.002>
- Pekrun, R., Vogl, E., Muis, K. R., & Sinatra, G. M. (2017). Measuring emotions during epistemic activities: The Epistemically-Related Emotion Scales. *Cognition and Emotion*, 31(6), 1268–1276. <https://doi.org/10.1080/02699931.2016.1204989>

Valentino, N. A., Hutchings, V. L., Banks, A. J., & Davis, A. K. (2008). Is a Worried Citizen a Good Citizen? Emotions, Political Information Seeking, and Learning via the Internet. *Political Psychology*, 29(2), 247–273. <https://doi.org/10.1111/j.1467-9221.2008.00625.x>

## Appendix B Coding Scheme

Coding will be done on **three different levels**:

1. Article Level: Meta-Data and Theory
2. Study Level
3. Effect-Size Level

We use a excel files with makros which assist in multiplying the entries for each subsequent level. After finishing one level, rows are multiplied automatically to the next tab by clicking on “Multiply Entries”. Afterwards, the next level is coded.

**Exclusion of Studies:** If during the coding process additional exclusion criteria are met by the study, there is still the possibility to exclude it when coding the first level. Only studies where the column “Eligible?” is “YES” will be multiplied.

The File is organized according to the three steps of coding, and the levels are separated in the different sheets of the file. The grey-coloured sheets are used for the drop-down menus and makros and mustn’t be edited. The background colours of the indicate how they need to be processed:

- Variables which need to be coded do not have a background colour. Cells with grey colour include formulas based on a column coded before. They formulas are used to automatically code the variable, but if they remain empty, they need to be coded manually.
- Green-coloured cells are those where the initial information on the articles is inserted (Meta-level), or where the Makros copy the information from the meta-level according to the number of studies/effect sizes in an article.
- ID columns are coloured in the colour of the sheet (meta-level, study-level, effect-size-level). They include formulas which automatically calculate the ID for the specific level.
- Columns for comments are in bright yellow-orange colour. Here is place for every question or note taken during coding the specific level.

### 4. Coding Scheme

In this section, all variables are described.

#### 4.1. Meta-Data and Theory

| V  | Name        | Type               | Description                                                                                                             | Coding                                                                                                                                                                                                       |
|----|-------------|--------------------|-------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | coderID     | <i>Categorical</i> | CoderID by initials, e.g. EG                                                                                            |                                                                                                                                                                                                              |
| 2  | ID          | <i>Numeric</i>     | Individual ID per article/book/chapter/dissertation                                                                     | Automatically                                                                                                                                                                                                |
| 3  | authors     | <i>String</i>      | As stated in the reference                                                                                              | Automatically                                                                                                                                                                                                |
| 4  | title       | <i>String</i>      | As stated in the reference                                                                                              | Automatically                                                                                                                                                                                                |
| 5  | year        | <i>Numeric</i>     | Indicates the year when the study was published, taken from reference.                                                  | Automatically                                                                                                                                                                                                |
| 6  | abstract    | <i>String</i>      |                                                                                                                         | Automatically                                                                                                                                                                                                |
| 7  | publication | <i>Categorical</i> | Type of publication<br>To find out whether a journal is peer reviewed, you can look it up in <a href="#">ulrichsweb</a> | (1) Peer-reviewed Journal Article<br>(2) Journal Article<br>(3) Book chapter<br>(4) Book (monograph)<br>(5) Conference Paper<br>(6) Dissertation /thesis<br>(7) Published (other)<br>(8) Unpublished (other) |
| 8  | focus       | <i>Dummy</i>       | Is the main focus of the study on the relation between (discrete) emotions and learning?                                | 1 – Yes<br>0 – No                                                                                                                                                                                            |
| 9  | aim         | <i>String</i>      | Aim of the study as stated in the article (purpose: use in qualitative synthesis, Systematic Review)                    |                                                                                                                                                                                                              |
| 10 | theory      | <i>String</i>      | Theoretical approach of the study authors (e.g. appraisal                                                               |                                                                                                                                                                                                              |

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|    |            |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----|------------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |            | theories, affective intelligence theory) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 11 | n_studies  | <i>Numeric</i>                           | <p>Number of relevant studies included in the article/book/chapter/dissertation</p> <p>➔ Variable 13 – 35 will be coded for each <b>relevant</b> study</p> <p>Examples: (1) An article reports results of three different experiments conducted; (2) A study analyses two different datasets</p>                                                                                                                                                                                                                          |
| 12 | ELIGIBLE?  | <i>Categorical</i>                       | <p>All studies are already checked for eligibility criteria. If it still turns out that it is not eligible due to variables coded on this level, insert it here. If you would exclude it on a subsequent level, insert it there in the comment section.</p> <p>YES<br/>NO<br/>UNCLEAR</p>                                                                                                                                                                                                                                 |
| 13 | Discipline | <i>Categorical</i>                       | <p>The discipline was coded retroactively the main coding process. It was based on the affiliation of the first author. If not indicated on the publication, coding is based on the CV or public profile of the first author. If a person has two equal affiliations in two different disciplines, a combination is coded. Categories were established along coding.</p> <p>(1) Political science<br/>(2) Communication science<br/>(3) Psychology<br/>(4) Political and Communication Science<br/>(5) Social Science</p> |

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#### 4.2.Study Characteristics

| V  | Name            | Type               | Description                                                                                                                                                                                                                                                                                                                      | Coding                                                                                           |
|----|-----------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| 13 | studyID         | <i>String</i>      | combines ID with individual number per study; pattern: <i>ID_Study-ID</i>                                                                                                                                                                                                                                                        | Automatically from N_Studies                                                                     |
| 14 | primary         | <i>Dummy</i>       | Indicates whether study uses primary (1) or secondary data analysis (0)                                                                                                                                                                                                                                                          | 1 – Yes<br>0 - No                                                                                |
| 15 | datasource      | <i>Categorical</i> | [if Primary = 0]: Data used in the study; new categories might be added                                                                                                                                                                                                                                                          | (1)ANES<br>(2) NAES<br>(3) Afrobarometer<br>(4) ...                                              |
| 16 | datasource_y    | <i>Numeric</i>     | Year when data was collected; if more than one year is reported, use the year when data collection started; use “n.r.” if not reported                                                                                                                                                                                           |                                                                                                  |
| 17 | datasource_wave | <i>String</i>      | [if Primary = 0]: indicate wave used in the study (if applicable). If several waves are used, report wave used for effect size measure; if different waves are used for measures of emotion and learning, report both of them (“emotion: X, learning: Y”); if not applicable, use “n.a.” (inserted automatically if primary = 0) |                                                                                                  |
| 18 | design          | <i>Categorical</i> | General Study-Design, taken from the methods section.                                                                                                                                                                                                                                                                            | (1)Cross-sectional<br>(2) Longitudinal<br>(3) Experimental<br>(4) other                          |
| 19 | targetpop       | <i>Categorical</i> | What was the target population of the study?<br><br>Revision: The electorate is coded as (1) adults.                                                                                                                                                                                                                             | (1)Adults<br>(2)College/university students<br>(3)Adolescents / high school students<br>(4)Other |

|    |             |                    |                                                                                                                                                                                                                                                        |                                                                                                                                                                              |
|----|-------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |             |                    |                                                                                                                                                                                                                                                        | (5)Not specified                                                                                                                                                             |
| 20 | country     | <i>Categorical</i> | Country, where the study was conducted. If the study is based on multiple countries, use the category “mixed”.<br><br><b>If country code is chosen with the form, assure that your active cell is on the right place to insert the code!</b>           | Choose from list of country-codes (click on button “code”; you can then search for the country by name)                                                                      |
| 21 | sampling    | <i>Categorical</i> | Sampling strategy used in the study<br><br>Example: Code (1) Random if random digital dialling is used as a strategy to recruit participants<br><br>Revision: Online sampling service added as category (for e.g., Mechanical Turk, Qualtrics Samples) | (1) Random sample<br>(2) Stratified sample<br>(3) Clustered sample<br>(4) Online Sampling Service<br>(5) Snowball sample<br>(6) Convenience sample<br><br>(99) not mentioned |
| 22 | samplesize  | <i>Numeric</i>     | Number of participants included in the sample, as reported in the methods-section.                                                                                                                                                                     |                                                                                                                                                                              |
| 23 | response    | <i>Dummy</i>       | Does the study report the response rate? Use “n.a.” if not applicable                                                                                                                                                                                  | 1 – Yes<br>0 - No                                                                                                                                                            |
| 24 | exclusion   | <i>Dummy</i>       | Does the study report information about excluding participants?                                                                                                                                                                                        | 1 – Yes<br>0 - No                                                                                                                                                            |
| 25 | missings    | <i>Dummy</i>       | Does the study report information about excluding participants?                                                                                                                                                                                        | 1 – Yes<br>0 - No                                                                                                                                                            |
| 26 | rem_details | <i>string</i>      | e.g., for response rate: percentage of responses of the initial sample; Percentage of missing values for missings;                                                                                                                                     |                                                                                                                                                                              |

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|    |                     |                    |                                                                                                                                                                     |                                                                                   |
|----|---------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|    |                     |                    | number of excluded participants; if not reported, insert “n.r.”                                                                                                     |                                                                                   |
| 27 | allocation          | <i>Categorical</i> | [if Design = (3) Experimental]<br>How were participants allocated to the experimental conditions? For non-experimental designs, “n.a.” is used.                     | (1) Random<br>(2) Quasi-experimental<br>(3) Non-random                            |
| 28 | age_m               | <i>Numeric</i>     | Mean age of the sample taken from the sample description.                                                                                                           |                                                                                   |
| 29 | age_sd              | <i>Numeric</i>     | Standard deviation of the sample age taken from the sample description                                                                                              |                                                                                   |
| 30 | p_female            | <i>Numeric</i>     | Percentage of female participants in the sample taken from the sample description. If not reported, use “n.r.”                                                      |                                                                                   |
| 31 | p_male              | <i>Numeric</i>     | Percentage of male participants in the sample taken from the sample description. If not reported, use “n.r.”                                                        |                                                                                   |
| 32 | measure_e           | <i>Categorical</i> | Kind of Measurement of Emotions, taken from the methods section.<br><br>If two measures are used (e.g. induced and additionally self-reported), choose (4) multiple | (1)Self-reported<br>(2) Physiological<br>(3) Induced<br>(4) Multiple<br>(5) other |
| 33 | trait               | <i>Dummy</i>       | Indicates whether trait (1) or state (0) measure is used for emotion. Note that physiological or induced emotions (-> measure_e) are always state.                  | (1)Trait<br>(0) State                                                             |
| 34 | Objectfocus_in<br>f | <i>Dummy</i>       | Object focus of the emotion measured – taken from the operationalization of emotions.                                                                               | (1) YES<br>(0) NO                                                                 |

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|    |                     |                    |                                                                                                                                                                                                                                              |                                                                                                                                                                                |
|----|---------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |                     |                    | Are emotions related to an overall topic, or specific aspects of political information (e.g. incongruent information) which trigger the emotion? Use “YES” if it is focused on political information, and “NO” if it is not.                 |                                                                                                                                                                                |
| 35 | objectfocus_to<br>p | <i>Categorical</i> | Object focus of the emotion measured – taken from the operationalization of emotions.<br><br>Note that non-political focus is an exclusion criterion → <b>NO EFFECT-SIZES NEED TO BE CODED</b> (just leave n_emotions and n_learning blank). | (2)Political leaders/<br>candidates<br>(3)Policy issue<br>(4)Election &<br>campaign<br>(5)General political<br>situation<br>(6)Political event<br>(7)Other<br>(8)Non-political |
| 37 | n_emotions          | <i>Numeric</i>     | How many discrete emotions are analysed in the study?                                                                                                                                                                                        |                                                                                                                                                                                |
| 38 | n_learning          | <i>Numeric</i>     | How many learning-related measures are used in the study?                                                                                                                                                                                    |                                                                                                                                                                                |

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### 4.3. Effect-Sizes

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| V | Name         | Type               | Description                                                                                         | Coding                                     |
|---|--------------|--------------------|-----------------------------------------------------------------------------------------------------|--------------------------------------------|
|   | effectsizeID | <i>String</i>      | combines Study-ID with individual number per effect size; pattern: <i>ID_Study-ID_EffectSize-ID</i> | Automatically from N_Emotions & N_Learning |
|   | emotions_str |                    | How is the emotion named in the study?                                                              |                                            |
|   | emotion      | <i>Categorical</i> | Which emotion is used for this effect size?                                                         | Chose emotion from emotion list            |

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|               |                    |                                                                                                                                                  |                                                    |
|---------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| positive      | <i>Dummy</i>       | Is it a positive – meaning pleasant, comfortable or negative, unpleasant emotion?                                                                | (1)Positive<br>(0)Negative                         |
| activation    | <i>Dummy</i>       | Is it physiologically activating or deactivating?                                                                                                | (1)Activating<br>(0)deactivating                   |
| emotion_cat   | <i>Categorical</i> | Which Category does the emotion belong to? Positive Activating, Negative Activating, Positive Deactivating or Negative Deactivating Emotion?     | Automatically; 4 categories, combined by v16 & v17 |
| items_e       | <i>Numeric</i>     | Number of items used to measure this emotion; if emotions are induced or measured physiologically, indicate “n.a.”                               |                                                    |
| bidimensional | <i>Dummy</i>       | Is a uni-dimensional (e.g. how anxious do you feel) or bi-dimensional scale used (e.g. from relaxed to excited, where would you place yourself?) | (0)Uni-dimensional<br>(1)Bi-dimensional            |
| min_e         | <i>Numeric</i>     | The minimum of the response scale used to measure emotions; use “n.a.” if no self-report measure was used                                        |                                                    |
| max_e         | <i>Numeric</i>     | The maximum of the response scale used to measure emotions; use “n.a.” if no self-report measure was used (see measure_e)                        |                                                    |
| mean_e        | <i>Numeric</i>     | The mean of the emotion as reported in the descriptive statistics; if not applicable, use “n.a.”; if not reported, use “n.r.”                    |                                                    |
| sd_e          | <i>numeric</i>     | The standard deviation of the emotion as reported in the descriptive statistics; if not                                                          |                                                    |

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|                   |                    |                                                                                                                                                                                                             |                                                                                                                                                           |
|-------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   |                    | applicable, use “n.a.”; if not reported, use “n.r.”                                                                                                                                                         |                                                                                                                                                           |
| reliability_e_c   | <i>Categorical</i> | Reliability of Emotions-Scale: Type of Coefficient (if reported);<br>Choose (6) not reported if no measure is reported, and (7) not applicable if type of measurement would not allow a reliability measure | (1) Cronbach’s Alpha<br>(2) McDonald’s Omega<br>(3) Test-Test-correlation<br>(4) Kappa<br>(5) Krippendorff’s Alpha<br>(6) other<br>(7) n. r.<br>(8) n. a. |
| reliability_e     | <i>Numeric</i>     | Reliability Coefficient of the Emotions-Scale – Magnitude of the reliability                                                                                                                                |                                                                                                                                                           |
| learning          | <i>String</i>      | Which learning-related measure was used? Type how it is named in the primary study; if it limited to specific kind of information (see learning_limits_d), describe it here                                 |                                                                                                                                                           |
| learning_c        | <i>Categorical</i> | Which learning-related measure was used? For detailed definition, see list of working definition.                                                                                                           | (1) Attention to politics /Media Use<br>(2)Information seeking<br>(3)information acquisition<br>(4)Discussions<br>(5)political knowledge                  |
| learning_limits_d | <i>Dummy</i>       | Is learning general on politics/the object focus of the emotions or specific kind of                                                                                                                        | (1) YES (limited)<br>(0) NO                                                                                                                               |

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|           |                    |                                                                                                                                                                                   |                                                                       |
|-----------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
|           |                    | politics (e.g. information in line with one's attitudes / counter-attitudinal ); if it includes limits, describe it in the string-variable (learning)                             |                                                                       |
| measure_l | <i>Categorical</i> | Kind of measurement of learning, taken from the methods section.<br><br>Examples: behavioural measures are e.g., clicks on news articles; recall tasks would be a test/assessment | (2) self-report<br>(3) behavioral<br>(4) test/assessment<br>(5) other |
| items_l   | <i>Numeric</i>     | Number of items used to measure learning; if not applicable, insert "n.a."                                                                                                        |                                                                       |
| min_l     | <i>Numeric</i>     | The minimum of the response scale used to measure learning; "n.a." if no self-report measure was used (this is coded automatically, based on the category chosen for measure_l)   |                                                                       |
| max_l     | <i>Numeric</i>     | The maximum of the response scale used to measure learning; "n.a." if no self-report measure was used (this is coded automatically, based on the category chosen for measure_l)   |                                                                       |
| mean_l    | <i>Numeric</i>     | The mean of learning reported in the descriptive statistics; if not applicable, use "n.a."; if not reported, use "n.r."                                                           |                                                                       |
| sd_l      | <i>Numeric</i>     | The standard deviation of learning as reported in the descriptive statistics; if not applicable, use "n.a."; if not reported, use "n.r."                                          |                                                                       |

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|                 |                    |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                |
|-----------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| reliability_l_c | <i>Categorical</i> | Reliability of Learning-Scale: Type of Coefficient (if reported)                                                                                                                                                                                                                                                                                                                                  | (1) Cronbach's Alpha<br>(2) test-test-correlation<br>(3) Kappa other<br>(3) n. r.<br>(4) n. a. |
| reliability_l   | <i>Numeric</i>     | Reliability Learning of the Emotions-Scale – Magnitude of the reliability                                                                                                                                                                                                                                                                                                                         |                                                                                                |
| n               | <i>Numeric</i>     | Sample size of the (sub-)sample which is used for the measure, if it deviates from before mentioned sample size.<br><br>If it is not reported, insert "n.r."                                                                                                                                                                                                                                      |                                                                                                |
| es_design       | <i>Categorical</i> | Study design on which the effect size is based. E.g., if the study generally has an experimental design, but the effect size is taken from two measures at the baseline, use "cross-sectional"; if the independent variable is affected by the manipulation, use "experimental"; In longitudinal studies, use "cross-sectional" if a relationship-measure is available from the first time point. | (1) Cross-sectional<br>(2) Longitudinal<br>(3) Experimental<br>(4) other                       |
| calc_method     | <i>Categorical</i> | Is the effect size based on calculating and effect size based on a relationship (e.g., Pearson's R, taken from a Regression) or on comparison of means (e.g. t-test, ANOVA)? This question is decisive for which of the                                                                                                                                                                           | (1) relationship<br>(2) means                                                                  |

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|             |                    |                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                               |
|-------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|             |                    | following variables need to be coded; those not dedicated to the respective method will automatically include “n.a.”                                                                                                       |                                                                                                                                                                                                                                                                                               |
| measure     | <i>Categorical</i> | Type of Measure used for indicating relationship;<br><br>Note that (6) will be excluded for quantitative synthesis                                                                                                         | (0) correlation (unspecified)<br>(1) Pearson’s R<br>(2) Spearman’s $\rho$<br>(3) Kendall’s $\tau$<br>(4) Latent correlation<br>(5) Bivariate Regression Coefficient<br>(6) Standardized Beta<br>(7) Partial Correlation<br>(8) Unstandardized Beta<br>(9) Odds Ratio from Logistic Regression |
| direction   | <i>Categorical</i> | Is there a direction implied by the statistical model? Use “none” for bivariate correlations, and 2 or 3 for regressions depending on the predictors and outcomes used in the study                                        | (6) None<br>(7) Emotions to learning<br>(8) Learning to emotions                                                                                                                                                                                                                              |
| controls    | <i>Numeric</i>     | [if 29 == Standardized Beta, Partial Correlation or unstandardized Beta]: Number of control variables included; otherwise use “n.a.”; If other emotions are included in the same model, mention them in the model_comment; |                                                                                                                                                                                                                                                                                               |
| effect_size | <i>Numeric</i>     | Size of the effect size (correlational); if a different effect size is used, insert “n.a.”                                                                                                                                 |                                                                                                                                                                                                                                                                                               |

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|                 |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| effect_size_se  | <i>Numeric</i>     | Standard error of the effect size.                                                                                                                                                                                                                                                                                                                                                                                                                |
| p-value_c_exact | <i>Numeric</i>     | What was the exact p-value? Insert with as many digits as reported; if it is reported only verbal (e.g. “significant relationship”) or stars, use “n.r.” und indicate the corresponding category in “p-value_c_cat”                                                                                                                                                                                                                               |
| p-value_c_cat   | <i>Categorical</i> | <p>This variable is automatically calculated from the variable “p-value_c_exact”, unless “n.r.” is chosen; then chose the corresponding category via drop-down menu; use “n.s.” for “not significant” if no significance level is reported, but stated in the text that the effect is not significant</p> <p>(5) below 0.001<br/>(6) below 0.01<br/>(7) below 0.05<br/>(8) below 0.1<br/>(5) above 0.1<br/>(6) n.s.<br/>(7) n.r.<br/>(8) n.a.</p> |
| model_comments  | <i>String</i>      | <p>Indicate any special model features, e.g. moderator terms or mediation; other emotions as controls,...</p> <p>Please do not leave this blank, but include “<b>none</b>” if you do not have any comment on the model.</p>                                                                                                                                                                                                                       |
| m_emg           | <i>Numeric</i>     | For experimental designs: Mean of learning within the emotion (experimental) group                                                                                                                                                                                                                                                                                                                                                                |
| sd_emg          | <i>Numeric</i>     | For experimental designs: SD of learning within the emotion (experimental) group                                                                                                                                                                                                                                                                                                                                                                  |
| n_emg           | <i>Numeric</i>     | For experimental designs: number of participants within the emotion (experimental) group                                                                                                                                                                                                                                                                                                                                                          |
| controlgroup    | <i>String</i>      | Type of control group (e.g. no-emotion induced,                                                                                                                                                                                                                                                                                                                                                                                                   |

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|                       |                    |                                                                                               |                                |
|-----------------------|--------------------|-----------------------------------------------------------------------------------------------|--------------------------------|
|                       |                    | relaxation,.. ) – describe it shortly                                                         |                                |
| m_cg                  | <i>Numeric</i>     | For experimental designs: Mean of learning within the control group                           |                                |
| sd_cg                 | <i>Numeric</i>     | For experimental designs: SD of learning within the control group                             |                                |
| n_cg                  | <i>Numeric</i>     | For experimental designs: number of participants within the control group                     |                                |
| statistic             | <i>Categorical</i> | For experimental designs: which test-statistic is reported?                                   | (3) t<br>(4) F<br>(5) $\chi^2$ |
| df                    | <i>Numeric</i>     | Degrees of freedom reported in the test statistic                                             |                                |
| value                 | <i>Numeric</i>     | t-/F-/ $\chi^2$ -value                                                                        |                                |
| Comments              |                    |                                                                                               |                                |
| Contact_address       | <i>String</i>      | url of published data or e-mail of author contacted (anonymized to “mail@” in published data) |                                |
| contacted             | <i>Date</i>        | Date of contact                                                                               |                                |
| measure_contacted     | <i>Categorical</i> | Type of measure received through author consultation / using published data                   |                                |
| effect_size_contacted | <i>Numeric</i>     | Effect size received through author consultation / using published data                       |                                |
| p-value_contacted     | <i>Numeric</i>     | p-value received through author consultation / using published data                           |                                |
| N_contacted           | <i>Numeric</i>     | Number of observations in calculation received through                                        |                                |

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|            |                    |                                                                                                                                                                  |
|------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|            |                    | author consultation / using published data                                                                                                                       |
| dir_diff_c | <i>Categorical</i> | Direction of the effect received through author consultation / using published data (if using t-test): 1 = higher in emotion group, -1 = higher in control group |
| dataID     | <i>Categorical</i> | Mirrors studyID, unless same data is used in two studies -> one ID                                                                                               |

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## Missing Values

For missing values, two different categories are used:

- **“n.a.”: not applicable** – for variables which can’t be coded due to specific dependencies (e.g. allocation in a non-experimental design)
- **“n.r.”: not reported** – for variables which can’t be coded due to missing information in the original study

## 5. Working Definitions

### 5.1. Emotions

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| Emotion  | Category            | Definition                                                                                                                                             |
|----------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| positive | -                   | Only used if effect sizes are not reported on discrete emotion level, but can be differentiated as either positive-activating or positive-deactivating |
| negative | -                   | Only used if effect sizes are not reported on discrete emotion level, but can be differentiated as either negative-activating or negative-deactivating |
| anger    | Negative-activating | Outcome or activity emotion (Pekrun & Stephens, 2012), high in arousal (Russel, 1980)                                                                  |
| anxiety  | Negative-activating | Prospective outcome emotion (Pekrun & Stephens, 2012); includes fear and fright                                                                        |

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|              |                               |                                                                                                                                                                          |
|--------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| fear         | Negative-activating           | Being afraid is rated high in distress (Russel, 1980) – activating; can be grouped with anxiety                                                                          |
| boredom      | Negative-deactivating emotion | Activity emotion                                                                                                                                                         |
| curiosity    | Positive-activating           | Positive, though valence might vary regarding the emotion-eliciting event (Pekrun & Loderer, 2020)                                                                       |
| disgust      | Negative-activating           |                                                                                                                                                                          |
| enjoyment    | Positive-activating           | Includes “happy”                                                                                                                                                         |
| enthusiasm   | Positive-activating           |                                                                                                                                                                          |
| frustration  | Negative-?                    | Can be both, activating or deactivating (Pekrun & Loderer, 2020) – depending whether it is more directed towards anger or disappointment; activity and epistemic emotion |
| surprise     | ?-activating                  | Can be either positive or negative (Pekrun & Loderer, 2020)                                                                                                              |
| confusion    | Negative-activating           | (Pekrun & Loderer, 2020)                                                                                                                                                 |
| hope         | Positive-activating           |                                                                                                                                                                          |
| hopelessness | Negative-deactivating         |                                                                                                                                                                          |
| Pride        | Positive-activating           |                                                                                                                                                                          |
| Sadness      | Negative-deactivating         |                                                                                                                                                                          |
| Shame        | Negative-activating           |                                                                                                                                                                          |
| Aversion     | Negative-activating           | Differentiation of anger: not an approach-emotion                                                                                                                        |
| Hatred       |                               |                                                                                                                                                                          |
| Compassion   |                               |                                                                                                                                                                          |
| Guilt        | Negative-deactivating         |                                                                                                                                                                          |
| Content      | Positive-deactivating         |                                                                                                                                                                          |

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## 5.2.Learning Categories

| Learning              | Definition                                                                                                                                                                                                                                                                                                    |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Attention to politics | Media use (for example number of days one is exposed to television, radio, internet or newspapers), and media use specific to politics, e.g. debate viewing or election campaigns                                                                                                                             |
| Information Seeking   | <i>Behavioural</i> : often measured by process tracing methods, e.g. mock websites; information seeking is often operationalized as the number of clicks, or time spent on websites                                                                                                                           |
| Discussions           | Political discussions, often measured by frequency and different items focusing on several social groups – e.g. family, friends, at work;                                                                                                                                                                     |
| Knowledge             | Issue knowledge (often measured by multiple items asking where to place two opposing candidates, and by comparing their placements – that the “left” candidate is placed left to the other), classical knowledge tests (e.g., multiple choice questions about the political system, candidates, parties, ...) |
| Learning              | Change/gain in knowledge, either by adjusting for prior knowledge or by measuring information acquisition – knowledge of new information which was presented directly in the study or experiment                                                                                                              |

## Appendix C Coding

The following table shows the agreement rates and Krippendorff's  $\alpha$  and how we handled disagreement of coded variables. Note that variables which assessed the effect size from studies comparing means were excluded from this table as this applied to none of the double-coded sample.

**Table C1**

*Reliability and processing of disagreement for coded variables*

| Variable                         | N (%) | AR  | Kripp. $\alpha$ | Comment                                                                       |
|----------------------------------|-------|-----|-----------------|-------------------------------------------------------------------------------|
| <i>Publication level (N = 8)</i> |       |     |                 |                                                                               |
| publication                      | 8     | 100 | 1.00            |                                                                               |
| focus                            | 8     | 37  | -0.190          | not relevant, dropped                                                         |
| <i>Study level (N = 9)</i>       |       |     |                 |                                                                               |
| datasource_y                     | 8     | 75  | 0.995           |                                                                               |
| design                           | 8     | 100 | 1.000           |                                                                               |
| targetpop                        | 8     | 25  | -0.023          | focus on actual sample, electorate and adults combined to one group - revised |
| country                          | 8     | 87  | 0.717           |                                                                               |
| sampling                         | 8     | 62  | 0.262           |                                                                               |
| samplesize                       | 8     | 87  | 0.951           |                                                                               |
| allocation                       | 8     | 75  | 0.524           | disagreement due to coding not reported                                       |
| age_m                            | 8     | 75  | 1.000           |                                                                               |
| age_sd                           | 8     | 87  | 1.000           |                                                                               |
| p_female                         | 8     | 87  | 0.960           |                                                                               |
| p_male                           | 8     | 62  | 1.000           |                                                                               |
| measure_e                        | 8     | 75  | 0.423           | disagreement from coding 'multiple' - revised                                 |

**Table C1***(continued)*

| Variable                          | N (%) | AR  | Kripp. $\alpha$ | Comment                                                                                   |
|-----------------------------------|-------|-----|-----------------|-------------------------------------------------------------------------------------------|
| trait                             | 8     | 75  | -0.071          | revised with clearer rules                                                                |
| object_focus                      | 8     | 50  | 0.318           | revised with clearer rules                                                                |
| <i>Effect-size level (N = 49)</i> |       |     |                 |                                                                                           |
| emotion_str                       | 36    | 100 | 1.000           |                                                                                           |
| items_e                           | 36    | 94  | 1.000           |                                                                                           |
| bidimensional                     | 36    | 100 |                 | only bidimensional measures included                                                      |
| min_e                             | 36    | 86  | 0.878           |                                                                                           |
| max_e                             | 36    | 92  | 1.000           |                                                                                           |
| mean_e                            | 36    | 81  | 0.934           |                                                                                           |
| sd_e                              | 36    | 81  | 0.992           |                                                                                           |
| reliability_e_c                   | 36    | 94  | 0.884           |                                                                                           |
| reliability_e                     | 36    | 81  | 0.498           | mixed up numbers and rows - revised                                                       |
| learning_c                        | 36    | 83  | 0.738           | disagreement between 'information acquisition' and 'knowledge' - combined to one category |
| Learning_limits_d                 | 36    | 14  | -0.732          | different rules applied, resolved by discussion                                           |
| measure_l                         | 36    | 100 | 1.000           |                                                                                           |
| items_l                           | 36    | 92  | 0.908           |                                                                                           |
| min_l                             | 36    | 100 | 1.000           |                                                                                           |
| max_l                             | 36    | 100 | 1.000           |                                                                                           |
| mean_l                            | 36    | 44  | 1.000           |                                                                                           |
| sd_l                              | 36    | 44  | 1.000           |                                                                                           |
| reliability_l_c                   | 36    | 100 | 1.000           |                                                                                           |

**Table C1***(continued)*

| Variable        | N (%) | AR  | Kripp. $\alpha$ | Comment                                                                                                                             |
|-----------------|-------|-----|-----------------|-------------------------------------------------------------------------------------------------------------------------------------|
| reliability_l   | 36    | 100 | 1.000           |                                                                                                                                     |
| n               | 36    | 25  | 0.811           | wrong formula used, range coded - revised with lower bound                                                                          |
| es_design       | 36    | 25  | -0.578          | different rules applied, resolved by discussion                                                                                     |
| calc_method     | 36    | 100 |                 |                                                                                                                                     |
| measure         | 36    | 42  | 0.047           | disagreement from 'Pearson's R' versus 'Correlation (unspecified)' and 'Bivariate Regression Coefficient' and 'Unstandardized Beta' |
| direction       | 36    | 89  | 0.743           |                                                                                                                                     |
| controls        | 32    | 94  | 0.942           |                                                                                                                                     |
| effect_size     | 36    | 92  | 1.000           |                                                                                                                                     |
| effect_size_se  | 36    | 89  | 1.000           |                                                                                                                                     |
| p-value_c_exact | 36    | 97  | 1.000           |                                                                                                                                     |
| p-value_c_at    | 36    | 92  | 0.900           |                                                                                                                                     |

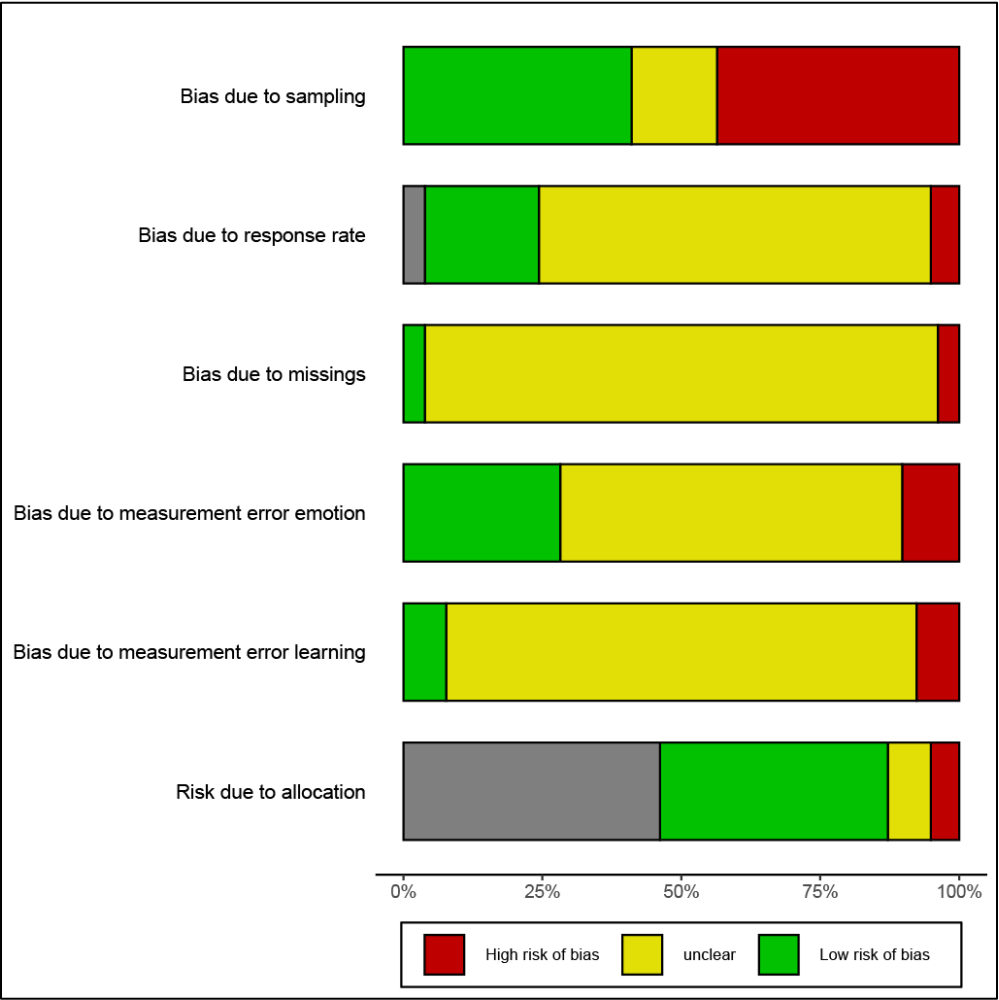
*Note.* AR = Agreement rate, N (%) is the number of entries used to calculate the agreement rate (missing values are deleted listwise).

## **Appendix D Risk of Bias Quality Assessment**

We used the following rules for classifying coded variables into high and low risk of bias:

- Bias due to sampling:
  - low risk: Random sample, clustered sample, online sampling service, stratified sample
  - high risk: convenience sample, snowball sample
- Bias due to response rate: values of 75% and higher are coded as low risk (based on the MERSQI-scale, where full points are allocated in line with this threshold; Reed et al., 2008), values below are coded as high risk
- Bias due to missings: if reported percentage of missing values is below than 5%, risk of bias is coded as low risk (Graham, 2008)
- Bias due to measurement error: according to general recommendations on reliability of scale measures (see for example, Moosbrugger & Kelava, 2012, p. 683), values above .7 are coded as low risk

**Figure D1**  
Risk of Bias Assessment



*Note.* For detailed coding description, please consult the supporting information. Studies where an assessment of the risk of bias was not applicable to the respective categories are displayed in gray.

## Appendix E Study Description

**Table F1**

*Summary of included studies*

| Study                   | Publication Type | Aim                                                                                                                                                                                                 | Sample                                                | Emotion                     | Learning                         |
|-------------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-----------------------------|----------------------------------|
| Zweigenhaft (1986)      | p.r. Article     | explore the relations between nuclear knowledge and anxiety about a nuclear war, expectations and attitudes                                                                                         | N = 1115, other, multiple                             | anxiety                     | Knowledge                        |
| Boehnke (1989)          | p.r. Article     | how adolescents experience nuclear threat and how it affects various (psycho-social and health-related) outcomes                                                                                    | N = 3499, adolescents / high school students, Germany | anxiety                     | Knowledge                        |
| Marcus (1993)           | p.r. Article     | aim to incorporate emotions (anxiety and enthusiasm) into information-processing models of citizens during elections                                                                                | N = n.r., adults, USA                                 | enthusiasm, anxiety         | Learning, Attention to politics  |
| Nadeau (1995)           | p.r. Article     | analyze the effect of anxiety on learning, test its mediation through issue importance and a moderation with hope                                                                                   | N = n.r., adolescents / high school students, Canada  | anxiety, hope               | Knowledge                        |
| Lee (2000)              | Diss. / Thesis   | examine how cognitive appraisals of candidates produce discrete emotions (fear, anger, happiness, pride) and how these relate to political learning, participation and attitudes towards candidates | N = 517, adults, USA                                  | anger, hope, anxiety, pride | Knowledge                        |
| Marcus (2000)           | Book             | set up a two-system theory of emotional functioning in the context of elections, in order to explain political behavior, party identification, symbolic politics and negative campaigning           | N = 10682, adults, USA                                | anxiety, enthusiasm         | Attention to politics, Knowledge |
| Chaffee study 1 (2001), | p.r. Article     | attention to counter-attitudinal messages                                                                                                                                                           | N = 430, adults, USA                                  | curiosity                   | Attention to politics            |
| Chaffee study 2 (2001), | p.r. Article     | attention to counter-attitudinal messages                                                                                                                                                           | N = 417, adolescents / high school students, USA      | curiosity                   | Attention to politics            |
| Hullett (2003)          | p.r. Article     | analyze effects of voters' emotions on attitudes, involvement and learning of candidates' statement at a debate                                                                                     | N = 81, not specified, USA                            | anger, anxiety, enthusiasm  | Attention to politics, Learning  |

| Study                   | Publication Type | Aim                                                                                                                                                                                              | Sample                                    | Emotion                       | Learning                                             |
|-------------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-------------------------------|------------------------------------------------------|
| Wolak (2003)            | Conf. paper      | analyze what elicits emotions in politics (political issues, different news constructions)                                                                                                       | N = 341, college/university students, USA | anxiety, enthusiasm, aversion | Information Seeking                                  |
| Brader (2006)           | Book             | show through emotions the motivational and persuasive power of campaign ads                                                                                                                      | N = 286, adults, USA                      | anxiety, enthusiasm           | Attention to politics, Learning, Information Seeking |
| Hutchings (2006)        | Book Chapter     | analyze how group cues in a campaign elicit emotion which in turn affect candidate evaluation and learning in a campaign                                                                         | N = 198, adults, USA                      | anxiety                       | Knowledge                                            |
| Capelos (2007), study 1 | Conf. paper      | test AIT in the context of Dutch parliamentary democracy - influence of heuristics vs preferences on party evaluation                                                                            | N = 244, adults, Netherlands              | anxiety                       | Attention to politics, Knowledge                     |
| Capelos (2007), study 2 | Conf. paper      | test AIT in the context of Dutch parliamentary democracy - influence of heuristics vs preferences on party evaluation                                                                            | N = 3178, adults, Netherlands             | anxiety                       | Discussions, Attention to politics                   |
| Gadarian (2007)         | Conf. paper      | experiment in the context of immigration: effects of anxiety on information seeking, differentiate between threatening and non-threatening news                                                  | N = 52, college/university students, USA  | enthusiasm, anxiety           | Information Seeking, Learning                        |
| Huddy (2007)            | Book Chapter     | show distinct effects of anxiety and anger on political beliefs and actions                                                                                                                      | N = 1071, adults, USA                     | anger, anxiety                | Discussions, Information Seeking                     |
| Redlawsk (2007)         | Book Chapter     | investigate how initial feelings toward a candidate influence evaluation of information; how emotional reactions to the information influence learning; in a dynamic process tracing environment | N = 117, college/university students, USA | anger, anxiety, enthusiasm    | Information Seeking, Knowledge                       |
| Surawski (2007)         | Diss. / Thesis   | analyze effects of threat on preferences for information                                                                                                                                         | N = 302, college/university students, USA | anxiety                       | Information Seeking                                  |
| Brader (2008)           | p.r. Article     | analyze how group cues on immigration issues affect opinions and action, mediated through emotions                                                                                               | N = 354, adults, USA                      | anxiety                       | Information Seeking                                  |

| Study                     | Publication Type | Aim                                                                                                                                                                             | Sample                                     | Emotion                             | Learning                                   |
|---------------------------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-------------------------------------|--------------------------------------------|
| Valentino (2008), study 1 | p.r. Article     | analyze whether emotions (anxiety and anger) mediate effects of threat on information seeking                                                                                   | N = 408, adults, USA                       | anger, anxiety, enthusiasm          | Attention to politics, Information Seeking |
| Valentino (2008), study 2 | p.r. Article     | analyze whether emotions (anxiety and anger) mediate effects of threat on information seeking                                                                                   | N = 101, adults, USA                       | anxiety, anger, enthusiasm, disgust | Information Seeking                        |
| Williams (2008)           | Diss. / Thesis   | analyze effects of anxiety on information seeking and voting by replicating studies by Marcus et al.                                                                            | N = n.r., adults, USA                      | anxiety, enthusiasm                 | Knowledge                                  |
| Civettini (2009)          | p.r. Article     | experimental study on whether anxiety influences information remembered at the time of voting in a dynamic process tracing environment                                          | N = 189, adults, USA                       | enthusiasm, anxiety, anger          | Learning                                   |
| McClain (2009)            | p.r. Article     | test a predictive model on effect of enthusiasm and anxiety on behavioral and information seeking outcomes regarding stem cell research, an issue salient in the 2008 elections | N = 100, college/university students, USA  | enthusiasm, anxiety, anger          | Information Seeking, Discussions           |
| Valentino (2009)          | p.r. Article     | aim to explain what explains biased versus balanced information seeking                                                                                                         | N = 305, adults, USA                       | anger, anxiety                      | Information Seeking, Knowledge             |
| Albertson (2010)          | Conf. paper      | testing how anxiety affects trust and learning about health issues                                                                                                              | N = 156, college/university students,      | anxiety                             | Information Seeking, Learning              |
| MacKuen (2010)            | Conf. paper      | aim to compare effects of personality traits and emotions on political attention, steadfastness of views and inclination towards compromise using a survey experiment           | N = 1545, adults, USA                      | enthusiasm, aversion, anxiety       | Information Seeking                        |
| MacKuen (2010)            | p.r. Article     | aim to analyze the effect of emotions on the type of citizenship practiced (loyal partisan solidarity versus open-minded deliberation)                                          | N = 2015, college/university students, USA | anxiety, enthusiasm, aversion       | Information Seeking                        |
| Schoen (2010)             | p.r. Article     | Analyzes the relations between anxiety related to the economic crisis and decision-making during elections in Germany 2009                                                      | N = 2173, adults, Germany                  | anxiety                             | Attention to politics, Discussions         |

| Study                      | Publication Type | Aim                                                                                                                                                                          | Sample                                    | Emotion                                 | Learning                                      |
|----------------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-----------------------------------------|-----------------------------------------------|
| Landreville (2011)         | p.r. Article     | analyzes how political entertainment film and negative emotions are related to discussion intent of the film                                                                 | N = 302, college/university students, USA | anger, disgust, sadness, guilt, anxiety | Discussions                                   |
| MacKuen (2011), study 1    | Conf. paper      | experimental panel design to investigate effects of news stories on emotional responses and information seeking over time                                                    | N = 1026, adults, USA                     | anxiety, aversion, enthusiasm           | Attention to politics, Information Seeking    |
| MacKuen (2011), study 2    | Conf. paper      | experimental panel design to investigate effects of news stories on emotional responses and information seeking over time                                                    | N = 1047, adults, USA                     | anxiety, aversion, enthusiasm           | Attention to politics, Information Seeking    |
| Sirin (2011)               | p.r. Article     | aim to explore effects of political information and anger on participant's cognitive processing and policy preferences                                                       | N = 188, college/university students, USA | anger                                   | Information Seeking                           |
| Valenzuela (2011), study 1 | Diss. / Thesis   | aims to understand the process how emotions enable people to learn about public affairs                                                                                      | N = 2586, adults, USA                     | positive, negative                      | Attention to politics, Discussions, Knowledge |
| Valenzuela (2011), study 2 | Diss. / Thesis   | aims to understand the process how emotions enable people to learn about public affairs                                                                                      | N = 415, adults, USA                      | negative                                | Attention to politics, Discussions, Knowledge |
| Ryan (2012), study 1       | p.r. Article     | analyze effects of evoked anger on information seeking                                                                                                                       | N = n.r., adults, USA                     | anxiety, anger                          | Information Seeking                           |
| Ryan (2012), study 2       | p.r. Article     | analyze effects of evoked anger on information seeking                                                                                                                       | N = n.r., adults, USA                     | anxiety, anger                          | Information Seeking                           |
| Ryan (2012), study 3       | p.r. Article     | analyze effects of evoked anger on information seeking                                                                                                                       | N = n.r., adults, USA                     | anger                                   | Information Seeking                           |
| Schemer (2012)             | p.r. Article     | analyze reinforcing spirals of affective responses towards asylum seekers (anxiety and anger) on attention to political advertisements in a campaign on the issues of asylum | N = 1725, adults, Switzerland             | negative                                | Attention to politics                         |

| Study                      | Publication Type | Aim                                                                                                                                                                                      | Sample                                        | Emotion                             | Learning                           |
|----------------------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-------------------------------------|------------------------------------|
| Weber (2013)               | p.r. Article     | analyze effects of discrete emotions (anger, sadness, fear and enthusiasm in emotional adds) on political participation                                                                  | N = 656, not specified, USA                   | anger, sadness, anxiety, enthusiasm | Attention to politics, Discussions |
| Cohen-Chen (2014)          | p.r. Article     | hypothesize opposite effects of hope and fear on information processing in the context of peace for the Israeli-Palestinian conflict                                                     | N = 222, other, Israel                        | hope, anxiety, compassion, hatred   | Information Seeking                |
| Han (2014)                 | Diss. / Thesis   | examination of the role of bias-induced emotions (anxiety and anger) in partisan information seeking and the role of anger expression and issues novelty in partisan emotional responses | N = 243, college/university students, USA     | anger, anxiety                      | Information Seeking                |
| Obermaier (2014)           | Article          | analyze effects of induced emotions (anger, anxiety and enthusiasm) on participation, and information seeking                                                                            | N = 249, college/university students, Germany | enthusiasm, anxiety, anger          | Information Seeking                |
| Albertson (2015)           | Book             | analyze how anxiety affects information processing/focus on threatening information on the issue of migration                                                                            | N = 384, adults, USA                          | anxiety                             | Information Seeking, Learning      |
| Chadwick (2015)            | p.r. Article     | use factorial survey design to analyze appraisals of hope (importance, goal congruence, future expectations and possibility of climate protection) and persuasive outcomes               | N = 245, college/university students,         | hope                                | Attention to politics              |
| Park (2015)                | p.r. Article     | investigate the effect of negative twitter news on participants emotions, cognitive and behavioral responses                                                                             | N = 420, other, South Korea                   | anger, anxiety, disgust             | Information Seeking, Learning      |
| Valenzuela (2015), study 1 | p.r. Article     | analyze relations between emotions (pride and anger) and discussions with people with different opinion                                                                                  | N = 1737, adults, Chile                       | pride, anger                        | Discussions                        |
| Valenzuela (2015), study 2 | p.r. Article     | analyze relations between emotions (pride and anger) and discussions with people with different opinion                                                                                  | N = 1457, adults, USA                         | pride, anger                        | Discussions                        |
| Valenzuela (2015), study 3 | p.r. Article     | analyze relations between emotions (pride and anger) and discussions with people with different opinion                                                                                  | N = 999, adults, Switzerland                  | pride, anger                        | Discussions                        |
| Wang (2015)                | p.r. Article     | analyze reactions to a public health crisis - surprise as initial emotional reactions on information seeking and vaccination behavior                                                    | N = 205, college/university students, USA     | surprise                            | Information Seeking                |
| Calfano (2016)             | p.r. Article     | AIT outside the partisan context: analyze the effect of anxiety on information seeking and validating sought information                                                                 | N = 330, adults, USA                          | anxiety                             | Information Seeking                |

| Study                    | Publication Type | Aim                                                                                                                                                          | Sample                                    | Emotion                                          | Learning                                    |
|--------------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|--------------------------------------------------|---------------------------------------------|
| Cheung-Blunden (2016)    | p.r. Article     | analyze the effect of anxiety during cyber attacks on information processing/memory                                                                          | N = 130, college/university students, USA | anxiety, anger                                   | Knowledge                                   |
| Kim (2016)               | p.r. Article     | analyze in an experimental design how induced anger and information provided influences participation in a debate and post-deliberation outcomes             | N = 237, college/university students,     | anger                                            | Discussions, Knowledge                      |
| Ditonto (2017)           | Article          | test implications of various theories in a dynamic processing environment - what motivates to switch from System 1 to System 2 processing                    | N = 473, not specified, USA               | enthusiasm, anger, anxiety                       | Information Seeking, Learning               |
| Martin (2017)            | p.r. Article     | use an experiment to test how aspects of news coverage and participants' emotions and cognitions shape attitudes and behavioral intentions about health care | N = 1056, adults, USA                     | hope, anger, anxiety, pride                      | Information Seeking, Attention to politics  |
| Song (2017)              | p.r. Article     | analyzes the role of fear, anger and enthusiasm in selective approach and avoidance of partisan news                                                         | N = 5914, adults, USA                     | anxiety, anger, enthusiasm                       | Attention to politics                       |
| Taylor (2017)            | p.r. Article     | aim to analyze effects of extreme television media on political knowledge and affect                                                                         | N = 686, college/university students, USA | negative                                         | Knowledge                                   |
| Sokhey (2017)            | Conf. paper      | analyze how emotions experienced in the 2016 presidential campaign relate to political discussions                                                           | N = n.r., adults, USA                     | enthusiasm, aversion, anxiety, shame             | Discussions                                 |
| Choi (2018)              | Diss. / Thesis   | analyze the difference between appraisals of discrete positive emotions and (pos. and neg.) emotions' effects on information seeking and participation       | N = 387, adults, USA                      | enthusiasm, pride, hope, anger, anxiety, disgust | Information Seeking                         |
| Clifford study 1 (2018), | p.r. Article     | compare effects of disgust and anxiety on learning in an experimental setting about an outbreak of a disease                                                 | N = 1000, adults, USA                     | disgust, anxiety                                 | Knowledge, Information Seeking, Discussions |
| Clifford study 2 (2018), | p.r. Article     | compare effects of disgust and anxiety on learning in an experimental setting about an outbreak of a disease                                                 | N = 748, college/university students, USA | disgust                                          | Knowledge, Information Seeking, Discussions |

| Study               | Publication Type | Aim                                                                                                                                                                             | Sample                                         | Emotion                                      | Learning                                                |
|---------------------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|----------------------------------------------|---------------------------------------------------------|
| Erisen (2018)       | Book Chapter     | test the role of emotions in learning about politics, information seeking and extending one's political knowledge in the context of the Syrian crisis and ISIS threat in Turkey | N = 233, not specified, Turkey                 | anxiety, anger, enthusiasm                   | Discussions, Attention to politics, Information Seeking |
| Kahlor (2018)       | p.r. Article     | analyze the role of perceived risk, related emotions in information seeking intent (also separately for liberals and conservatives) during 2016 presidential elections          | N = 520, adults, USA                           | anxiety, anger, sadness, enjoyment, positive | Information Seeking, Knowledge                          |
| Lee (2018)          | p.r. Article     | investigate how debates influence emotional responses (anger, fear and enthusiasm) and how these are related to cognitive elaboration and tolerance                             | N = 407, other, South Korea                    | anger, anxiety, enthusiasm                   | Discussions                                             |
| Vasilopoulos (2018) | p.r. Article     | Analyze effects of fear stemming from a terrorist attack on information seeking and participation                                                                               | N = 1524, adults, France                       | anxiety, anger                               | Information Seeking                                     |
| Söderström (2018)   | p.r. Article     | analyze how affective response to political violence is related to cognition (political knowledge)                                                                              | N = 27713, adults, multiple                    | anxiety                                      | Knowledge, Discussions                                  |
| Hmielowski (2019)   | p.r. Article     | test the effect of hopelessness and anxiety on information seeking in the context of water quality                                                                              | N = 2015, not specified, USA                   | anxiety, hopelessness                        | Information Seeking                                     |
| Hoewe (2019)        | p.r. Article     | analyze the relations between anger, anxiety, enthusiasm and hopefulness and post-election information seeking / sharing behaviors                                              | N = 263, college/university students, USA      | anger, anxiety, enthusiasm, hope             | Information Seeking                                     |
| Lamprianou (2019)   | p.r. Article     | experimental analysis of effects of emotions (anger and shame) on political behavior (information seeking and political activism); in interaction with political sophistication | N = 217, college/university students, multiple | anger, shame                                 | Information Seeking                                     |
| Lee (2019), study 1 | p.r. Article     | experimental study to investigate effects of tone of messages (pos. vs negative) and emotions on learning (wish for more information) about a presidential candidate            | N = 718, college/university students, USA      | positive, negative                           | Information Seeking                                     |
| Lee (2019), study 2 | p.r. Article     | experimental study to investigate effects of tone of messages (pos. vs negative) and emotions on learning (wish for more Information) about a presidential candidate            | N = 703, college/university students, USA      | positive, negative                           | Information Seeking                                     |

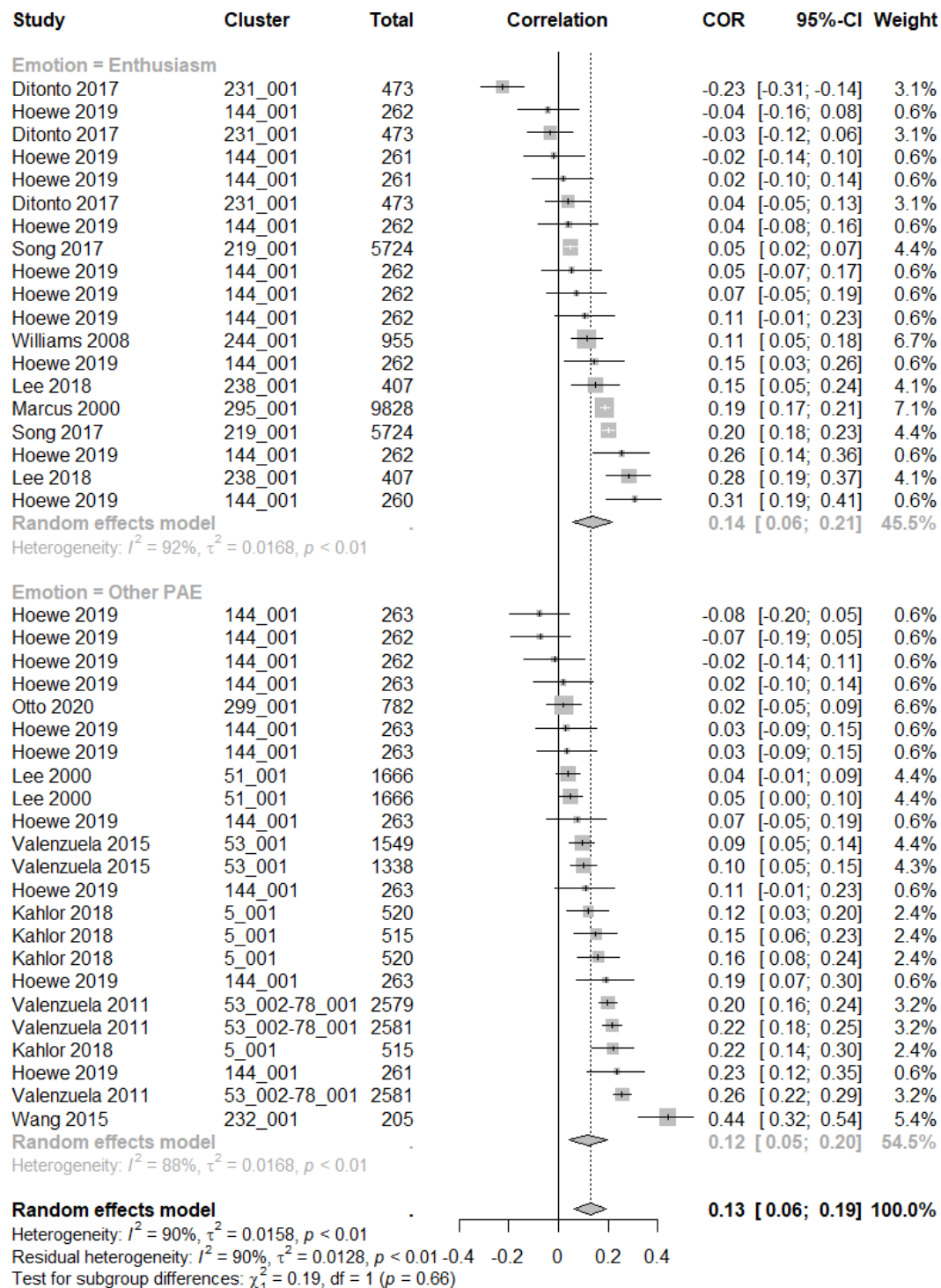
| Study                 | Publication Type | Aim                                                                                                  | Sample                                           | Emotion                                     | Learning                           |
|-----------------------|------------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------|---------------------------------------------|------------------------------------|
| So (2019)             | p.r. Article     | experimental study to analyze effects of threat on information seeking                               | N = 927, college/university students, USA        | anxiety                                     | Information Seeking                |
| Wollebæk (2019)       | p.r. Article     | investigate the role of fear and anger on online information seeking and debating                    | N = 10000, adults, Norway                        | anxiety, anger                              | Discussions, Information Seeking   |
| Chung (2020)          | Conf. paper      | analyze whether emotions mediate the relation between media use and political efficacy               | N = 1365, college/university students, Hong Kong | enjoyment, hope, anger, anxiety, sadness    | Attention to politics, Discussions |
| Otto (2020)           | p.r. Article     | use experience sampling to investigate the relation between emotions and attention towards news      | N = 78, adults, Germany                          | anger, content, anxiety, enjoyment          | Attention to politics              |
| Tian (2020)           | p.r. Article     | analyze the role of cynicism for emotions and information seeking - emotions considered as mediators | N = 800, adults, USA                             | anxiety, anger, enthusiasm                  | Information Seeking                |
| Miles (2021), study 1 | p.r. Article     | analyze effects of compulsory voting on participation and learning                                   | N = 109, college/university students, USA        | anger, worry, sadness, frustration, anxiety | Learning                           |
| Miles (2021), study 2 | p.r. Article     | analyze effects of compulsory voting on participation and learning                                   | N = 138, college/university students, USA        | anger, worry, sadness, frustration, anxiety | Learning                           |

*Note.* The ‘Sample’-column reports sample size, target population and country where the study was conducted. p.r. article = peer reviewed Article; Diss. = Dissertation; n.r. = not reported. AIT = Affective Intelligence Theory.

## Appendix G Forest Plots

**Figure G1**

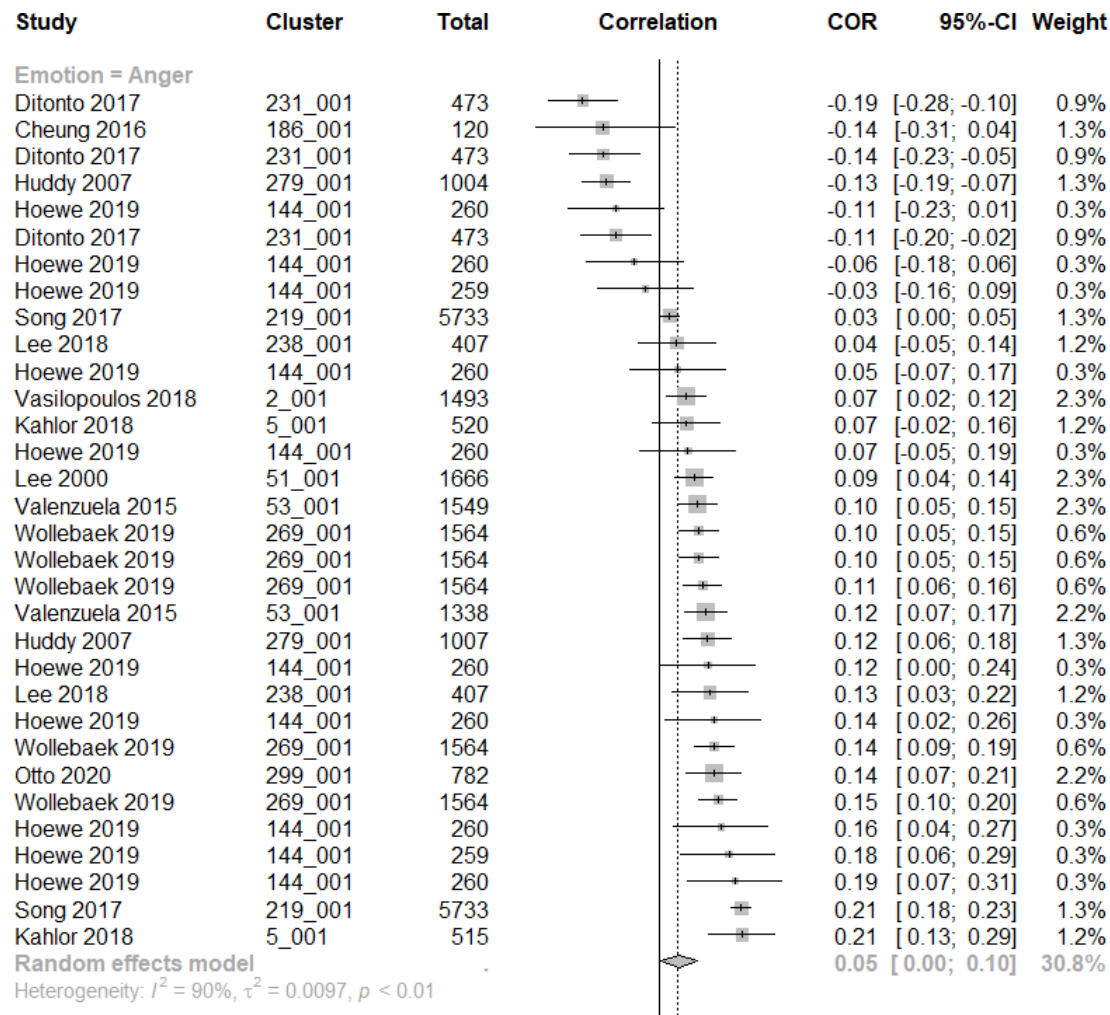
*Effect Sizes of the Associations Between Positive-Activating Emotions and Learning in Cross-Sectional Studies*



*Note.* Discrepancies of subgroup overall effects between the figure and text are due to differences in the sum of weights.

**Figure G2a**

*Effect Sizes of the Associations Between Negative-Activating Emotions and Learning in Cross-Sectional Studies, first part*



*Note.* Discrepancies of subgroup overall effects between the figure and text are due to differences in the sum of weights.

**Figure G2b**

*Effect Sizes of the Associations Between Negative-Activating Emotions and Learning in Cross-Sectional Studies, second part*

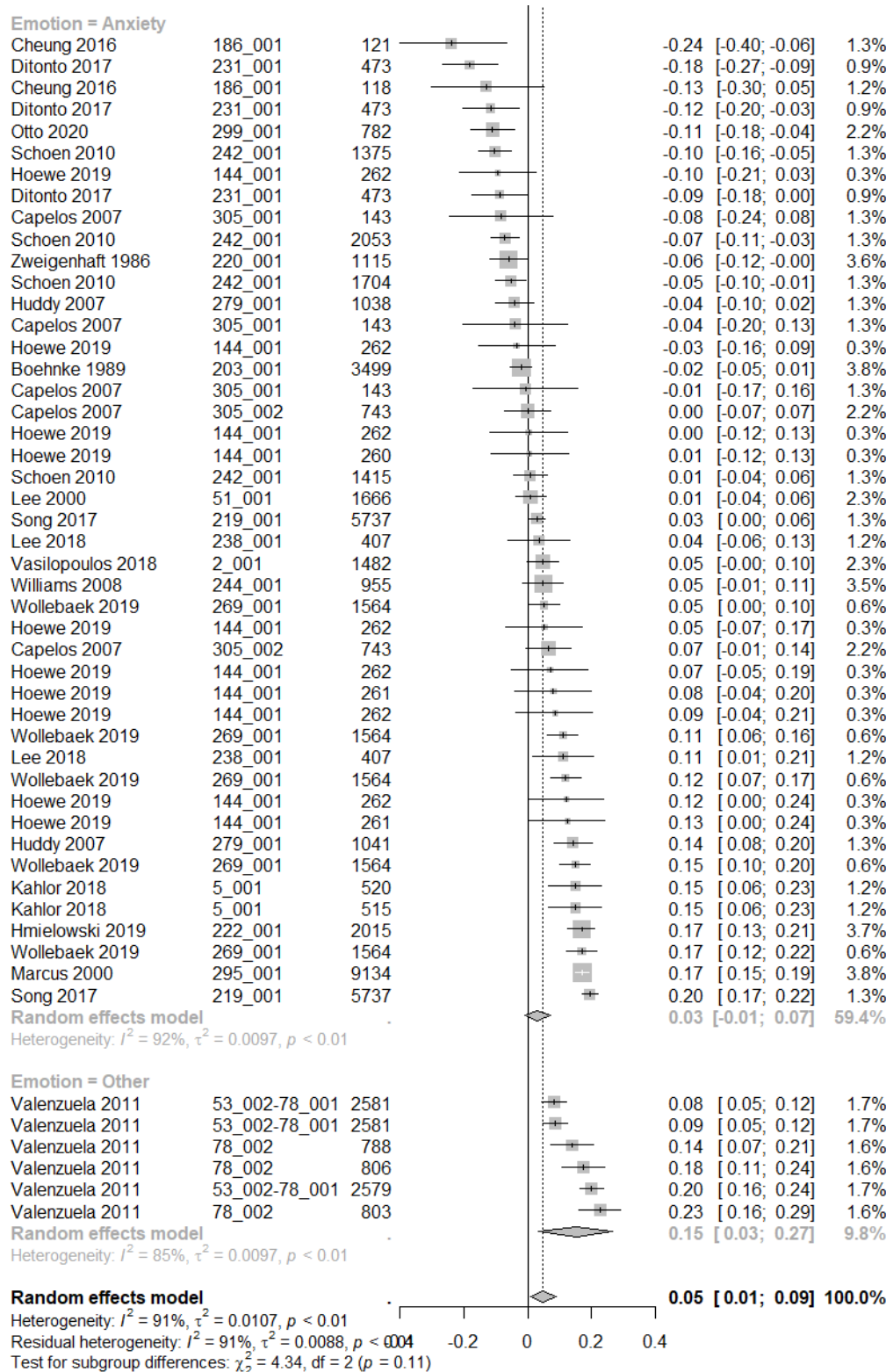


Figure G3

*Effect Sizes of the Associations Between Negative-Deactivating Emotions and Learning in Cross-Sectional Studies*

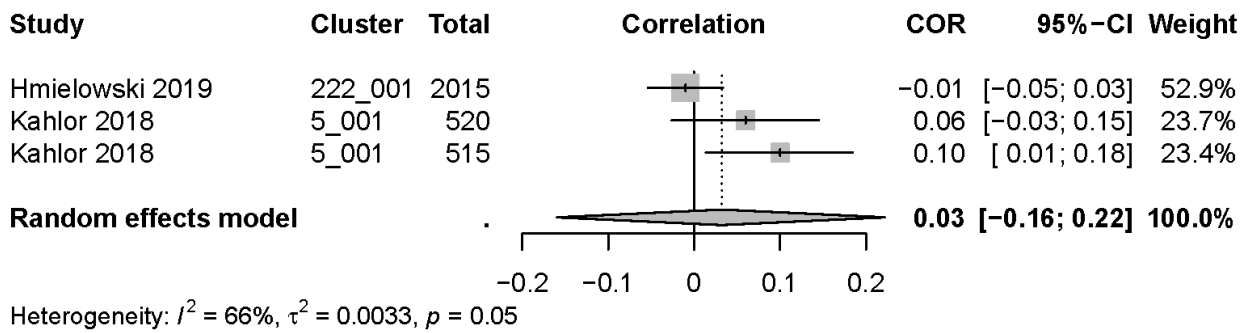
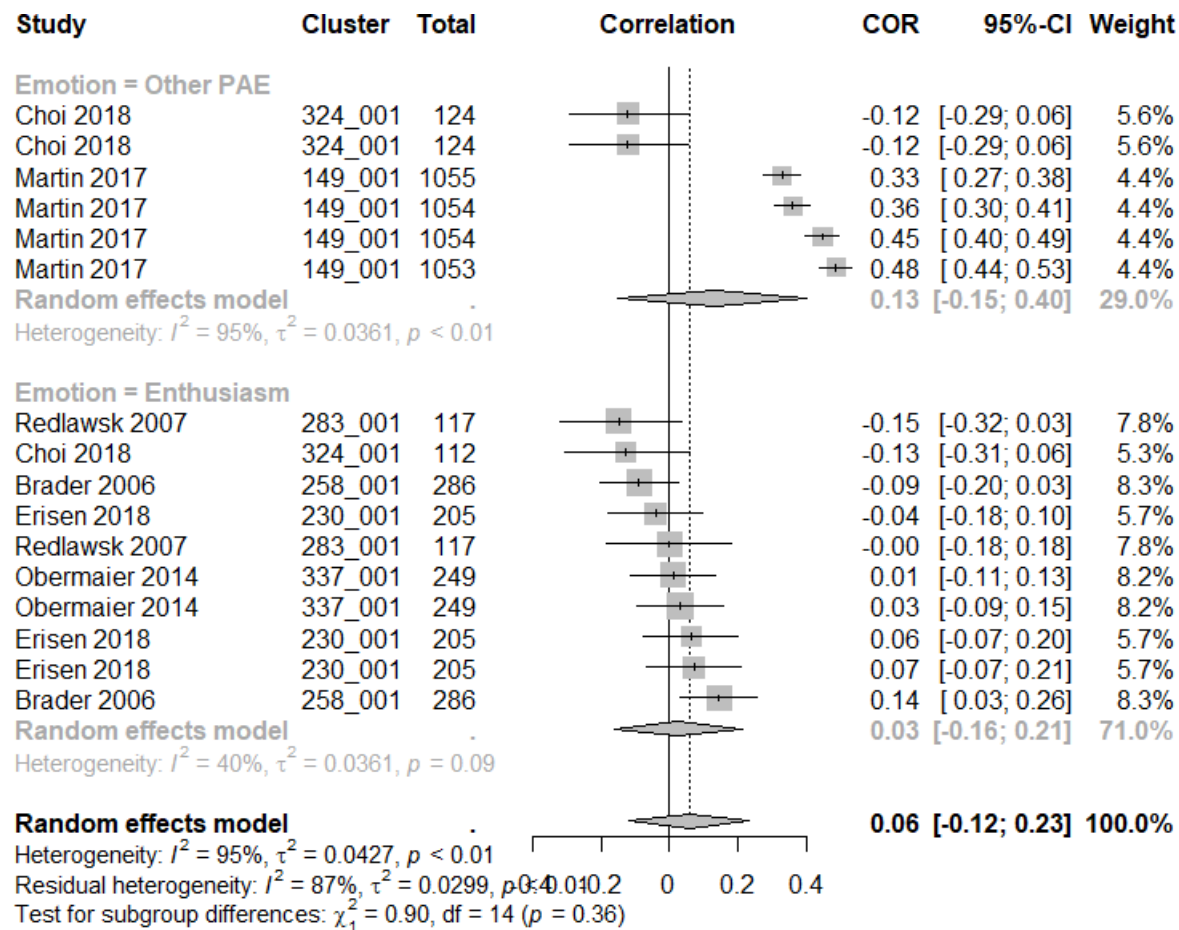


**Figure G4**

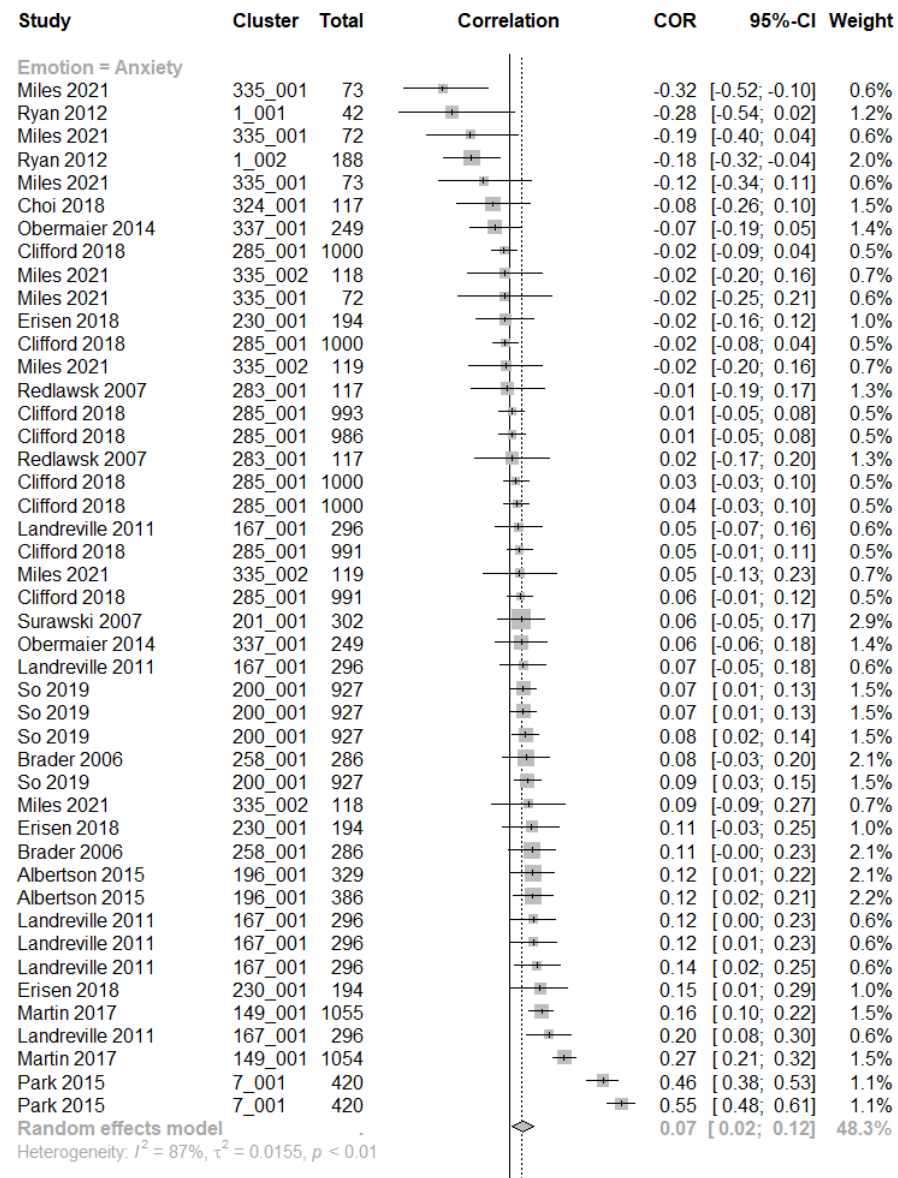
*Effect Sizes of the Associations Between Positive-Activating Emotions and Learning in Experimental Studies*



*Note.* Discrepancies of subgroup overall effects between the figure and text are due to differences in the sum of weights.

**Figure G5a**

*Effect Sizes of the Association Between Negative-Activating Emotions and Learning in Experimental Studies, first part*



*Note.* Discrepancies of subgroup overall effects between the figure and text are due to differences in the sum of weights.

**Figure G5b**

*Effect Sizes of the Association Between Negative-Activating Emotions and Learning in Experimental Studies, second part*

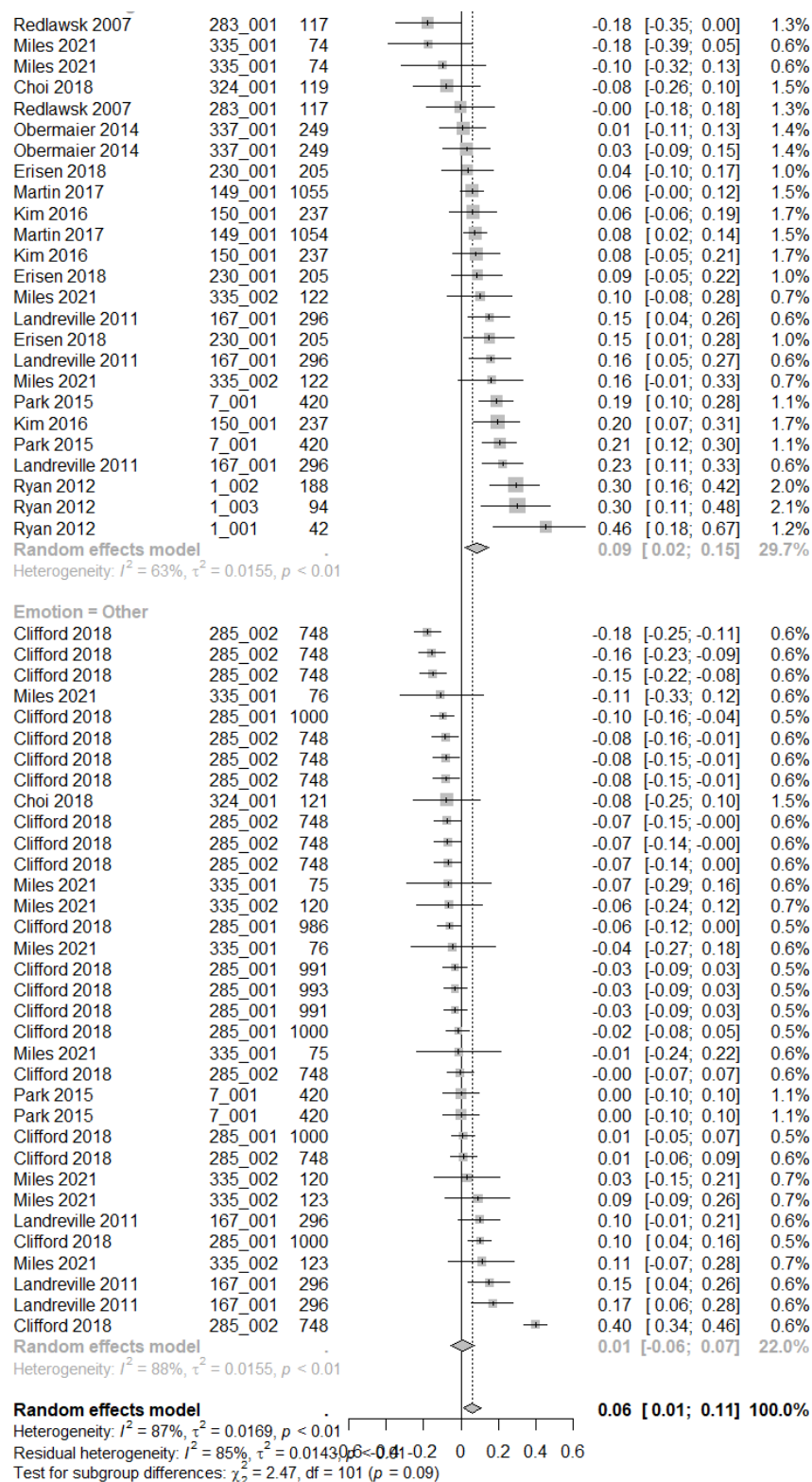
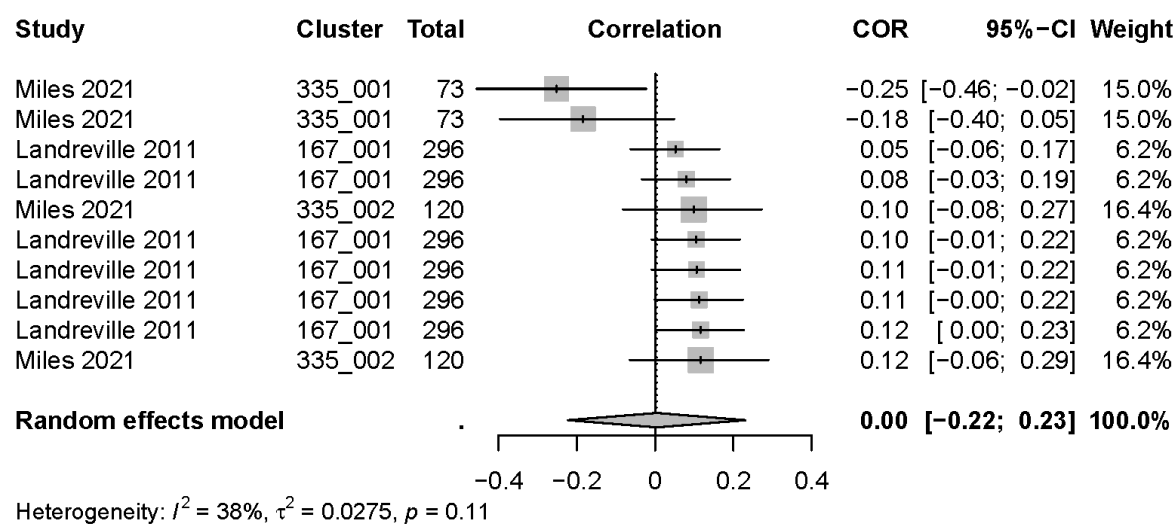


**Figure G6**

*Effect Sizes of the Association Between Negative-Activating Emotions and Learning in Experimental Studies*



## Appendix H Results of the Analysis of Variance Components

**Table H1**

*Log-Likelihood tests for heterogeneity of effect sizes within and between studies (cross-sectional designs)*

| Model      | Variance          | df | AIC      | BIC      | AICc     | logLik  | LRT     | <i>p</i> |
|------------|-------------------|----|----------|----------|----------|---------|---------|----------|
| PAE        | within estimated  | 3  | -55.020  | -49.879  | -54.372  | 30.510  |         |          |
|            | within fixed      | 2  | 29.827   | 33.254   | 30.143   | -12.914 | 86.848  | <.001    |
|            | between estimated | 3  | -55.020  | -49.879  | -54.372  | 30.510  |         |          |
|            | between fixed     | 2  | -50.508  | -47.081  | -50.192  | 27.254  | 6.512   | .011     |
| Enthusiasm | within estimated  | 3  | -16.943  | -14.272  | -15.229  | 11.472  |         |          |
|            | within fixed      | 2  | 68.567   | 70.348   | 69.367   | -32.283 | 87.510  | .000     |
|            | between estimated | 3  | -16.943  | -14.272  | -15.229  | 11.472  |         |          |
|            | between fixed     | 2  | -17.847  | -16.067  | -17.047  | 10.924  | 1.096   | .295     |
| NAE        | within estimated  | 3  | -153.830 | -146.610 | -153.523 | 79.915  |         |          |
|            | within fixed      | 2  | 77.486   | 82.300   | 77.638   | -36.743 | 233.316 | <.001    |
|            | between estimated | 3  | -153.830 | -146.610 | -153.523 | 79.915  |         |          |
|            | between fixed     | 2  | -126.248 | -121.434 | -126.096 | 65.124  | 29.583  | <.001    |
| Anxiety    | within estimated  | 3  | -80.269  | -74.916  | -79.669  | 43.134  |         |          |
|            | within fixed      | 2  | 8.829    | 12.397   | 9.122    | -2.415  | 91.098  | <.001    |
|            | between estimated | 3  | -80.269  | -74.916  | -79.669  | 43.134  |         |          |
|            | between fixed     | 2  | -70.050  | -66.481  | -69.757  | 37.025  | 12.219  | <.001    |
| Anger      | within estimated  | 3  | -45.398  | -41.096  | -44.509  | 25.699  |         |          |
|            | within fixed      | 2  | 68.681   | 71.549   | 69.109   | -32.340 | 116.079 | <.001    |
|            | between estimated | 3  | -45.398  | -41.096  | -44.509  | 25.699  |         |          |
|            | between fixed     | 2  | -43.577  | -40.709  | -43.148  | 23.788  | 3.821   | .051     |
| NDE        | within estimated  | 3  | -0.369   | -4.290   | 23.631   | 3.185   |         |          |
|            | within fixed      | 2  | -2.369   | -4.983   | 9.631    | 3.185   | 0.000   | 1.00     |
|            | between estimated | 3  | -0.369   | -4.290   | 23.631   | 3.185   |         |          |
|            | between fixed     | 2  | -1.663   | -4.277   | 10.337   | 2.832   | 0.706   | .401     |

*Note.* PAE = Positive activating emotions, NAE = negative activating emotions, NDE = negative deactivating emotions;

**Table H2***Log-Likelihood tests for heterogeneity of effect sizes within and between studies (experimental designs)*

| Model      | Variance          | df | AIC      | BIC      | AICc     | logLik  | LRT     | <i>p</i> |
|------------|-------------------|----|----------|----------|----------|---------|---------|----------|
| PAE        | within estimated  | 3  | -11.118  | -8.994   | -8.936   | 8.559   |         |          |
|            | within fixed      | 2  | 2.964    | 4.380    | 3.964    | 0.518   | 16.082  | <.001    |
|            | between estimated | 3  | -11.118  | -8.994   | -8.936   | 8.559   |         |          |
|            | between fixed     | 2  | 2.154    | 3.570    | 3.154    | 0.923   | 15.272  | <.001    |
| Enthusiasm | within estimated  | 3  | -11.237  | -10.646  | -6.437   | 8.619   |         |          |
|            | within fixed      | 2  | -11.653  | -11.258  | -9.653   | 7.826   | 1.585   | .208     |
|            | between estimated | 3  | -11.237  | -10.646  | -6.437   | 8.619   |         |          |
|            | between fixed     | 2  | -13.237  | -12.843  | -11.237  | 8.619   | 0.000   | 1.00     |
| NAE        | within estimated  | 3  | -119.093 | -111.189 | -118.851 | 62.547  |         |          |
|            | within fixed      | 2  | 113.994  | 119.263  | 114.114  | -54.997 | 235.087 | <.001    |
|            | between estimated | 3  | -119.093 | -111.189 | -118.851 | 62.547  |         |          |
|            | between fixed     | 2  | -100.120 | -94.850  | -100.000 | 52.060  | 20.974  | <.001    |
| Anxiety    | within estimated  | 3  | -75.530  | -70.177  | -74.930  | 40.765  |         |          |
|            | within fixed      | 2  | -77.177  | -73.609  | -76.885  | 40.589  | 0.352   | .553     |
|            | between estimated | 3  | -75.530  | -70.177  | -74.930  | 40.765  |         |          |
|            | between fixed     | 2  | -34.744  | -31.176  | -34.452  | 19.372  | 42.785  | <.001    |
| Anger      | within estimated  | 3  | -32.860  | -29.326  | -31.660  | 19.430  |         |          |
|            | within fixed      | 2  | -34.860  | -32.504  | -34.289  | 19.430  | 0.000   | 1.00     |
|            | between estimated | 3  | -32.860  | -29.326  | -31.660  | 19.430  |         |          |
|            | between fixed     | 2  | -24.711  | -22.355  | -24.140  | 14.356  | 10.149  | .001     |
| NDE        | within estimated  | 3  | -16.602  | -16.010  | -11.802  | 11.301  |         |          |
|            | within fixed      | 2  | -18.602  | -18.208  | -16.602  | 11.301  | 0.000   | 1.00     |
|            | between estimated | 3  | -16.602  | -16.010  | -11.802  | 11.301  |         |          |
|            | between fixed     | 2  | -11.796  | -11.402  | -9.796   | 7.898   | 6.806   | .009     |

*Note.* PAE = Positive activating emotions, NAE = negative activating emotions,  
 NDE = negative deactivating emotions;

## Appendix I Additional Analysis

**Table I1**

*Results from Moderator Analysis using Bayesian Regularized Meta-Analysis (BRMA)*

| Predictor                   | Effect [95% CI]              |                              |                              |                              |
|-----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
|                             | Cross-sectional Designs      |                              | Experimental Designs         |                              |
|                             | Positive-activating Emotions | Negative-activating Emotions | Positive-activating Emotions | Negative-activating Emotions |
| Intercept                   | 0.182 [-0.043, 0.566]        | 0.005 [-0.245, 0.148]        | -0.121 [-0.575, 0.255]       | 0.046 [-0.059, 0.149]        |
| Sample size                 | 0 [0, 0]                     | 0 [0, 0]                     | 0 [0, 0.001]                 | 0 [0, 0]                     |
| Country                     |                              |                              |                              |                              |
| Germany                     | -                            | -0.019 [-0.144, 0.026]       | -                            | -                            |
| Korea                       | -                            | -                            | -                            | 0.021 [-0.027, 0.206]        |
| Netherlands                 | -                            | -0.008 [-0.093, 0.033]       | -                            | -                            |
| Norway                      | -                            | 0.003 [-0.038, 0.062]        | -                            | -                            |
| Turkey                      | -                            | -                            | -0.012 [-0.279, 0.182]       | 0.003 [-0.044, 0.071]        |
| USA                         | 0.004 [-0.073, 0.115]        | 0.006 [-0.02, 0.074]         | 0.022 [-0.122, 0.284]        | -0.004 [-0.062, 0.024]       |
| Multiple                    | -                            | -0.013 [-0.147, 0.069]       | -                            | -                            |
| Discipline                  |                              |                              |                              |                              |
| Political Science           | 0.001 [-0.071, 0.084]        | -0.008 [-0.086, 0.025]       | 0.002 [-0.171, 0.198]        | -0.007 [-0.079, 0.015]       |
| Psychology                  | -                            | -0.027 [-0.182, 0.026]       | -                            | 0.004 [-0.083, 0.12]         |
| Social Science              | -                            | 0.004 [-0.033, 0.06]         | -                            | -                            |
| Published                   | 0.003 [-0.084, 0.105]        | 0.007 [-0.027, 0.081]        | 0.050 [-0.119, 0.444]        | 0.007 [-0.037, 0.099]        |
| Sampling                    |                              |                              |                              |                              |
| Random sample               | 0.002 [-0.04, 0.052]         | 0.002 [-0.023, 0.039]        | -                            | 0.006 [-0.056, 0.106]        |
| Not mentioned               | 0.007 [-0.08, 0.138]         | 0.005 [-0.035, 0.07]         | -0.013 [-0.209, 0.128]       | -0.013 [-0.133, 0.02]        |
| Online sampling service     | -                            | -                            | 0.006 [-0.171, 0.225]        | 0 [-0.035, 0.038]            |
| Other                       | -                            | 0.020 [-0.057, 0.189]        | -                            | -0.001 [-0.043, 0.035]       |
| Snowball sample             | -                            | -0.010 [-0.124, 0.041]       | -                            | -                            |
| Stratified sample           | -0.002 [-0.096, 0.089]       | 0.007 [-0.051, 0.099]        | -                            | -                            |
| Target Population           |                              |                              |                              |                              |
| Adults                      | -                            | 0.005 [-0.023, 0.067]        | -                            | -                            |
| College/university students | -0.003 [-0.066, 0.04]        | -0.007 [-0.079, 0.021]       | -0.011 [-0.231, 0.141]       | -0.003 [-0.046, 0.016]       |
| Not specified               | -                            | 0.022 [-0.055, 0.194]        | -0.017 [-0.232, 0.115]       | -0.006 [-0.08, 0.022]        |
| Other                       | -                            | -0.012 [-0.151, 0.069]       | -                            | 0.023 [-0.027, 0.219]        |

|                             |                        |                        |                        |                        |
|-----------------------------|------------------------|------------------------|------------------------|------------------------|
| Emotion                     |                        |                        |                        |                        |
| Anxiety                     | -                      | -0.003 [-0.03, 0.013]  | -                      | 0.002 [-0.012, 0.026]  |
| Disgust                     | -                      | -                      | -                      | -0.013 [-0.089, 0.008] |
| Enthusiasm                  | 0.001 [-0.027, 0.036]  | -                      | -                      | -                      |
| Frustration                 | -                      | -                      | -                      | 0.003 [-0.04, 0.066]   |
| Hope                        | -0.007 [-0.075, 0.019] | -                      | -0.007 [-0.085, 0.063] | -                      |
| Positive                    | 0.002 [-0.052, 0.075]  | -                      | -                      | -                      |
| Pride                       | -0.002 [-0.093, 0.077] | -                      | 0.014 [-0.046, 0.104]  | -                      |
| Surprise                    | 0.062 [-0.067, 0.444]  | -                      | -                      | -                      |
| Worry                       | -                      | -                      | -                      | -0.002 [-0.058, 0.045] |
| Trait                       | -0.056 [-0.428, 0.061] | 0.040 [-0.037, 0.278]  | -0.007 [-0.246, 0.177] | 0.001 [-0.033, 0.044]  |
| Emotion Measure             |                        |                        |                        |                        |
| Multiple                    | -                      | -                      | -0.02 [-0.292, 0.155]  | -0.004 [-0.083, 0.048] |
| Self-reported               | -                      | 0.001 [-0.067, 0.074]  | 0.026 [-0.085, 0.266]  | 0.004 [-0.013, 0.051]  |
| Object Focus                |                        |                        |                        |                        |
| General political situation | -                      | 0.004 [-0.033, 0.064]  | -                      | -                      |
| Other                       | -                      | -                      | -                      | -0.001 [-0.032, 0.026] |
| Policy issue                | 0.064 [-0.06, 0.456]   | -0.014 [-0.13, 0.022]  | 0.016 [-0.116, 0.238]  | 0.001 [-0.021, 0.03]   |
| Political candidates        | -0.002 [-0.06, 0.046]  | 0.002 [-0.027, 0.044]  | 0.004 [-0.235, 0.269]  | -0.004 [-0.088, 0.053] |
| Political event             | -                      | -0.04 [-0.272, 0.036]  | -                      | -                      |
| Learning Measure            |                        |                        |                        |                        |
| self-report                 | -0.001 [-0.076, 0.071] | 0.004 [-0.034, 0.068]  | 0.057 [-0.04, 0.285]   | 0.002 [-0.016, 0.029]  |
| test/assessment             | 0.003 [-0.086, 0.104]  | -0.002 [-0.057, 0.038] | -0.048 [-0.252, 0.067] | -0.001 [-0.028, 0.015] |
| Learning Category           |                        |                        |                        |                        |
| Discussions                 | -0.002 [-0.087, 0.075] | -0.003 [-0.041, 0.023] | 0.037 [-0.063, 0.207]  | 0.003 [-0.019, 0.046]  |
| Information Seeking         | -0.003 [-0.059, 0.039] | 0.004 [-0.016, 0.046]  | 0.091 [-0.006, 0.183]  | 0.001 [-0.015, 0.022]  |
| Knowledge                   | 0.005 [-0.038, 0.081]  | 0.005 [-0.023, 0.069]  | 0.002 [-0.231, 0.253]  | 0 [-0.027, 0.024]      |
| Learning                    | -                      | -                      | -0.058 [-0.253, 0.07]  | -0.002 [-0.036, 0.019] |
| Learning limited            | -0.002 [-0.061, 0.050] | 0.008 [-0.015, 0.068]  | 0.004 [-0.242, 0.273]  | -0.002 [-0.071, 0.051] |
| $\tau^2_{\text{between}}$   | 0.010 [0, 0.059]*      | 0.005 [0, 0.019]*      | 0.062 [0.001, 0.288]*  | 0.01 [0.002, 0.024]*   |
| $\tau^2_{\text{within}}$    | 0.008 [0.003, 0.016]*  | 0.003 [0.002, 0.006]*  | 0.002 [0, 0.012]*      | 0.01 [0.007, 0.014]*   |

*Note.* \* 95% credible interval excludes zero. Reference categories: <sup>1</sup> Chile in the models for cross-sectional designs, Germany in the models for experimental designs; <sup>2</sup> communication science; <sup>3</sup> Convenience sample; <sup>4</sup> adolescents / high school students; <sup>5</sup> enjoyment / enthusiasm in models for positive-activating emotions; anger in models for negative-activating emotions; <sup>6</sup> other in cross-sectional designs, induced in experimental designs; <sup>7</sup> election & campaign; <sup>8</sup> behavioral; <sup>9</sup> attention to politics;

## Appendix J Funnel Plots

**Figure J1**

*Funnel Plots of Studies with Cross-Sectional Designs*

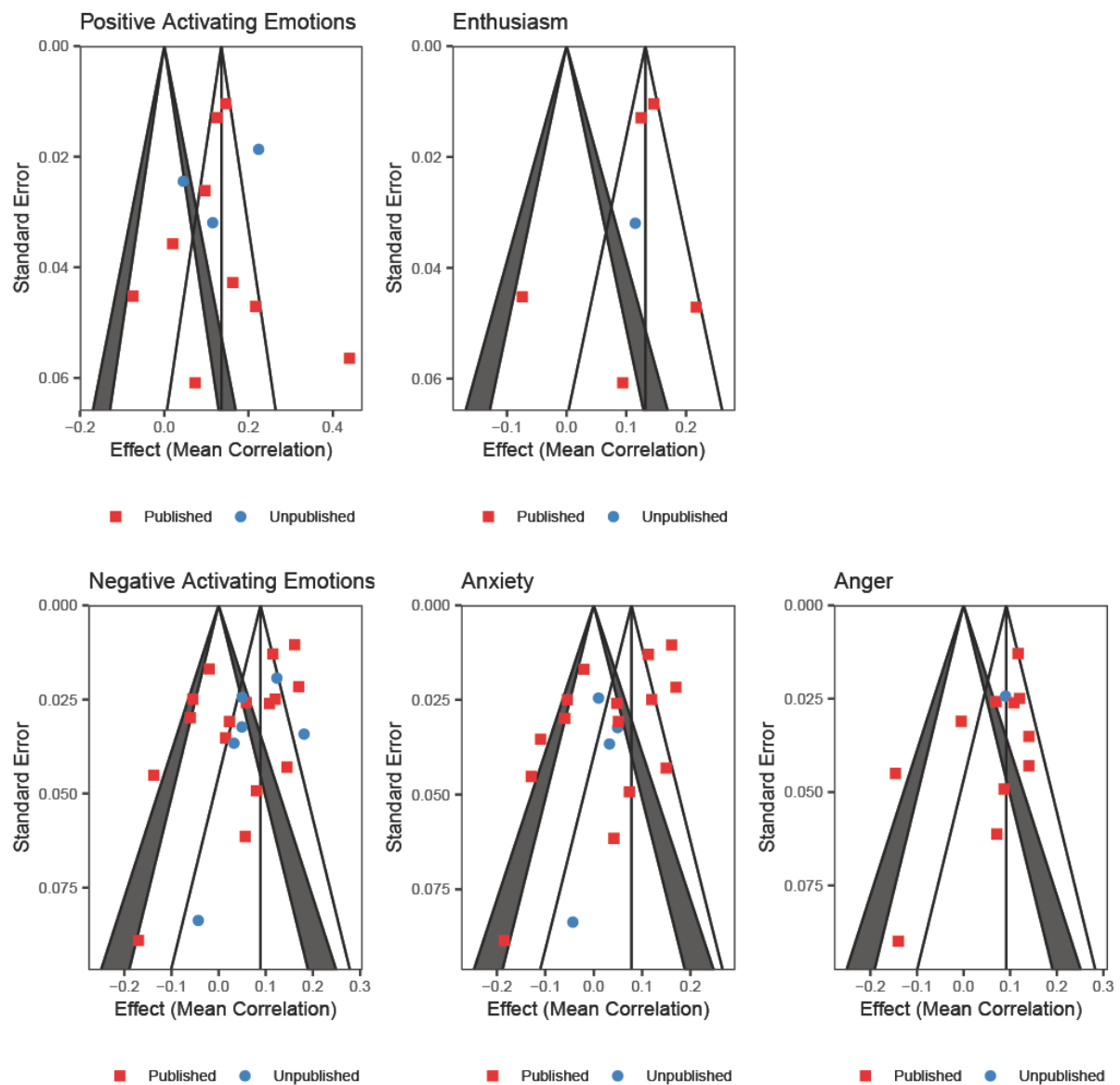
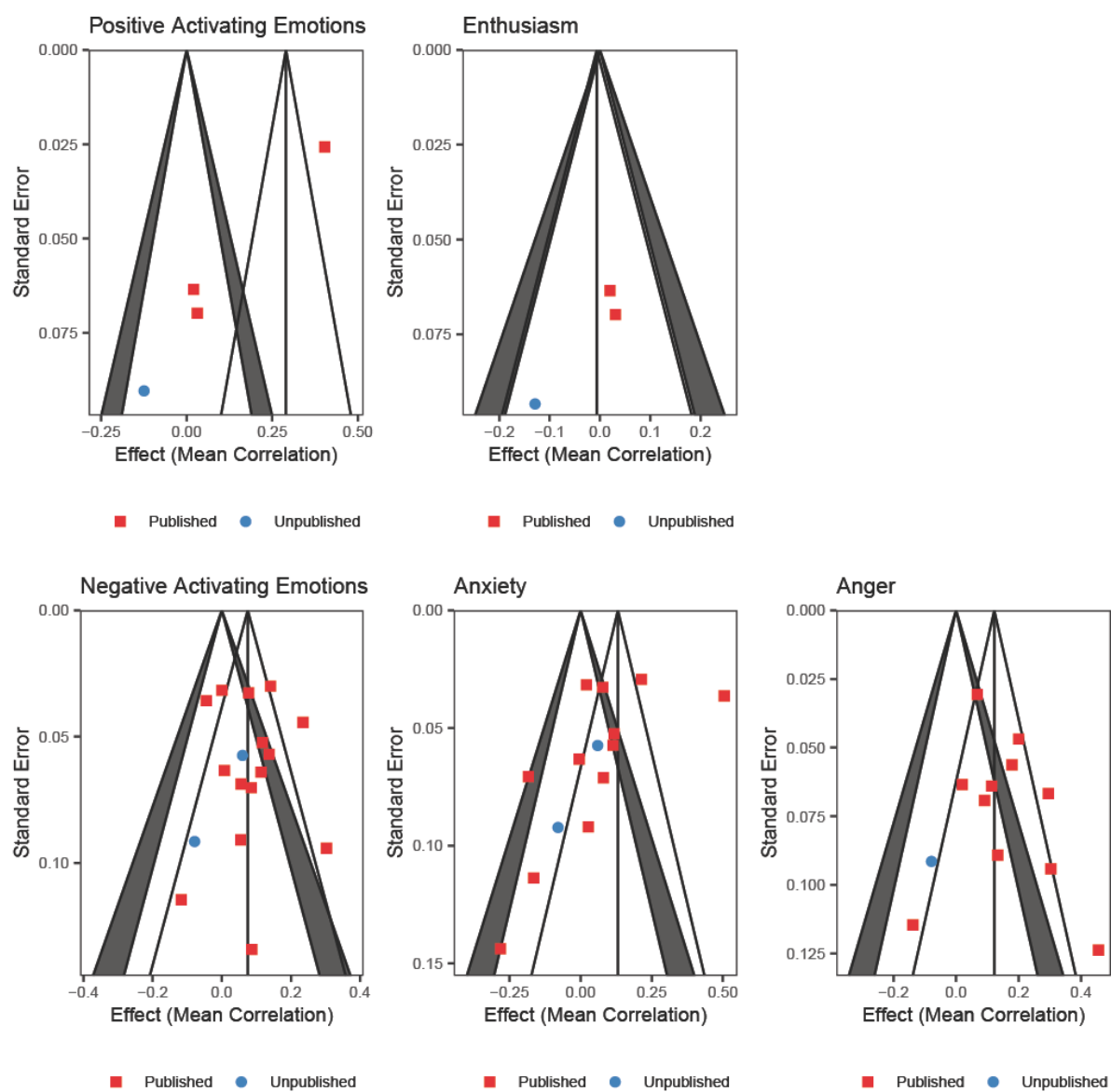


**Figure J2***Funnel Plots of Studies with Experimental Designs*

## 5.2. Study 2

**Graf, E., Goetz, T., Bieleke, M., & Murano, D. (2022). Feeling politics at high school: Antecedents and effects of emotions in civic education. *Political Psychology*.**

<https://doi.org/10.31234/osf.io/mfn8c>

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- Published online on May 19, 2023; © 2023 The Authors ([CC BY 4.0](#))
- Part of the results of this study were presented at EARLI 2021 (online) and GEBF 2022

### Author Contributions:

I contributed to the conception and design of the study, was responsible for the data collection, conducted the analysis, wrote the first draft of the manuscript, and revised the manuscript with the contributions of the co-authors. Thomas Goetz contributed to the conception and design of the study, manuscript drafting through continuous feedback, revising, and approval of the final version. Maik Bieleke contributed to the conception and design of the study, revision of the manuscript, and approval of the final submission. Dana Murano contributed to translating the scales used for data collection, manuscript revision, and approval of the final version.

### Note

The study was registered with osf.io (Registration DOI: <https://osf.io/r9a6g>, date: April 15, 2021). Data and the analysis scripts are available through [OSF](#). Portions of the findings were presented at the EARLI 2021 and the GEBF 2022.

### Abstract

Studies on voters have shown that emotions are an important factor in politics. However, less is known about emotions experienced by adolescents in the context of civic education. Applying the control-value theory to a cross-curricular context, we analyze the relations between two types of emotions experienced in civic education and their antecedents and effects on learning: achievement emotions experienced during in-class political discussions and epistemic emotions experienced during individual processing of political information in school. We hypothesized both types of emotions relate to control and value appraisal antecedents (e.g., internal political efficacy, personal importance). Further, we expected – depending on the specific emotion – positive or negative relations with academic outcomes (e.g., motivation, engagement, and knowledge). Data were collected with an online questionnaire in Austrian upper secondary schools with students ( $N = 594$ ,  $M_{\text{age}} = 17.1$ ) from grade 10 to 13. Bivariate latent correlations broadly support the expectations: We found mainly positive associations of antecedents and outcomes to enjoyment, hope, pride, curiosity and surprise, and negative associations to hopelessness, confusion, and boredom, but more complex correlation patterns for anxiety, anger, and shame. The results provide first insights into which emotions are experienced during political learning and underscore the importance of acknowledging the role of emotions in civic education.

*Keywords:* achievement emotions, epistemic emotions, control-value theory, political discussions, civic education, political learning

### **Feeling politics at high school: Antecedents and effects of emotions in civic education**

Emotions are omnipresent in many political contexts, from heated debates in parliament, billboards during election campaigns designed to elicit emotional reactions, or emotional expression of protestors on a street. In the last 30 years, research from political psychology has stressed the importance of emotions for informal political learning (Brader & Marcus, 2013), such as enhanced attention due to enthusiasm and anxiety (Marcus et al., 2000). However, these studies have rarely addressed the role of emotions in the context of civic education among students at school. Though theoretical literature on civic education acknowledges the importance of emotions, we know relatively little on which emotions are experienced in this context, what their antecedents are, and whether and how they are related to learning processes.

This contrasts sharply with extensive research on antecedents and effects of emotions in other academic domains (e.g., mathematics, language learning; Camacho-Morles et al., 2021). Emotions experienced in educational environments impact not only learning motivation and achievement (Pekrun et al., 2011), but also students' career aspirations (Schuster & Martiny, 2017). They are a major component in shaping the learning process. It is unclear whether findings in these domains also apply to the domain of civic education. Civic education is often taught as a cross-curricular subject, where topics of political and social relevance are integrated into teaching of other subjects (Losito et al., 2021; Schulz et al., 2018) such as language learning or history (Hämmerle et al., 2009). Goals of civic education include developing knowledge and understanding of civic skills, values, identity, and participation (Carretero et al., 2016). In order to study the role emotions play in civic education, it is crucial to first identify when and how civic education takes place at school and then develop corresponding measures to assess emotions in this context.

In this study, we assessed emotions experienced by adolescents in cross-curricular civic education contexts and analyzed their relations to antecedents and academic outcomes. In doing so, we examine whether control-value theory can be applied to civic education. We focused on adolescents in upper secondary schools because most adolescents gain political rights, like the eligibility to vote, during this time. Additionally, late adolescence is often cited as a critical period in political socialization (Sears & Brown, 2013), and an important time to explore one's civic identity (Crocetti et al., 2012). Experiencing emotions in civic education can help to attract students' attention to the civic domain and promote civic engagement but may also act

as a barrier. Knowing about antecedents and outcomes of emotions can assist educators to create settings for civic education that integrate students' emotions to foster civic engagement.

### **Learning about political and social issues inside and outside school**

Learning about politics is often informal (Losito et al., 2021). Discussions with parents, for example, which are sometimes highly emotional and controversial, provide information about political and social issues (Schulz et al., 2018). Voters learn about current events through interactions with peers and the media, and several studies have found that emotions play a critical role for information seeking, media attention, and discussions (e.g., Huddy et al., 2007; Just et al., 2007, Marcus et al., 2000; Otto et al., 2020, Park, 2015). Surprisingly, the role of emotions in adolescent political learning - and particularly civic learning in schools - has received little attention (Barret et al., 2019).

One intriguing exception is a study by Bayram Özdemir and colleagues (2016), who discovered that the relation between students' perceptions of engaged teaching about politics and their own initiation of political discussions is mediated by their feelings about politics. Furthermore, philosophical and qualitative approaches frequently emphasized the significance of emotions in civic education (Garrett, 2020; Keegan, 2021; Knight Abowitz & Mamlok, 2019). Emotions are essential to drive political action, hence they are central to Keegan's (2021) model on critical affective civic literacy. Since civic education should allow students to learn about emotions and how they are used in politics, theories on how emotions function in civic education are desperately needed.

Because of its diverse forms of implementation, civic education is an exciting and unique subject for psychological research. A popular approach in Austria and around the world is integrating civic matters in all other subjects (i.e., cross-curricular; Schulz et al., 2018). According to the International Civic and Citizenship Education Study (ICCS), this approach is common in 18 of the 24 participating countries' schools (e.g., Belgium, Chile, Croatia; Schulz et al., 2018). Though the integrated approach enables teachers to connect political topics to various disciplines, it challenges civic education researchers to identify situations in which students are learning about political and social issues at school.

We consider two different situations of cross-curricular civic education, in which emotions are likely experienced: (1) discussions (Campbell, 2008; Kahne et al., 2013; Losito et al., 2021) and (2) information processing about political and social issues (e.g., studying textbooks; Schulz et al., 2018). Both are among the most commonly used methods when

teaching civic education (Schulz et al., 2018). Discussions can differ greatly in their emotional dynamics, can get very heated and tense (Garrett, 2020), and relations of discrete emotions in this context and their antecedents and effects are yet to be studied. Besides from information in textbooks, other information sources like newspaper articles about political and social issues are likely used in a cross-curricular civic education context. For example, students might be asked to write a comment in response to an article on a recent policy in their language class. Depending on the cognitive quality of the task and the information processed, emotions are likely experienced (Muis, Pekrun, et al., 2015).

### **Academic Emotions**

Pekrun and Loderer (2020) distinguish between four groups of emotions typically experienced in achievement settings, which differ in their object focus: achievement, epistemic, topic, and social emotions. In this study, we focus on achievement and epistemic emotions, as they directly pertain to learning (Pekrun & Perry, 2014).

Achievement emotions occur in achievement settings, (e.g., taking classes, learning, or test-taking). More specifically, they are directed at achievement outcomes, and can be either prospective (e.g., hope, anxiety), retrospective (e.g., pride, shame), or related to the activity itself (e.g., enjoyment, boredom; Pekrun, 2006). As described earlier, discussing political and social issues during regular classes are an important activity of cross-curriculum civic education (e.g., Campbell, 2008; Dassonneville et al., 2012). Given past findings of students experiencing and expressing emotions during discussions of social and political issues (e.g., Bayram Özdemir et al., 2016; Garrett, 2020), it seems likely that discrete activity emotions are experienced in these settings and contribute to further engagement with the topics.

Epistemic emotions focus on the knowledge-generating aspect of learning, and can be experienced when being confronted with new, often controversial information (Muis, Sinatra, et al., 2018). Typical epistemic emotions include curiosity, surprise, and confusion, which often occur in the context of processing controversial scientific issues that challenge prior beliefs and therefore trigger emotions (Muis, Pekrun, et al., 2015). This has been shown in the case of reading conflicting texts about the causes and consequences of climate change (Muis, Pekrun, et al., 2015) and texts directly addressing one's misconceptions about genetically modified food (Muis, Sinatra, et al., 2018). Similarly, processing political information may conflict with individuals' attitudes, which can be experienced as threat or novelty and activate attention and emotions (Redlawsk et al., 2007). Consider, for example, increased vigilance and curiosity at

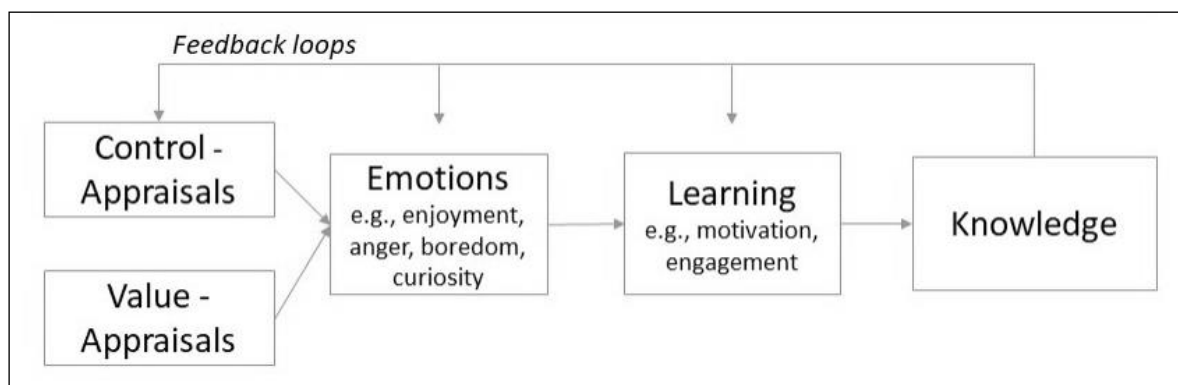
the start of the COVID pandemic, given novel and sometimes conflicting information about policies discussed to prevent spreading the virus. Another possible scenario could be at school, where students may be asked to write an argumentative essay about what individuals and states must change to combat the climate crisis. They may be surprised by new information discovered during their search, or they may be confused by inconsistent information.

### Antecedents and Effects of Academic Emotions

A prominent theory explaining antecedents and effects of academic emotions is the control-value theory (Pekrun, 2006; Pekrun & Perry, 2014). Control-value theory assumes that appraisals of control and value act as proximal antecedents of discrete emotions, which in turn affect learning characteristics and outcomes (see Figure 1). While the theory implies a direction from antecedents to outcomes, it also includes recursive effects from outcomes to the preceding components (Pekrun, 2006). Further, the theory considers emotions as a multifaceted phenomenon, including affective, cognitive, motivational, physiological, and expressive components. Control-value theory has been applied to various academic domains such as mathematics (Bieg et al., 2017; Goetz et al., 2007), language learning (Goetz et al., 2007; Shao et al., 2020), and physical education (Simonton & Garn, 2019). It applies to both state (Bieg et al., 2017; Goetz et al., 2020) and trait (Pekrun et al., 2011) emotions. Even more support for the theory is provided from meta-analyses focusing on relations with achievement (Camacho-Morles et al., 2021) and specific learning environments (e.g., technology-based learning; Loderer et al., 2020).

**Figure 1**

*Theoretical Mechanisms of the Role of Emotions in Civic Education Based on Control-Value Theory (adapted from Pekrun, 2006, p. 328).*



However, research testing its application to political learning and to domains taught in a cross-curricular approach is lacking. For example, none of the 68 studies included in a recent meta-analysis examined emotions in the context of civic education, and only few focused on social sciences in tertiary education (Camacho-Morles et al., 2021). Despite the domain-specific orientation of emotions (Goetz et al., 2007), the control-value theory proposes a relative universality of relations between antecedents, discrete emotions, and outcomes (Pekrun & Perry, 2014). As a result, we anticipate that patterns similar to those observed in other domains will emerge in civic education contexts.

### ***Antecedents of Academic Emotions***

According to the control-value theory, subjective appraisals of control and value are the main cognitive, proximal antecedents of emotions (Pekrun, 2006). Value appraisals are further classified as intrinsic value, value of success, and value of failure. The latter is concerned with anticipated failure, which is highly valued, and is frequently referred to as *negative value* (Pekrun & Perry, 2014). Relations have been shown for both achievement (Pekrun et al., 2011) and epistemic emotions (Di Leo et al., 2019). Students experience enjoyment, hope, and pride when they perceive a learning activity or outcome to be valuable and controllable. Anger, anxiety, shame, and hopelessness are associated with low control appraisals and negative value (Pekrun et al., 2011; Pekrun & Perry, 2014). Boredom, in contrast, is the only emotion which increases with decreasing value appraisals. Though in theory boredom is associated with low and high control (i.e., curvilinear relation), empirical findings from achievement settings usually reveal negative relations as high control is rarely experienced in this context (Pekrun et al., 2010). Regarding epistemic emotions, high value appraisals correlate positively with curiosity, and negatively with confusion. Furthermore, appraisals of control negatively relate to confusion (Muis, Pekrun, et al., 2015), a relation that is dependent on the appraisal of value (Di Leo et al., 2019). Studies on surprise have found either no relation (Muis, Pekrun, et al., 2015) or a negative relation with control appraisals (Di Leo et al., 2019).

### ***Effects of Academic Emotions***

According to the control-value theory (Pekrun, 2006), the effects of emotions on learning and achievement are mediated by motivation, available cognitive resources, and learning strategies. While this core assumption concerns both types of emotions, epistemic emotions generally have positive effects on critical thinking, learning, and the use of meta-cognitive strategies (Chevrier et al., 2019; Di Leo et al., 2019; Muis, Pekrun, et al., 2015; Muis,

Chevrier, et al., 2018), with only few studies showing a negative relation between confusion and learning (Muis, Pekrun, et al., 2015). For achievement emotions, differences pertain to the direction of the relations based on the dimensions of valence and activation. Positive-activating emotions typically promote learning. For example, enjoyment is related to motivation, use of elaboration as a learning strategy, self-regulated learning, and achievement (e.g., Camacho-Morles et al., 2021; Pekrun et al., 2002, 2011). Negative-deactivating emotions such as boredom and hopelessness distract from learning, affecting motivation, learning resources, and achievement (Camacho-Morles et al., 2021; Pekrun et al., 2002, 2010, 2011). The effects of negative-activating emotions on learning are less straightforward. Emotions like anger and anxiety can distract attention from learning by causing task-irrelevant thinking (Pekrun et al., 2002) as well as block intrinsic motivation, while increasing extrinsic motivation (Pekrun et al., 2011). Consistent with positive effects of negative emotions on learning, information seeking increases when anxiety is triggered in threatening political situations (Redlawsk et al., 2007; Valentino et al., 2008). Whether and how negative-activating emotions in civic education are related to various concepts of learning remains an open question and will be explored in this study.

### **The Present Study**

This study aims to investigate how emotions experienced by adolescents during political learning relate to antecedents and learning processes, and whether relations proposed by the control-value theory can be applied to the context of civic education. Currently, research on emotions in civic education is lacking, though it seems particularly interesting given the high emotionality of many political topics and the cross-curricular implementation of the subject. First, we investigate how cognitive appraisals of control and value are related to achievement emotions experienced in the context of discussing political and social issues in class, and epistemic political emotions experienced when processing information about political and social issues. Second, we inspect the relations of these emotions with learning processes and academic outcomes.

### **Hypotheses**

We expect control and value appraisals to positively correlate with enjoyment, hope, pride, and curiosity, and negatively correlate with boredom and confusion. For hopelessness, anger, anxiety and shame, we expect a negative relation with control, but a positive relation to appraisals of negative value, (i.e., if failing is highly valued in a given context). In terms of

outcomes, we hypothesize that positive-activating emotions (enjoyment, hope, and pride) and epistemic political emotions enhance learning. The opposite is expected regarding negative-deactivating emotions (boredom and hopelessness).<sup>5</sup>

## Method

### Participants and Procedure

Data were collected using an online questionnaire administered to students in grades 10 to 13 from three Austrian regions (Vienna, Lower Austria, and Upper Austria). Schools were randomly selected via a stratified sample for school type and region. From the initially selected schools ( $N = 68$ ), 12 took part in the data collection<sup>6</sup>. After approval from the university's ethical review board<sup>7</sup> and the regional educational agencies, students' and, if required, their parents' consent was obtained. Between April and June 2021, teachers sent a link to the online questionnaire to participating students, mainly providing the possibility to fill in the questionnaire during classes. On average, it took students 22 minutes to complete the questionnaire. Overall, 619 students from upper secondary schools participated. We excluded participants ( $N = 25$ ; 4%) based on a relative completion speed index to identify meaningless records (Leiner, 2019; for details see online appendix, section 1).

The final sample included 594 students from 12 schools and 34 classes. The included schools last four to five years and students are entitled to study at university upon graduation. Students in this schools are taught civic education in combination with other subjects, and as a cross-curricular theme. The mean age of students is 17.1 ( $SD = 1.18$ ), with a range from 15 to 22 years. Table 1 displays detailed information about student's sociodemographic characteristics.

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<sup>5</sup> These hypotheses were pre-registered [OSF](#) (H2-H6). H1 in the pre-registration addresses measurement invariance of the scales, which was excluded from this study in order to keep the focus on main topic of the manuscript. H3 in the preregistration refers to “negative-deactivating emotion” in general, but as outlined in the theory (section I1 of the pre-registration), expectations regarding value-appraisals for hopelessness are similar to other emotions such as anger, anxiety, and shame.

<sup>6</sup> We also collected data at part-time vocational schools, who teach civic education as single subjects. Due to a small sample size and focus of this paper, they were excluded from the analysis.

<sup>7</sup> Reference Number: 00624

**Table 1***Sociodemographic Characteristics Statistics of Participating Students*

| Sociodemographic Characteristics                   | <i>n</i> | %  |
|----------------------------------------------------|----------|----|
| <i>Gender</i>                                      |          |    |
| Male                                               | 143      | 24 |
| Female                                             | 438      | 75 |
| Gender diverse                                     | 4        | 1  |
| <i>School type</i>                                 |          |    |
| AHS                                                | 256      | 43 |
| BHS                                                | 338      | 57 |
| <i>Grade</i>                                       |          |    |
| 10th grade                                         | 178      | 30 |
| 11th grade                                         | 203      | 34 |
| 12th grade                                         | 180      | 30 |
| 13th grade                                         | 33       | 6  |
| <i>Residence</i>                                   |          |    |
| Rural                                              | 376      | 65 |
| Small town                                         | 91       | 16 |
| Small city                                         | 55       | 9  |
| Urban                                              | 26       | 4  |
| Suburban                                           | 33       | 6  |
| <i>Language spoken at home</i>                     |          |    |
| Non-German                                         | 13       | 2  |
| German                                             | 569      | 98 |
| <i>Migration background</i>                        |          |    |
| At least one parent born in Austria                | 522      | 90 |
| Students born in country but parent(s) born abroad | 34       | 6  |
| Students and parent(s) born abroad                 | 22       | 4  |
| <i>Citizenship</i>                                 |          |    |
| Non-Austrian Citizenship                           | 28       | 5  |
| Austrian Citizenship                               | 553      | 95 |
| <i>Eligibility to vote</i>                         |          |    |
| Not eligible                                       | 287      | 51 |
| Eligible                                           | 273      | 49 |

*Note.* *N* = 594; Participants were on average 17.10 years old (*SD* = 1.18).

## Measures

### Emotions Scales

#### *Achievement Emotions*

To measure achievement emotions, we adopted the AEQ-S (Bieleke et al., 2021) class-related emotions scales to the context of discussing social and political issues in class. It included four items for each emotion (enjoyment, hope, pride, anger, anxiety, shame, hopelessness, and boredom; e.g., “*I enjoy discussions about political and social issues at school*”, or “*I have lost all hope in understanding the content of discussions about political and social issues*”), rated on a five-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*). As displayed in Table 2, the mean Cronbach's Alpha was .78, and ranged from .67 (anger) to .87 (boredom).

#### *Epistemic Political Emotions*

We used two scales to measure epistemic emotions (i.e., surprise, curiosity, and confusion): (1) a new scale addressing the component structure of emotions (affective, cognitive, motivational, physiological/expressive), called the Epistemic Political Emotions Scale (EPES) and (2) an adaption of the German version of the Epistemic Emotions Scale (EES-D; Vogl et al., 2018). The object focus of emotions in both scales was the processing of political and social information. For the EPES, items were pretested with a sample on university students ( $N = 78$ ) and selected according to theoretical considerations and satisfying reliability values. The final scale included seven items for surprise (e.g., “*Information about political and social issues always surprises me*”), seven items for curiosity (e.g., “*I am curious about the political and social issues we deal with in school*”), and seven items for confusion (e.g., “*Information about political and social issues confuses me*”). The items were rated on a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The scales showed good measures of reliability, with a Cronbach's alpha of .84 for surprise, .92 for curiosity, and .88 for confusion (see Table 2 for details; items are provided in the online appendix). The EES-D includes three affective terms each for surprise ( $\alpha = .81$ ), curiosity ( $\alpha = .91$ ), and confusion ( $\alpha = .86$ ), rated on a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). While we used emotions measured by the EES-D mainly as a measure of validity to the new scale, the EPES mimics the item composition of the AEQ-S and provided due to its component structure a better fit to the theoretical framework used in this study.

## **Antecedents of Emotions**

### ***Control Appraisals***

We used three different measures of control appraisals. First, scales on internal political efficacy and students' sense of citizenship self-efficacy were administered (Brese et al., 2014). Internal political efficacy refers to students' beliefs in their abilities to understand and participate in politics and is measured with six items (e.g., "*I am able to understand most political issues easily*";  $\alpha = .79$ ). The scale on students' sense of citizenship self-efficacy consisted of seven items (e.g., "*How well do you think you would do the following activities? Follow a television debate about a controversial issue*";  $\alpha = .80$ ). In both scales, items were rated on a four-point scale from 1 (*strongly disagree / not at all*) to 4 (*strongly agree / very good*). Finally, all participants completed a scale on epistemic political efficacy, translated from the scales developed by Pingree and colleagues (Pingree, 2011; Pingree et al., 2012). This scale assesses whether students feel efficacious to discover the truth in politics and included four items (e.g., "*I feel confident that I can find the truth about political issues*";  $\alpha = .77$ ) rated on a five-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*).

### ***Value Appraisals***

The value component was measured with four different scales: First, a scale on students' interest in political and social issues (Brese et al., 2014) consisting of seven items focusing on different political levels or policy issues (e.g., "*How interested are you in the following issues? International politics*",  $\alpha = .80$ ), which were rated on a four-point scale from 1 (*not at all interested*) to 4 (*very interested*). Second, two subscales of Gaspard's (2017) task value scale were used to measure value of achievement (e.g., "*It is important to me to be good at discussions in class*",  $\alpha = .76$ ) and personal importance (e.g., "*Political and social issues are very important to me personally*",  $\alpha = .80$ ). Finally, we developed a scale on negative value of failure (e.g., "*It is very important for me not to fail when discussing political and social issues*",  $\alpha = .68$ ). The three task value dimensions were assessed with four items each, rated on a four-point scale from 1 (*strongly disagree*) to 4 (*strongly agree*).

## **Effects of Emotions**

In order to test relations between emotions and learning, we consider four motivational, behavioral, and academic outcomes in civic education. Intrinsic (1) and extrinsic (2) motivation were chosen as mediators typically considered in the control-value theory (Pekrun, 2006).

Students' engagement with politics (3) specifically suits the context of civic education as learning often takes place in informal contexts (Losito et al., 2021). Finally, we have chosen political knowledge (4) as an achievement measure, which is considered as a core outcome of civic education (Carretero et al., 2016).

### ***Engagement and Motivation***

As possible outcomes of emotions in civic education, students' engagement with politics (nine items, e.g., talking with parents about political or social issues;  $\alpha = .84$ ; Köhler et al., 2016) and intrinsic and extrinsic learning motivation (National Center for Education Statistics, 2018) were assessed. The motivation scale was translated to German and adapted to the learning context, focusing on discussions about political and social issues in class (e.g., “*I want other students to think I am good in discussing political and social issues*” for extrinsic motivation,  $\alpha = .86$ ; “*I want to learn as much as possible when discussing political and social issues*” for intrinsic motivation,  $\alpha = .89$ ). All eight items were rated on a five-point Likert scale from 1 (*not at all*) to 5 (*exactly*).

### ***Political Knowledge Test***

Political knowledge was measured with a test adapted from the Austrian National Election Study (Kritzinger et al., 2020). It includes questions on the political system (e.g., “*What is the electoral threshold for parties to enter parliament?*”) and politicians (i.e., “*To which party do the following politicians belong?*”). We additionally developed questions to address different policy issues (e.g., “*Which institution supports employees in their job search?*”), which were pretested before starting the data collection. The final scale included 15 items, which were recoded to *correct* (1) and *incorrect* (0) and summed up to a score ranging from 0 to 15 (ordinal coefficient  $\alpha = .84$ , items are available in the online appendix)<sup>8</sup>.

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<sup>8</sup> One item from the original AUTNES scale was excluded due to low variation and a negative loading on the latent factor (voting age in Austria: 90 % could give a correct answer). Though this item is usually used in representative studies with adult voters, it might not work in young samples where participants are directly affected from the regulation. Additionally, it differs from other items of the scale due to its open answer format.

## Analysis

Similar to prior studies on academic emotions and their antecedents and outcomes (Pekrun et al., 2023), we used structural equation models (SEM) to determine bivariate latent correlations between emotions and their antecedents and outcomes. With the exception of models including political knowledge, all models were estimated in the lavaan package in R (Rosseel, 2012) using robust maximum likelihood estimation. As the knowledge scale includes dichotomous indicators, we used the estimator WLSMV in Mplus (Muthén & Muthén, 1998), which is designed for estimations with ordinal endogenous variables.

## Results

### Missing Data

From all 594 participating students, 517 (87 %) completed the survey. There was no significant difference between complete and incomplete cases in age ( $t = 0.17$ ,  $df = 85.6$ ,  $p = 0.86$ ), migration background ( $\chi^2 = 3.92$ ,  $p = .27$ ), and school type ( $\chi^2 = 2.06$ ,  $p = .17$ ), but female participants were more likely than male participants to complete the survey ( $\chi^2 = 10.19$ ,  $p = .01$ ). Across all data, 7.62 % of data originating from 115 incomplete cases were missing. Though a test proposed by Little (1988) for missing completely at random (MCAR) on the indicators for the emotion scales was not supported ( $\chi^2 = 1081$ ,  $df = 793$ ,  $p < 0.001$ ), we only found significant relations between overall percentage of missing values and citizenship ( $t = 3.15$ ,  $df = 545.33$ ,  $p = .002$ ), with a higher percentage of missing values among students with the Austrian citizenship (1.92 %,  $N = 553$ ) than students without the Austrian citizenship (0.96 %,  $N = 28$ ). To still use as much information as possible, we employed full information maximum likelihood estimation (FIML) under the assumption of missing at random (MAR) in the models. Participants with missing values on all indicators included in a SEM model were excluded from analysis.

### Descriptive Statistics

Table 2 shows the descriptive statistics of emotions, appraisals, and outcomes. Measurement models of the emotion scales and manifest and latent intercorrelations between the emotion scales and appraisals and outcomes can be found in the online appendix (Section 3 and 4, respectively).

**Table 2***Descriptive Statistics and Cronbach's Alpha of Variables of Interest*

| Variable                                                           | <i>M</i> | <i>SD</i> | <i>α</i> |
|--------------------------------------------------------------------|----------|-----------|----------|
| <i>Achievement Emotions<sup>a</sup></i>                            |          |           |          |
| Enjoyment                                                          | 2.77     | 1.01      | 0.86     |
| Hope                                                               | 2.86     | 0.85      | 0.77     |
| Pride                                                              | 2.69     | 0.93      | 0.72     |
| Anger                                                              | 2.14     | 0.84      | 0.67     |
| Anxiety                                                            | 2.05     | 0.85      | 0.73     |
| Shame                                                              | 2.06     | 0.91      | 0.80     |
| Hopelessness                                                       | 2.03     | 0.81      | 0.74     |
| Boredom                                                            | 2.40     | 1.06      | 0.87     |
| <i>Epistemic Political Emotions<sup>a</sup></i>                    |          |           |          |
| <i>Epistemic Political Emotions Scale (EPES)</i>                   |          |           |          |
| Surprise                                                           | 2.49     | 0.78      | 0.84     |
| Curiosity                                                          | 2.68     | 0.98      | 0.92     |
| Confusion                                                          | 2.30     | 0.88      | 0.88     |
| <i>Epistemic Emotions Scale (EES-D)</i>                            |          |           |          |
| Surprise                                                           | 2.60     | 0.90      | 0.81     |
| Curiosity                                                          | 3.36     | 1.08      | 0.91     |
| Confusion                                                          | 2.42     | 1.03      | 0.86     |
| <i>Appraisals<sup>b</sup></i>                                      |          |           |          |
| <i>Control-Appraisals</i>                                          |          |           |          |
| Internal political efficacy                                        | 2.54     | 0.55      | 0.79     |
| Epistemic political efficacy                                       | 3.33     | 0.77      | 0.77     |
| Citizenship self-efficacy                                          | 2.53     | 0.60      | 0.80     |
| <i>Value-Appraisals</i>                                            |          |           |          |
| Interest in political and social issues                            | 2.72     | 0.55      | 0.80     |
| Value of achievement                                               | 2.56     | 0.65      | 0.76     |
| Personal importance                                                | 2.84     | 0.64      | 0.80     |
| Negative value                                                     | 2.55     | 0.61      | 0.68     |
| <i>Outcomes</i>                                                    |          |           |          |
| Student's engagement with political and social issues <sup>b</sup> | 2.18     | 0.62      | 0.84     |
| Extrinsic motivation <sup>a</sup>                                  | 2.48     | 1.07      | 0.86     |
| Intrinsic motivation <sup>a</sup>                                  | 3.18     | 1.07      | 0.89     |
| Political knowledge test <sup>c</sup>                              | 7.64     | 3.17      | 0.84     |

Note. *N* = 521-572; For the reliability ( $\alpha$ ), Cronbach's alpha was calculated. For the knowledge test, ordinal coefficient alpha was used.

<sup>a</sup> Range from strongly disagree (1) to strongly agree (5).

<sup>b</sup> Range from strongly disagree (1) to strongly agree (4).

<sup>c</sup> Answers recoded to dummy-variables (0 = false, 1 = true). As the knowledge test includes 15 items, the theoretical and empirical range in the sample is 0 to 15.

## Antecedents of Emotions

### Achievement Emotions

Latent correlations between discussion-related emotions and its control and value appraisals are displayed in Table 3. As expected, enjoyment, hope, and pride had moderate-to-strong positive associations with control ( $r = .33$  to  $.79$ ,  $p < .001$ ) and value ( $r = .53$  to  $.77$ ,  $p < .001$ ). In contrast, boredom consistently showed negative moderate-to-strong associations with control ( $r = -.30$  to  $-.60$ ,  $p < .001$ ) and value ( $r = -.38$  to  $-.74$ ,  $p < .001$ ). While there was no significant correlation between anger and control ( $r = -.06$  to  $.09$ ,  $p > .211$ ), anxiety was related negatively to internal political efficacy and citizenship self-efficacy ( $r = -.24$  to  $-.38$ ,  $p < .001$ ). Results on hopelessness and shame indicated negative small-to-moderate associations with all control ( $r = -.17$  to  $-.46$ ,  $p < .002$ ). Concerning value, we expected a positive relation with negative value of failure. This hypothesis was supported by the results on anger ( $r = .19$ ,  $p = .004$ ) and anxiety ( $r = .12$ ,  $p = .048$ ), but not on shame ( $r = -.003$ ,  $p = .951$ ). Similar to boredom, hopelessness even revealed a negative correlation with negative value of failure ( $r = -.14$ ,  $p = .029$ ).

**Table 3**

*Latent Correlations Between Discussion-Related Emotions and Cognitive Appraisals*

| Appraisals                   | Enjoy-ment | Hope   | Pride  | Anger | Anxiety | Shame   | Hopeless | Boredom |
|------------------------------|------------|--------|--------|-------|---------|---------|----------|---------|
| <i>Control-Appraisals</i>    |            |        |        |       |         |         |          |         |
| Internal Political Efficacy  | .73***     | .77*** | .79*** | .09   | -.24*** | -.33*** | -.37***  | -.60*** |
| Epistemic Political Efficacy | .33***     | .46*** | .39*** | -.06  | -.09    | -.17**  | -.24**   | -.30*** |
| Citizenship Self-Efficacy    | .65***     | .71*** | .72*** | .08   | -.38*** | -.46*** | -.37***  | -.53*** |
| <i>Value-Appraisals</i>      |            |        |        |       |         |         |          |         |
| Interest                     | .71***     | .71*** | .66*** | .06   | -.08    | -.18*** | -.30***  | -.63*** |
| Importance of Achievement    | .67***     | .67*** | .70*** | .16** | -.04    | -.20*** | -.22***  | -.50*** |
| Personal Importance          | .76***     | .77*** | .68*** | .01   | -.07    | -.19*** | -.42***  | -.74*** |
| Negative Value of Failure    | .55***     | .61*** | .53*** | .19** | .12*    | .00     | -.14*    | -.38*** |

*Note.*  $N = 563 - 573$ . Standard errors are adjusted for clustering of the data within classes.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

### Epistemic Political Emotions

Latent correlations between epistemic political emotions and appraisals are displayed in Table 4. As expected, results indicated positive moderate-to-large associations between control and value and curiosity ( $r = .35$  to  $.75$ ,  $p < .001$ ), and negative small associations between control and value and confusion ( $r = -.23$  to  $-.34$ ,  $p < .001$ ). Results on surprise were similar to curiosity, indicating positive relations to both control and value but with a smaller effect size ( $r = .17$  to  $.43$ ,  $p < .005$ ) and one non-significant relation.

**Table 4**

*Latent Correlations Between Epistemic Political Emotions and Cognitive Appraisals*

| Appraisals                | Epistemic Political Emotions |           |           | Epistemic Emotion Scale |           |           |
|---------------------------|------------------------------|-----------|-----------|-------------------------|-----------|-----------|
|                           | Scale (EPES)                 |           |           | (EES-D)                 |           |           |
|                           | Surprise                     | Curiosity | Confusion | Surprise                | Curiosity | Confusion |
| <i>Control-Appraisals</i> |                              |           |           |                         |           |           |
| Internal Efficacy         | Political.39***              | .69***    | -.34***   | .22***                  | .65***    | -.34***   |
| Epistemic Efficacy        | Political.17**               | .36***    | -.24***   | .08                     | .35***    | -.23***   |
| Citizenship Self-Efficacy | .33***                       | .57***    | -.28***   | .19**                   | .54***    | -.27***   |
| <i>Value-Appraisals</i>   |                              |           |           |                         |           |           |
| Interest                  | .43***                       | .75***    | -.25***   | .22***                  | .69***    | -.29***   |

*Note.*  $N = 563 - 573$ ; Standard errors are adjusted for clustering of the data within classes.

\*\*  $p < .01$ . \*\*\*  $p < .001$ .

### Effects of Emotions

#### Achievement Emotions

When we turn to effects of emotions, latent correlations (Table 5) indicated moderate-to-large positive associations between positive-activating emotions and outcome variables ( $r = .42$  to  $.76$ ,  $p < .001$ ). Negative-deactivating emotions indicated effects in the opposite direction, with small-to-moderate associations ( $r = -.20$  to  $-.52$ ,  $p < .001$ ). Only the expected relation between hopelessness and extrinsic motivation was not significant ( $r = .01$ ,  $p = .883$ ). Concerning negative-activating emotions, anger and anxiety were related positively to extrinsic

motivation ( $r = 0.21, p < .001$ , and  $r = .19, p = .005$ , respectively) and anger and shame were related negatively with achievement on the knowledge test ( $r = -.23, p < .001$ ,  $r = -.13, p = .005$ , respectively).

**Table 5**

*Latent Correlations Between Discussion-Related Emotions and Outcomes*

| Outcomes     | Engagement | Extrinsic Motivation | Intrinsic Motivation | Knowledge Test |
|--------------|------------|----------------------|----------------------|----------------|
| Enjoyment    | .62***     | .54***               | .76***               | .42***         |
| Hope         | .63***     | .55***               | .76***               | .48***         |
| Pride        | .61***     | .65***               | .67***               | .43***         |
| Anger        | .12*       | .21***               | -.01                 | -.23***        |
| Anxiety      | -.08       | .19**                | .07                  | -.12           |
| Shame        | -.12       | .07                  | -.04                 | -.13**         |
| Hopelessness | -.31***    | .01                  | -.34***              | -.36***        |
| Boredom      | -.52***    | -.20***              | -.56***              | -.36***        |

*Note.*  $N = 551 - 552$ ; Standard errors are adjusted for clustering of the data within classes.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

### **Epistemic Political Emotions**

For epistemic political emotions, we hypothesized positive relations to engagement and results on the knowledge test for all three emotions. However, results showed only positive latent correlations regarding surprise and curiosity ( $r = .16$  to  $.68, p < .004$ ), while confusion was negatively related with engagement ( $r = -.15$  to  $-.20, p < .014$ ) and knowledge ( $r = -.25$  to  $-.28, p < .001$ ; see Table 6).

### **Further analysis**

A robustness-check using partial latent correlations with gender as a control variable revealed similar results, with a change in significance in only three out of 124 effect sizes (details are included in Section 5 of the online appendix, Table A7–A10).

**Table 6***Latent Correlations Between Epistemic Political Emotions and Outcomes*

| Emotions     | Engagement | Knowledge Test |
|--------------|------------|----------------|
| <i>EPES</i>  |            |                |
| Surprise     | .38***     | .18***         |
| Curiosity    | .68***     | .43***         |
| Confusion    | -.15*      | -.28***        |
| <i>EES-D</i> |            |                |
| Surprise     | .16**      | .20***         |
| Curiosity    | .58***     | .44***         |
| Confusion    | -.20***    | -.25***        |

*Note.*  $N = 535 - 536$ ; Standard errors are adjusted for clustering of the data within classes.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

## Discussion

The aim of the present research was to analyze emotions experienced in the context of political learning in adolescents, who are in a critical period of their political development. We investigated whether the control-value theory can be applied to emotions experienced in the cross-curricular context of civic education at upper secondary schools. Thus, we test how experienced emotions are associated with antecedents and academic outcomes. Two types of emotions were analyzed: (1) achievement emotions during discussions of political and social issues, and (2) epistemic political emotions experienced during processing of information about political and social issues in class. We found broad support for expected relations regarding positive-activating emotions (enjoyment, hope, pride, curiosity) and negative-deactivating emotions (hopelessness, boredom). As anticipated, relations of negative-activating emotions to their antecedents and effects depended in more complex ways on the kind of appraisal, discrete emotion, and outcome. The study contributes to the emotions literature by providing novel insights into a new content domain and a rarely investigated cross-curricular context.

### Control and Value Appraisals as Antecedents of Emotions

Paralleling studies on emotions in other domains, we found consistent patterns of relations between control-value appraisals and emotions in civic education. While control appraisals were consistently positively related to positive-activating emotions, and negatively related to negative-deactivating emotions, relations to negative-activating emotions differed

considerably. As hypothesized, control was negatively associated with anxiety and shame but not with anger. Although prior studies on emotions at school have shown no differences between anger and anxiety (e.g., Pekrun et al., 2011), studies from political psychology provide similar expectations. Huddy (2007) suggests anxiety but not anger is characterized by lack of perceived control. Additionally, anger might differ regarding the object focus. Though discussions about political and social issues in class was included in the study, it is unclear whether reported anger is targeted at topics discussed, statements of classmates, or the situation of discussing as such. All in all, the results underline the importance to differentiate between negative-activating emotions in future studies and call for qualitative data especially on the experience of anger in this context.

In terms of value appraisals, this study was among the first to examine the positive relation of anger, anxiety, shame and hopelessness with negative value of failure (Pekrun, 2006; Pekrun & Perry, 2014). Prior studies have shown similar results regarding extrinsic value appraisals such as the importance of grades (Goetz et al., 2020). While in the current study, this positive correlation with importance of achievement only appeared concerning anger, both anger and anxiety were, as expected, positively correlated with negative value of failure, but not correlated to intrinsic value. In line with the suggestion by a study testing the expectancy-value theory in the context of civic education (Liem & Chua, 2013), the results underline the importance to distinguish between different value appraisals especially when considering cognitive appraisals of negative-activating emotions.

Finally, results of the present study support the applicability of the control-value theory to epistemic emotions in the context of politics. While studies on epistemic emotions commonly focus on appraisals like novelty or complexity of information (Chevrier et al., 2019), only few studies have tested control-value appraisals regarding surprise, curiosity, and confusion (e.g., see Muis, Psaradellis, et al., 2015). The mostly moderate to large associations support the importance of control and value appraisal also for this type of emotions. Additionally, the developed scale for epistemic political emotions (EPES) provides a new instrument to measure epistemic emotions beyond their affective component. This is an important asset for future studies, especially as recent findings have shown differential relations between emotional components and performance (Roos et al., 2021).

### **Emotions and Learning in Civic Education**

The strong correlations of positive-activating emotions with engagement and motivation support the motivational dimension of emotions and highlight their importance for learning. Additionally, we found a consistent pattern of relations between emotions and student's achievement on a political knowledge test, indicated by positive correlations with positive-activating emotions and negative correlations with negative-deactivating emotions. Considering negative-activating emotions, our results corroborated prior research by showing positive correlations with extrinsic motivation for anger and anxiety, but no relation to intrinsic motivation (e.g., Pekrun et al., 2011). Additionally, similar differential effects of anger and anxiety have been found in studies from political psychology. Anger, often classified as an approach emotion and as motivating for action (Brader & Marcus, 2013), was related positively with engagement, the more behavioral outcome considered in the present study. At the same time, it was negatively related to scores on the knowledge test, but no significant relation occurred on anxiety. Several studies have shown no or suppressing effects of anger and positive effects of anxiety on political information seeking and learning (e.g., Park, 2015; Valentino et al., 2008). This might explain the negative relation of anger with achievement on the knowledge test.

Interestingly, while we expected learning to be triggered by all three types of epistemic political emotions considered, we only found positive correlations of surprise and curiosity with engagement and achievement in the knowledge test, while confusion showed consistent negative correlations with both concepts. Indeed, prior studies have found positive effects of confusion on learning (e.g., regarding knowledge exploration; Vogl et al., 2019), but effects are smaller and less consistent than those of other epistemic emotions. Long duration of and unresolved confusion can transit into negative emotions like frustration (Di Leo et al., 2019). This fast fluctuation and interplay of different emotions can only be shown at the state level. It might be that trait confusion, or a disposition to experience confusion in a specific context, is manifested and not easy to resolve, therefore more closely connected to other negative emotions. In line with this argument, our results show that confusion closely mirrored correlations of hopelessness. The negative relation to learning is in line with other studies looking at epistemic emotions at a trait level (Balaž & Pavlin-Bernardić, 2021) or with younger students (Muis, Psaradellis, et al., 2015).

Overall, the study adds to the limited literature on emotions in civic education (e.g., Bayram-Özdemir et al., 2016, Garret, 2020). Even if taught in a cross-curricular context, students could identify and report their experienced emotions by referring to two specific situations. We particularly find higher engagement, motivation, and knowledge coming along with positive emotions, though from the agonistic view on politics, general motivational effects due to conflict-evoked emotions are expected (Keegan, 2021). Though this might apply to activating emotions and political actions (e.g., see the small positive relationship between anger and engagement), it is likely detrimental for political knowledge.

### **Limitations**

While the present study is the first to systematically investigate various discrete emotions in the context of civic education, it has some limitations. First, the cross-sectional design only provides correlational insights. It would be interesting to investigate the causal paths from appraisals through emotions towards civic learning. For example, future studies could look into the effects of appraisals by experimentally manipulating value and control, or analyzing the temporal development of cognitive and affective states in cross-lagged panel models. Second, although in our targeted school types the proportion of female students is usually higher than the proportion of male students (Statistik Austria, 2022), female students were overrepresented in our sample. Though results from our robustness check controlling for gender yielded mostly consistent results, gender imbalance may still limit the generalizability of our results. Third, we limit our civic learning outcomes to engagement, motivation, and achievement on a knowledge test. Aims of civic education, however, are much broader – and also include identity and value development, participation, and civic skills (Carretero et al., 2016). As shown concerning anger, emotions differ in their direction and magnitude of the effect depending on the outcome, which underlines the importance to investigate relations to other aims of civic education in future studies. Additionally, we encourage future studies to investigate other core mediators between emotions and achievement mentioned in the control-value theory (e.g., cognitive resources, learning strategies; Pekrun, 2006). Fourth, we only looked at emotions experienced in a cross-curricular context of civic education. It is still unclear whether results would replicate in other contexts of civic learning. Related to this, we focused on bivariate correlations in this analysis, as the aim of the study was to inspect patterns of relations between antecedents and effects of emotions in the context of civic education. This enabled us to also compare it to results from prior studies using similar approaches (e.g., Bieleke et al., 2021; Pekrun et al., 2011, 2023). However, if interested in joint associations

between cognitive appraisals, emotions, and outcomes, future studies might utilize multivariate analysis. Finally, we focused only on academic emotions that directly pertain to learning. Future studies could additionally investigate the role of topic and social emotions in the context of civic education.

### **Implications for Future Research and Practice**

Studying emotions in civic education is challenging due to the broad and diverse contexts of civic learning at school. With the adaption and development of new emotion scales, we provide valid instruments to further investigate emotions and its role in civic learning. The scales are especially comprehensive as they address the component structure of both achievement and epistemic emotions. We encourage future studies to use the scales and deepen our understanding of their functioning by testing measurement invariance (e.g., across grades and cultures) and whether relations to antecedents and effects are similar in different subsamples.

Additionally, it would be interesting to further investigate implications of the control-value theory by analyzing distal antecedents of emotions in civic education. Besides individual dispositions (e.g., general political interest gained from political socialization at home), contextual characteristics of the class could be important distal antecedents of emotions to consider. Prior studies have, for example, investigated relations between teaching methods used in civic education (e.g., group-work; Dassonneville et al., 2012; Neundorf et al., 2016), or experienced teaching quality (e.g., cognitive activation; Alscher et al., 2022; or open classroom climate; Manganelli et al., 2015; Sohl & Arensmeier, 2015) and civic learning. A more open classroom climate during discussions of political and social issues relates positively to students' citizenship self-efficacy (i.e., higher control appraisals; Manganelli et al., 2015). Similar, teachers encouraging students to express their opinion might increase the perceived importance to personally participate in the debate (i.e., value appraisals), and in turn the experience of positive emotions. This is in line with studies from other domains showing indirect effects from teaching methods on emotions via control- and value appraisals (Goetz et al., 2020). Future studies investigating whether discrete emotions (e.g., enjoyment, anger, or boredom) and their control- and value appraisals mediate relations between classroom context and civic learning would extend the current research and broaden the current evidence (Bayram Özdemir et al., 2016; Manganelli et al., 2015).

Finally, teachers could use knowledge about the appraisals and effects of emotions to foster a positive emotional climate during cross-disciplinary civic education, thereby shaping students' habits about how they learn about political and social issues in their daily lives. The findings indicate that fostering positive emotions may be particularly beneficial. Positive emotions even relate positively to students' engagement outside of school. The facts and skills learned in emotionally engaging learning activities at school may improve students' ability to understand current political developments and participate in debates in their daily lives. This not only improves the civic competence of the youth, but also the democratic processes in the long run.

### Data Accessibility Statement

This study was pre-registered under [OSF](#). Data and scripts for analysis are available via [OSF](#).

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## Online Appendix

**1. Calculation of the Relative Completion Speed Index**

We used the following formula for the relative completion speed index (RSI; Leiner, 2019):

$$RSI_i = \frac{\sum_{p=1}^n SF_{pi}}{n} \quad \text{with } SF_{pi} = \begin{cases} \frac{\tilde{t}_p}{t_{pi}} & \text{if } \frac{\tilde{t}_p}{t_{pi}} \leq 3 \\ 3 & \text{if } \frac{\tilde{t}_p}{t_{pi}} > 3 \end{cases}$$

where  $t_{pi}$  is the time in seconds a person (i) spends per page (p),  $SF_{pi}$  is a speed factor for the page (p) and person (i), calculated by dividing the median time spent on the page in the sample ( $\tilde{t}_p$ ) by the time person i spent on this page ( $t_{pi}$ ). We excluded pages with knowledge items from the calculation in order to prevent mistaking experts from fraudulent answer behavior.

**2. Items of new scales developed for this study****Epistemic Political Emotions Scale (EPES)**

Introduction Text:

*This part of the questionnaire refers to emotions you feel while reading about, listening to, or discussing political and social information.*

*Before answering the following questions, please recall a typical situation in which you covered political and social information in class.*

Original (German): „Dieser Teil des Fragebogens bezieht sich auf Emotionen, die Sie fühlen, während Sie über politische und soziale Informationen lesen, hören oder sie diskutieren

*Bevor Sie die folgenden Fragen beantworten, erinnern Sie sich bitte an eine typische Situation in der Sie in der Klasse politische und soziale Informationen behandelt haben.“*

**Table A1***Epistemic Political Emotions Scale (EPES) Items*

| Component                    |                                                                                                                        | Item text (German)                                                                                                   |
|------------------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| <i>Surprise</i>              |                                                                                                                        |                                                                                                                      |
| Affective                    | Information about political and social issues always surprises me.                                                     | Informationen über politische und soziale Themen überraschen mich immer wieder.                                      |
|                              | Political and social information amazes me.                                                                            | Politische und soziale Informationen bringen mich zum Staunen.                                                       |
| Cognitive                    | When I deal with political and social information, I think to myself, “Who would have thought that!”                   | Wenn ich mich mit politischen und sozialen Informationen beschäftige, denke ich mir: Wer hätte das gedacht!          |
|                              | When dealing with political and social information, I think about how surprising it is.                                | Bei der Beschäftigung mit politischen und sozialen Informationen geht mir durch den Kopf, wie überraschend sie sind. |
|                              | When it comes to political and social issues, I always learn things I didn't expect.                                   | Bei politischen und sozialen Themen lerne ich immer wieder Dinge, mit den ich nicht gerechnet habe.                  |
| Motivational / Physiological | When I am astonished, I want to ask again if I really understood it correctly.                                         | Aus Überraschung möchte ich am liebsten nochmal nachfragen, ob ich es wirklich richtig verstanden habe.              |
| Expressive                   | My jaw almost drops open in amazement at political and social information.                                             | Vor Verwunderung über politische und soziale Informationen bleibt mir beinahe der Mund offen stehen.                 |
| <i>Curiosity</i>             |                                                                                                                        |                                                                                                                      |
| Motivational                 | I am curious about the political and social issues we deal with in school.                                             | Ich bin neugierig auf die politischen und sozialen Themen, die wir in der Schule behandeln.                          |
|                              | I am interested in discussions about political and social information.                                                 | Ich bin gespannt auf Diskussionen über politische und soziale Informationen.                                         |
| Motivational                 | When I come across unfamiliar information about political and social issues, I immediately want to know more about it. | Wenn ich auf unbekannte Informationen zu politischen und sozialen Themen stoße, will ich sofort mehr darüber wissen. |

|                            |                                                                                                      |                                                                                                              |
|----------------------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
|                            | I'm so interested in political and social information that I don't want to miss anything.            | Ich bin so interessiert an politischen und sozialen Informationen, dass ich nichts verpassen möchte.         |
| Expressive / Physiological | Out of sheer curiosity, I look and listen very carefully to catch everything.                        | Aus lauter Neugier schaue und höre ich ganz genau hin, um alles mitzubekommen.                               |
|                            | I am so inquisitive about political and social information that I get excited.                       | Ich bin so wissbegierig auf politische und soziale Informationen, dass ich ganz aufgeregt werde.             |
| <i>Confusion</i>           |                                                                                                      |                                                                                                              |
| Affective                  | I feel completely lost in the face of information on political and social issues.                    | Ich fühle mich angesichts der Informationen zu politischen und sozialen Themen ganz verloren.                |
|                            | I feel confused when dealing with political and social information.                                  | Ich fühle mich konfus, wenn ich mich mit politischen und sozialen Informationen auseinandersetze.            |
| Cognitive                  | Information about political and social issues confuses me.                                           | Informationen über politische und soziale Themen verwirren mich.                                             |
|                            | I get irritated when I think about political and social information.                                 | Ich bin irritiert, wenn ich über politische und soziale Informationen nachdenke.                             |
| Motivational               | When I become irritated, I would prefer to have more insight about political and social information. | Weil ich so irritiert bin, hätte ich am liebsten mehr Durchblick bei politischen und sozialen Informationen. |
|                            | Sometimes political and social information confuses me so much that I wish I had more clarity.       | Manchmal verwirren mich politische und soziale Informationen so sehr, dass ich mir mehr Klarheit wünsche.    |
| Expressive / Physiological | The amount of information about political and social issues sometimes makes me feel dizzy.           | Von den vielen Informationen über politische und soziale Themen wird mir manchmal schwindlig.                |

*Note.* Items are rated on a scale from 1 (*Stimme nicht zu/strongly disagree*) to 5 (*Stimmt genau/strongly agree*).

### Knowledge Test – Policy Items

**Table A2**

*Policy Questions of the Knowledge Test*

|   | Original Question                                                                                                                                   | Response Options<br>(original)                                                                                                       | Translation                                                                                                                                                          | Response Options<br>(translated)                                                                                                           |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Welche der folgenden finanziellen Förderungen gibt es in Österreich nicht?                                                                          | <b>Hartz-4</b><br>Wohnbeihilfe<br>Familienbeihilfe<br>Pflegegeld                                                                     | Which of the following financial aid programs does not exist in Austria?                                                                                             | <b>Hartz-4</b><br>Housing Allowance<br><br>Family allowance<br>Care allowance                                                              |
| 2 | Neben der neunjährigen Schulpflicht gibt es seit 2017 auch eine Ausbildungspflicht in Österreich. Bis zu welchem Alter gilt die Ausbildungspflicht? | Bis 14 Jahre<br>Bis 16 Jahre<br><b>Bis 18 Jahre</b><br>Bis 20 Jahre                                                                  | In addition to the nine-year compulsory education, there has also been compulsory training in Austria since 2017. Up to what age does the compulsory training apply? | Until 14 years<br>Until 16 years<br><b>Until 18 years</b><br>Until 20 years                                                                |
| 3 | Welche Institution unterstützt Arbeitnehmer*innen bei der Arbeitssuche?                                                                             | <b>Das Arbeitsmarktservice (AMS)</b><br>Die Arbeitsvermittlung (AV)<br>Das Institut für Arbeit (IFA)<br>Die Arbeiter*innenhilfe (AH) | Which institution supports employees in finding a job?                                                                                                               | <b>The Employment Service (AMS)</b><br>The Employment Mediation (AV)<br>The Institute for Employment (IFA)<br>The Workers' Assistance (AH) |
| 4 | Was regelt auf europäischer Ebene das sogenannte „Dublin-Verfahren“?                                                                                | <b>Asylwesen</b><br>Bankenregulation<br>Steuerpolitik<br>Studienabschlüsse                                                           | What is regulated at the European level by the so-called "Dublin Procedure"?                                                                                         | <b>Asylum system</b><br>Banking regulation<br>Tax policy<br>Degrees                                                                        |
| 5 | Für welchen der folgenden Bereiche werden die meisten Staatsausgaben verwendet?                                                                     | <b>Pensionen</b><br>Justiz<br>Bildung<br>Umwelt                                                                                      | For which of the following areas is most government spending used?                                                                                                   | <b>Pensions</b><br>Justice<br>Education<br>Environment                                                                                     |

|   |                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                              |                                                                                                                                                                                                                                                                                                                                                                      |
|---|--------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6 | Was ist ein Ziel des 1-2-3 Klimatickets?                           | <p><b>Mit einem Jahresticket alle öffentlichen Verkehrsmittel nutzen zu können.</b></p> <p>Stufenweise Reduktion der Treibhausgase (1: Industrie, 2: Verkehr, 3: Landwirtschaft)</p> <p>Der Ausbau von Fernkälte und Klimaanlage.</p> <p>Förderung für E-Mobilität (E-Fahrräder, E-Mopeds und E-Autos)</p>                                                                                                        | What is one goal of the 1-2-3 climate ticket?                                | <p><b>To be able to use all means of public transport with an annual ticket.</b></p> <p>Gradual reduction of greenhouse gases (1: industry, 2: transport, 3: agriculture).</p> <p>The expansion of district cooling and air conditioning.</p> <p>Promotion of e-mobility (e-bikes, e-mopeds, and e-cars).</p>                                                        |
| 7 | Was ist ein Kollektivvertrag?                                      | <p><b>Übereinkunft zwischen Arbeitnehmer*innen- und Arbeitgeber*innenvertretung zu Arbeitsbedingungen in einer Branche</b></p> <p>Verpflichtung zu gemeinsamem Vorgehen mehrerer Staaten beim Umweltschutz</p> <p>Übereinkommen in der Schulgemeinschaftsausschuss (Schulen, Eltern und Schüler*innen) zu Bildungszielen</p> <p>Ein Vertrag, der beim Besuch großer Veranstaltungen unterzeichnet werden muss</p> | What is a collective agreement?                                              | <p><b>Agreement between workers' and employers' representatives on working conditions in an industry.</b></p> <p>Commitment to joint action by several states on environmental protection</p> <p>Agreement in school community committee (schools, parents, and students) on educational goals</p> <p>A contract that must be signed when attending major events</p> |
| 8 | Was ist laut der Genfer Flüchtlingskonvention kein Grund für Asyl? | <p><b>Wirtschaftliche Perspektivenlosigkeit</b></p> <p>Verfolgung aufgrund ethnischer Herkunft</p> <p>Bedrohung aufgrund politischen Engagements</p> <p>Verfolgung aufgrund Zugehörigkeit zu sozialer Gruppe</p>                                                                                                                                                                                                  | According to the Geneva Refugee Convention, what is not a reason for asylum? | <p><b>Lack of economic prospects</b></p> <p>Persecution due to reasons of race</p> <p>Threat due to one's political opinion</p> <p>Persecution due to membership of a particular social group</p>                                                                                                                                                                    |

*Note.* Response options were randomized in the questionnaire. Participants would additionally respond with “don’t know” to the questions. Correct answers are displayed in bold.

Additionally to these new items, we used questions from the Austrian National Election Study (Kritzing et al., 2020) in order to address knowledge about structures and parties.

### 3. Internal Structure of Emotion Measures

In order to validate the emotion scales used in this study, we conducted confirmatory factor analysis (CFA) and used robust comparative fit index (rCFI), Tucker-Lewis index (rTLI), root-mean-square error of approximation (rRMSEA) and the standardized root-mean-square residual (SRMR) as fit indices for model evaluation with cut-off values proposed by Chen (2007). Results from these measurement models of the emotion scales are displayed in Table A3 for discussion related emotions, and Table A4 for epistemic political emotions measured by the Epistemic Political Emotions Scale. While the models on enjoyment, hope, shame and boredom indicate a very good model fit, the fit for pride is poor especially in terms of rTLI and rRMSEA values. Concerning epistemic political emotions, all three scales indicate a very good fit.

**Table A3**

*Results of the Confirmatory Factor Analysis for Discussion-Related Emotions*

| Emotion   | $\chi^2$ | df | rCFI  | rTLI  | rRMSEA | SRMR  |
|-----------|----------|----|-------|-------|--------|-------|
| Enjoyment | 8.36     | 2  | 0.996 | 0.987 | 0.062  | 0.014 |
| Hope      | 2.50     | 2  | 1.000 | 0.999 | 0.011  | 0.010 |
| Pride     | 33.78    | 2  | 0.936 | 0.807 | 0.167  | 0.038 |
| Anger     | 6.67     | 1  | 0.986 | 0.915 | 0.103  | 0.016 |
| Anxiety   | 6.28     | 1  | 0.990 | 0.939 | 0.093  | 0.017 |
| Shame     | 0.37     | 1  | 1.000 | 1.006 | 0.000  | 0.003 |
| Hopeless  | 16.09    | 2  | 0.970 | 0.910 | 0.112  | 0.027 |
| Boredom   | 4.30     | 2  | 0.999 | 0.997 | 0.033  | 0.010 |

*Note.*  $N = 551$ ; Robust fit measures (CFI, TLI, and RMSEA) estimated via MLR are reported.

**Table A4**

*Results of the Confirmatory Factor Analysis for Epistemic Political Emotions (EPES)*

| Emotion   | $\chi^2$ | df | rCFI  | rTLI   | rRMSEA | SRMR  |
|-----------|----------|----|-------|--------|--------|-------|
| Surprise  | 41.53    | 14 | 0.979 | 0.9968 | 0.057  | 0.028 |
| Curiosity | 37.39    | 14 | 0.992 | 0.988  | 0.049  | 0.018 |
| Confusion | 72.27    | 14 | 0.967 | 0.951  | 0.083  | 0.034 |

*Note.*  $N = 534$ ; Robust fit measures (CFI, TLI, and RMSEA) estimated via MLR are reported.

#### 4. Intercorrelation Tables

**Table A5**

*Intercorrelation between Emotions*

| Variable                            | 1       | 2       | 3       | 4       | 5      | 6      | 7       | 8       | 9       | 10      | 11      | 12      | 13      | 14      |
|-------------------------------------|---------|---------|---------|---------|--------|--------|---------|---------|---------|---------|---------|---------|---------|---------|
| <i>Achievement Emotions</i>         |         |         |         |         |        |        |         |         |         |         |         |         |         |         |
| 1. Enjoyment                        |         | .92***  | .90***  | .09     | -.10   | -.19** | -.37*** | -.68*** | .58***  | .89***  | -.22*** | .33***  | .78***  | -.29*** |
| 2. Hope                             | .75***  |         | .94***  | .06     | -.04   | -.18** | -.34*** | -.57*** | .6***   | .86***  | -.22*   | .35***  | .76***  | -.30*** |
| 3. Pride                            | .70***  | .69***  |         | .20**   | -.03   | -.19*  | -.21**  | -.46*** | .63***  | .84***  | -.13    | .37***  | .69***  | -.20**  |
| 4. Anger                            | -.09*   | -.08    | .06     |         | .44*** | .35*** | .91***  | .29**   | .22*    | .08     | .43***  | .24**   | -.08    | .37***  |
| 5. Anxiety                          | .01     | .02     | .05     | .42***  |        | .97*** | .79***  | .36***  | .34***  | .16**   | .61***  | .28***  | .01     | .48***  |
| 6. Shame                            | -.11**  | -.10*   | -.09*   | .37***  | .72*** |        | .69***  | .39***  | .14*    | -.07    | .62***  | .18***  | -.17*** | .47***  |
| 7. Hopelessness                     | -.30*** | -.26*** | -.14**  | .63***  | .55*** | .55*** |         | .76***  | .11     | -.29*** | .7***   | .13**   | -.43*** | .67***  |
| 8. Boredom                          | -.59*** | -.45*** | -.30*** | .46***  | .28*** | .34*** | .62***  |         | -.29*** | -.63*** | .45***  | -.20*** | -.66*** | .43***  |
| <i>Epistemic Political Emotions</i> |         |         |         |         |        |        |         |         |         |         |         |         |         |         |
| <i>EPES</i>                         |         |         |         |         |        |        |         |         |         |         |         |         |         |         |
| 9. Surprise                         | .50***  | .47***  | .48***  | .14**   | .28*** | .14**  | .10*    | -.23*** |         | .75***  | .38***  | .73***  | .58***  | .21***  |
| 10. Curiosity                       | .80***  | .71***  | .66***  | -.05    | .12**  | -.03   | -.23*** | -.54*** | .65***  |         | -.06    | .42***  | .83***  | -.16**  |
| 11. Confusion                       | -.16*** | -.15**  | -.06    | .41***  | .50*** | .51*** | .55***  | .39***  | .36***  | -.02    |         | .38***  | -.14*   | .82***  |
| <i>EES-D</i>                        |         |         |         |         |        |        |         |         |         |         |         |         |         |         |
| 12. Surprise                        | .29***  | .28***  | .28***  | .14**   | .21*** | .15**  | .10*    | -.16*** | .60***  | .36***  | .32***  |         | .44***  | .50***  |
| 13. Curiosity                       | .70***  | .64***  | .53***  | -.19*** | .01    | -.13** | -.35*** | -.59*** | .49***  | .76***  | -.09*   | .37***  |         | -.22*** |
| 14. Confusion                       | -.23*** | -.22*** | -.11*   | .38***  | .40*** | .38*** | .54***  | .39***  | .19***  | -.13**  | .71***  | .42***  | -.18*** |         |

*Note.*  $N = 527 - 549$ . The lower triangular displays bivariate manifest correlations between emotions, the upper triangular latent correlations. The latter also accounts for the clustered structure of the data. EPES = Epistemic Political Emotions Scale; EES-D = Epistemic Emotions Scale (Vogel et al., 2018).

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

**Table A6***Intercorrelation between Antecedents and Outcomes*

| Variable                        | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | 11     |
|---------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1. Internal Political Efficacy  |        | .60*** | .79*** | .80*** | .72*** | .82*** | .64*** | .70*** | .47*** | .57*** | .52*** |
| 2. Epistemic Political Efficacy | .50*** |        | .46*** | .43*** | .41*** | .43*** | .31*** | .37*** | .28*** | .42*** | .30*** |
| 3. Citizenship Self-Efficacy    | .59*** | .38*** |        | .62*** | .64*** | .59*** | .50*** | .56*** | .44*** | .55*** | .37*** |
| 4. Interest                     | .63*** | .34*** | .48*** |        | .62*** | .88*** | .53*** | .72*** | .38*** | .65*** | .50*** |
| 5. Achievement Value            | .53*** | .33*** | .50*** | .48*** |        | .73*** | .92*** | .57*** | .63*** | .64*** | .37*** |
| 6. Personal Importance          | .65*** | .32*** | .42*** | .69*** | .50*** |        | .65*** | .69*** | .36*** | .67*** | .52*** |
| 7. Negative Value               | .44*** | .25*** | .36*** | .39*** | .66*** | .42*** |        | .47*** | .61*** | .61*** | .30*** |
| 8. Engagement                   | .59*** | .32*** | .48*** | .61*** | .48*** | .57*** | .36*** |        | .41*** | .66*** | .43*** |
| 9. Extrinsic Motivation         | .38*** | .24*** | .37*** | .29*** | .51*** | .28*** | .46*** | .39*** |        | .66*** | .24*** |
| 10. Intrinsic Motivation        | .49*** | .36*** | .47*** | .56*** | .54*** | .56*** | .47*** | .57*** | .60*** |        | .42*** |
| 11. Knowledge                   | .39*** | .20*** | .23*** | .33*** | .25*** | .36*** | .19*** | .30*** | .19*** | .34*** |        |

*Note.*  $N = 517 - 572$ . The lower triangular displays bivariate manifest correlations between emotions, the upper triangular latent correlations. The latter also accounts for the clustered structure of the data.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

### 5. Robustness Check: Controlling for gender effects

**Table A7**

*Latent Partial Correlations Between Discussion-Related Emotions and Cognitive Appraisals*

| Appraisals                   | Enjoy-<br>ment | Hope   | Pride  | Anger | Anxiety | Shame   | Hopeless | Boredom |
|------------------------------|----------------|--------|--------|-------|---------|---------|----------|---------|
| <i>Control-Appraisals</i>    |                |        |        |       |         |         |          |         |
| Internal Political Efficacy  | .72***         | .77*** | .78*** | .04   | -.23*** | -.33*** | -.40***  | -.62*** |
| Epistemic Political Efficacy | .33***         | .46*** | .38*** | -.09  | -.09    | -.17**  | -.27***  | -.32*** |
| Citizenship Self-Efficacy    | .65***         | .71*** | .72*** | .05   | -.38*** | -.46*** | -.38***  | -.53*** |
| <i>Value Appraisals</i>      |                |        |        |       |         |         |          |         |
| Interest                     | .70***         | .71*** | .65*** | .03   | -.08    | -.17*** | -.31***  | -.63*** |
| Importance of Achievement    | .67***         | .67*** | .69*** | .15*  | -.04    | -.21*** | -.25***  | -.52*** |
| Personal Importance          | .76***         | .77*** | .68*** | .00   | -.06    | -.19*** | -.42***  | -.74*** |
| Negative Value of Failure    | .55***         | .60*** | .53*** | .18** | .12     | -.02    | -.17*    | -.40*** |

*Note.*  $N = 581$ . All partial correlations control for gender differences and standard errors are adjusted for clustering of the data within classes.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

**Table A8***Latent Partial Correlations Between Epistemic Political Emotions and Cognitive Appraisals*

| Appraisals                |           | Epistemic Political Emotions |           |           | Epistemic Emotion Scale |           |           |
|---------------------------|-----------|------------------------------|-----------|-----------|-------------------------|-----------|-----------|
|                           |           | Scale (EPES)                 |           |           | (EES-D)                 |           |           |
|                           |           | Surprise                     | Curiosity | Confusion | Surprise                | Curiosity | Confusion |
| <i>Control-Appraisals</i> |           |                              |           |           |                         |           |           |
| Internal Efficacy         | Political | .40***                       | .69***    | -.33***   | .24***                  | .67***    | -.32***   |
| Epistemic Efficacy        | Political | .17**                        | .36***    | -.24***   | .08                     | .36***    | -.24***   |
| Citizenship Efficacy      | Self-     | .33***                       | .57***    | -.28***   | .19**                   | .55***    | -.27***   |
| <i>Value-Appraisals</i>   |           |                              |           |           |                         |           |           |
| Interest                  |           | .43***                       | .74***    | -.24***   | .22***                  | .70***    | -.28***   |

*Note.*  $N = 581$ . All partial correlations control for gender differences and standard errors are adjusted for clustering of the data within classes.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

**Table A9***Latent Partial Correlations Between Discussion-Related Emotions and Outcomes*

| Outcomes     | Engagement | Extrinsic Motivation | Intrinsic Motivation | Knowledge Test |
|--------------|------------|----------------------|----------------------|----------------|
| Enjoyment    | .61***     | .54***               | .77***               | .42***         |
| Hope         | .63***     | .55***               | .77***               | .48***         |
| Pride        | .61***     | .65***               | .68***               | .43***         |
| Anger        | .09        | .19***               | -.03                 | -.24***        |
| Anxiety      | -.07       | .19**                | .07                  | -.12*          |
| Shame        | -.12       | .07                  | -.04                 | -.13**         |
| Hopelessness | -.32***    | -.01                 | -.36***              | -.37***        |
| Boredom      | -.52***    | -.21***              | -.56***              | -.37***        |

*Note.*  $N = 542\text{--}581$ . All partial correlations control for gender differences and standard errors are adjusted for clustering of the data within classes.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

**Table A10***Latent Partial Correlations Between Epistemic Political Emotions and Outcomes*

| Emotions     | Engagement | Knowledge Test |
|--------------|------------|----------------|
| <i>EPES</i>  |            |                |
| Surprise     | .37***     | .18***         |
| Curiosity    | .67***     | .43***         |
| Confusion    | -.15*      | -.28***        |
| <i>EES-D</i> |            |                |
| Surprise     | .16**      | .19**          |
| Curiosity    | .58***     | .44***         |
| Confusion    | -.20**     | -.25***        |

*Note.*  $N = 581$ . All partial correlations control for gender differences and standard errors are adjusted for clustering of the data within classes.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

### 5.3. Study 3

**Graf, E., Stempfer, L., Muis, K. R., & Goetz, T. (2023). *Classroom emotions in civic education: a multilevel approach to antecedents and effects* [Manuscript submitted for publication]. Department of Developmental and Educational Psychology, University of Vienna.**

- Submitted on July 13, 2023
- Part of the results of this study will be presented at EARLI 2023 in Thessaloniki

**Author Contributions (CRediT Statement):**

Elisabeth Graf: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Visualization; Writing: original draft; Writing: review & editing. Lisa Stempfer: Writing: original draft; Writing: review & editing. Krista R. Muis: Supervision; Writing: review & editing. Thomas Goetz: Conceptualization; Supervision; Writing: review & editing;

**Note**

The study was pre-registered via [OSF](#), and data and scripts are available via [OSF](#). Part of the results were presented at EARLI 2023, Thessaloniki.

### Abstract

**Background:** Classroom emotions are major predictors of student learning and academic outcomes. Emotions might be of particular significance in civic education, where oftentimes highly controversial and heated debates take place.

**Aims:** We aimed to examine antecedents and effects of emotions in civic education through the lens of the control-value theory. Specifically, we investigated the classroom climate during discussions of political and social issues as an antecedent of students' enjoyment, shame, anxiety, and boredom, in addition to a possible mediation effect of these emotions on political knowledge and participation as core outcomes in this domain.

**Sample:** Participants were 1,117 students from vocational schools (grades 10–13).

**Methods:** Multilevel structural equation modeling was used for the analysis.

**Results:** We found a positive relation between an open classroom climate and enjoyment and negative relations with anxiety and boredom. No support was provided for the relation to shame. Enjoyment related positively, and all negative emotions (shame, anxiety, boredom) negatively to achievement on the knowledge test. All activating emotions (enjoyment, shame, anxiety) related positively to intended political participation. Furthermore, enjoyment mediated the association between classroom climate and intended political participation at the student level.

**Conclusions:** This study strongly supports the theoretical assumptions of the control-value theory. Pedagogically, the results imply that fostering a classroom context that is open to diverse opinions can prevent the experience of negative emotions and increase students' experience of enjoyment.

*Keywords:* emotions, classroom climate, civic education, political knowledge, political participation, control-value theory

## **Classroom emotions in civic education: a multilevel approach to antecedents and effects**

### **1. Introduction**

*“I am very interested in politics, but the lessons are designed to be deadly boring, and that is a great pity.”*

(vocational school student, age 18;

comment on the questionnaire)

Whether bored in class due to non-engaging activities, joyful about an innovative method of introducing a novel topic, or anxious about saying something wrong – as illustrated by the quote above – emotions are frequently experienced in the academic setting. They are essential factors contributing to students’ learning motivation and academic outcomes (Pekrun et al., 2011). According to the control-value theory (Pekrun, 2006), the classroom context is an important factor in determining the experience of classroom emotions. Studies have shown that teaching methods and students’ perceptions of them are related to students’ emotions experienced in the classroom (Fierro-Suero et al., 2021; Wang et al., 2021). Emotions, in turn, relate to learning processes and outcomes (e.g., Goetz et al., 2020). Although those relations have been demonstrated across academic domains (Becker et al., 2014), they have never been tested in the context of civic education, despite its specific relevance for emotional experiences. This domain is particularly intriguing due to the frequent prevalence of highly controversial and emotionally charged debates.

Research on learning processes in civic education is essential for democracies, as it aims to encourage students to identify areas of societal concern, debate possible solutions, and engage in civic and political participation (Journell & Halvorsen, in press). Concerning the antecedents of emotions, studies on civic education have emphasized the classroom climate during the discussions of political and social issues as an important contextual factor contributing to civic learning (Barrett & Pachi, 2019). Specifically, when students perceive the classroom as a safe space to disagree with peers and teachers and discuss controversial social and political issues, this fosters important outcomes of civic education, such as students’ political knowledge and intended political participation (e.g., Martens & Gainous, 2013). As discussions of political and social issues in class often involve current conflicting political

issues and controversial topics, they can get particularly emotional. The classroom climate might be critical in this context, which may predict which emotions are experienced and how they relate to civic education outcomes.

Based on assumptions of the control-value theory, the study's aims are twofold: First, with respect to the antecedents of emotions, we analyzed whether and how an open classroom climate is related to discrete emotions experienced in civic education. Second, concerning the effects of emotions, we tested how discrete emotions are related to (a) political knowledge and (b) intention to engage in political participation and whether there is an indirect effect between open classroom climate and outcomes of civic education via these discrete emotions. We focused on students of Austrian vocational schools who are taught civic education in a single subject. In contrast to academic track schools, vocational schools are attended by students part-time next to their vocational training. Though students at vocational schools are not representative of all adolescents at this age, they are specifically relevant for civic education as they are typically less engaged and have less access to civic education compared to students of other educational tracks (Sampermans et al., 2021; Schwarzer & Zeglovits, 2013). Therefore, information about how emotions contribute to political knowledge and participation in this target group is critical for political equality. Further, knowledge about contextual antecedents of emotions can reveal possibilities for civic education teachers to decrease negative while enhancing positive emotions and further leverage the accomplishment of civic education goals in their classrooms.

### **1.1. Antecedents and Effects of Achievement Emotions in Civic Education**

According to the control-value theory (Pekrun, 2006; Pekrun et al., 2023), which aims to explain antecedents and effects of discrete emotions experienced in achievement situations, students' cognitive appraisals are central proximal antecedents of emotions experienced in the classroom. Specifically, students' perceived control (e.g., their perceived ability to master a learning task) and the value of the learning activity or outcome (e.g., the importance of the learning task) are associated with emotions experienced in this context. Further, distal antecedents located in the social environment, such as teacher support, instructional quality, cultural values of the relevance of achievement, and the performance level of the class, are central predictors of students' emotions (e.g., Bieg et al., 2017; Simonton et al., 2017). Especially in civic education, discussion-focused and socially interactive teaching approaches are common and helpful in promoting democratic competencies (Teegelbeckers et al., 2023). While dealing with inherently controversial and arousing topics, this pedagogical style fosters

a distinctive classroom climate which might be essential for emotions experienced in civic education.

### **1.1.1. Classroom Climate as an Antecedent of Emotions in Civic Education**

The classroom context is, first and foremost, a social context characterized by interpersonal interactions (Pianta & Hamre, 2009) between students and teachers and among peers. The quality of these social interactions shapes a specific *classroom climate*. Among other factors, Hamre and Pianta (2001) characterize a positive classroom climate by teachers' regard for students' perspectives and their encouragement of students' in-class participation, as well as sensitivity and interpersonal warmth (i.e., friendliness and respect). Importantly, and in line with the control-value theory, Klieme et al. (2009) emphasize emotions and affect as mediators between the classroom climate and learning outcomes. Indeed, in physical education, three facets of classroom climate (satisfaction with classroom climate, climate among peers, and student-teacher climate) were positively related to student enjoyment and pride and negatively related to boredom, hopelessness, anger, and anxiety (Fierro-Suero et al., 2021). Classroom climate, therefore, seems to be a relevant contextual antecedent of emotions experienced in the classroom.

Similar to Hamre and Pianta's (2001) general definition of a positive classroom climate, open classroom climate, often also termed "open classroom discussions", refers to the social environment, specifically when students discuss political and social issues in class. The openness thereby describes the extent to which students are encouraged to bring in political topics, express their own, and respect others' opinions, and discuss social and political issues from diverse viewpoints (Campbell, 2019). Throughout the literature on civic education, the significance of an open classroom climate is the most consistent theme (Campbell, 2019), showing positive relations with civic knowledge (Campbell, 2008; Persson, 2015; Sampermans et al., 2021), political interest (Kahne et al., 2013), political efficacy (Manganelli et al., 2014), critical consciousness (Rapa et al., 2022), political participation (Martens & Gainous, 2013; Quintelier & Hooghe, 2013), and political trust (Dassonneville et al., 2012). More generally, a systematic review by Geboers (2013) summarizes the broad evidence for the effectiveness of an open and democratic classroom climate for students' democratic development. However, he noted many null findings regarding the relation between pedagogical climate and civic knowledge, attitudes, and behavior.

### **1.1.2. Emotions and Outcomes of Civic Education: Participation and Knowledge**

Further, the control-value theory includes assumptions about association between emotions and academic outcomes (Pekrun, 2006; Pekrun et al., 2023). Depending on the valence (e.g., positive versus negative) and arousal (activating versus deactivating) of emotions, emotions are thereby assumed to relate positively (e.g., positive-activating emotions like enjoyment) or negatively (e.g., negative-deactivating emotions like boredom) to learning and learning outcomes. This is in line with recent research on civic education. For example, while enjoyment and curiosity positively relate to students' engagement, motivation, and knowledge, boredom has the opposite association (Graf et al., 2023). Further, students' feelings of fun about politics are associated with students' initiation of civic and political discussions in class (Bayram Özdemir et al., 2016). Thus, emotions can be assumed to mediate the associations between distal antecedents (e.g., the classroom climate) and outcomes of civic education.

Whereas similar associations have been shown in the context of foreign language learning (Wang et al., 2021), little is known for the context of civic education. Current evidence revealed students' efficacy beliefs as a mediator between open classroom climate and civic learning (Bayram Özdemir et al., 2016; Manganello et al., 2015), which is also known as a proximal antecedent of emotions experienced in class (Graf et al., 2023). An open classroom climate might relate positively to students' enjoyment while discussing political and social issues, which has been shown to relate positively to students' willingness to communicate in other domains (Wang et al., 2021). Consequently, students might bring up issues to discuss themselves, which can foster their political knowledge and motivation to participate. On the other hand, a classroom climate that restricts what can be said might create feelings of shame about saying something wrong or anxiety about openly expressing one's opinion. Finally, boredom might be experienced if the classroom climate does not create a lively discussion, including multiple perspectives, potentially discouraging students from learning and participating in politics in the future.

## **1.2. Current study**

In this study, we aimed to investigate antecedents and effects of emotions experienced in civic education classes, focusing on the classroom climate as potential distal antecedent and political knowledge and participation as outcome variables of emotions experienced in this context. We focused on enjoyment, shame, anxiety, and boredom to include emotions of different valence and activation levels (Pekrun, 2006). We hypothesized that an open classroom climate is positively associated with enjoyment (Hypothesis 1) and negatively associated with

shame, anxiety, and boredom experienced in civic education (Hypothesis 2). Further, we hypothesized that an open classroom climate is indirectly associated with knowledge and intended participation through emotions (positively through enjoyment, negatively through shame, anxiety, and boredom; Hypothesis 3). We test these hypotheses based on survey data from students in vocational schools in Austria who are taught civic education in a single subject<sup>9</sup>. This target group is often understudied and overlooked in educational psychology but specifically relevant due to disadvantages and underrepresentation in the political context.

## 2. Methods

We used an online questionnaire with self-report scales and a political knowledge test to assess our variables of interest. Schools were selected using a random sample of all schools in three Austrian regions, stratified by region. After obtaining approval from the university's ethical review board (Reference-NR: 00624) and in agreement with regional educational offices and school principles, data were collected mainly during regular lessons in class in cooperation with teachers during the summer terms of 2021 and 2022. The mean duration to fill in the full questionnaire was 22.5 minutes. From 1,321 students who initially started the questionnaire, 159 (12%) were excluded based on pre-defined criteria (high completion speed and self-reported dishonesty; see pre-registration).

### 2.1. Participants

The sample included 1,162 students from 19 schools and 89 classes with a mean age of 18.26 (SD = 2.57). Table 1 displays the socio-demographic characteristics of the sample.

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<sup>9</sup> Initially, we also planned to test the hypotheses in a second sample for academic track schools, but the sample size of available classes ( $N = 34$ ) turned out to be too small for the planned analysis (Preacher et al., 2010), including very low intra-class correlation for some of the variables (e.g.,  $ICC = 0.006$  for shame), resulting in convergence problems and unreliable estimates with incredibly huge confidence intervals (e.g.,  $[-60,000, 57,000]$ ). Additionally, students in academic track school types are not taught civic education in a single subject but rather cross-contextually. Therefore, students within one class might think about different contexts and situations when asked about classroom-level variables (e.g., different teachers).

**Table 1***Sociodemographic Characteristics Statistics of Participating Students*

| Sociodemographic Characteristics                   | <i>n</i> | %  |
|----------------------------------------------------|----------|----|
| <i>Gender</i>                                      |          |    |
| Male                                               | 547      | 48 |
| Female                                             | 573      | 51 |
| Diverse                                            | 13       | 1  |
| <i>Grade</i>                                       |          |    |
| 10th grade                                         | 510      | 45 |
| 11th grade                                         | 287      | 25 |
| 12th grade                                         | 307      | 27 |
| 13th grade                                         | 35       | 3  |
| <i>Residence</i>                                   |          |    |
| Rural                                              | 519      | 45 |
| Small town                                         | 124      | 11 |
| Small city                                         | 160      | 14 |
| Urban                                              | 183      | 16 |
| Suburban                                           | 155      | 14 |
| <i>Language spoken at home</i>                     |          |    |
| Non-German                                         | 115      | 10 |
| German                                             | 1030     | 90 |
| <i>Migration background</i>                        |          |    |
| At least one parent born in Austria                | 804      | 72 |
| Students born in country but parent(s) born abroad | 197      | 18 |
| Students and parent(s) born abroad                 | 122      | 11 |
| <i>Citizenship</i>                                 |          |    |
| Non-Austrian Citizenship                           | 182      | 16 |
| Austrian Citizenship                               | 957      | 84 |
| <i>Eligibility to vote</i>                         |          |    |
| Not eligible                                       | 488      | 47 |
| Eligible                                           | 555      | 53 |

Note. *N* = 1,162.

## 2.2. Measures

### 2.2.1. Open Classroom Climate

We used the scale on students' perception of openness in classroom discussions from the International Civic and Citizenship Education Study (Köhler et al., 2016) to measure open classroom climate. In this scale, students are asked how often situations occur while discussing political and social issues in class (*"When discussing political or social issues during regular lessons, how often do the following things happen?"*), with four items relating to teachers' behaviours (e.g., *"Teachers encourage students to make up their own minds"*) and two items relating to peers' behavior (e.g., *"Students express opinions in class even when their opinions are different from most of the other students."*). The items are rated on a four-point Likert scale from 1 (*never*) to 4 (*often*). The mean and standard deviations, intra-class correlation (ICC), reliability of the aggregated variables (ICC2), and Cronbach's Alpha of the manifest scale scores are displayed in Table 2.

### 2.2.2. Emotions

An adaption of the short form of the Achievement Emotions Questionnaire (AEQ-S; Bieleke et al., 2021) was used to measure enjoyment, anxiety, shame, and boredom in civic education classes. Students were asked to think of a typical civic education class before responding to the items (e.g., *"I enjoy civic education class"*). Each emotion was measured with four items, which were rated on a five-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

### 2.2.3. Political Knowledge Test

To measure political knowledge, we combined items about political structures (e.g., *"What is the percentage of votes a political party requires to enter the National Council? 3%, 4%, or 5%?"*) and politicians (e.g., *"Which party do the following politicians belong to?"*) from the Austrian national election study (Kritzing et al., 2020) with items about policies (e.g., *"What is regulated at the European level by the so-called 'Dublin Procedure'?"*; Graf et al., 2023), resulting overall in 15 items (see supplemental material). Responses were recoded to dummy variables indicating correct (= 1) and wrong answers or don't know responses (= 0).

### 2.2.4. Intention to Political Participation

For political participation, we used seven items from the international civic and citizenship study on students' expected participation in legal political activities (Köhler et al., 2016). The items refer to different activities of political participation, such as taking part in a peaceful march, contacting a member of parliament, or collecting signatures for a petition. Students were asked to rate the items on a four-point Likert scale on how likely they will participate in the activities in the future (e.g., "*Collect signatures for a petition*"), ranging from 1 (*I would certainly not do this*) to 4 (*I would certainly do this*).

### 2.2.5. Controls

In our robustness checks, we include two control variables: frequency of political discussions and topic emotions. First, a dummy variable for the frequency of discussions (0 = less than at least once a week, 1 = at least once a week) was used to separate the effect of the classroom climate from the effects the frequency of discussions might have. Second, topic emotions – meaning emotions elicited by the topic itself – are specifically relevant in subjects dealing with controversial issues and might independently contribute to learning (Sinatra et al., 2014). Students were introduced to report how intensely they experience emotions when thinking about political and social topics (e.g., "*enthusiastic*" or "*bored*"). For each emotion, we use a one-item measure of the same or most similar emotion from the Epistemically-Related Emotions Scale – Short Version (EES-Short; Muis et al., 2018; Vogl et al., 2018; items used: enthusiasm, confusion, anxiety, and boredom).

## 2.3. Analysis

The main analysis was conducted in Mplus, Version 8.5 (Muthén & Muthén, 1998). The predictor variable, open classroom climate, was located at the classroom level. Given that the school-level explained little variance (between 0% [boredom] and 0.05 % [knowledge]), we used two-level models in our analysis, with students at level 1 nested in classes at level 2. As a first step, we estimated a two-level confirmatory factor analysis to evaluate the measurement model of each of the latent variables, holding loadings equal across levels. Second, we used doubly-latent multilevel SEM (ML-SEM; Preacher et al., 2010) to simultaneously analyze the proposed relations and mediation on student (= within) and classroom (= between) levels. Using latent variable modeling on both levels has the advantage that measurement error at the individual level and sampling error at the group level can be taken into account (Lüdtke et al., 2011), and allows us to clearly separate the variance for each

level and avoid conflation in the estimation of indirect effects (Preacher et al., 2010). We evaluated the model fit based on mediation models including fixed slopes, and used three item parcels for the knowledge scale to decrease complexity.

The hypotheses were tested based on models including random slopes for the within-level paths between latent variables, thereby allowing the slopes from open classroom climate to emotions (path a) and the outcome variable (path c') and the slopes from emotions to the outcome variable (path b) to vary between classrooms. These random slopes are usually recommended in multilevel modeling as misspecifications of a random part as fixed results in a smaller standard error and a higher risk of Type 1 error for these effects (LaHuis et al., 2020). To estimate the models with random slopes, we utilized a Bayesian estimator with uninformative priors using a Markov Chain Monte Carlo (MCMC) simulation with a minimum of 10.000 iterations, eight chains, and 0.01 as a convergence criterion, which was suggested by Hox et al. (2012) to reduce bias in residual variances at the group level. To check for convergence, we manually evaluated posterior parameter trace plots. For a robustness check, we added the frequency of discussions and topic emotions as a control variable at the within-level.

### **3. Results**

#### **3.1. Missing Data and Descriptive Statistics**

Missing data (10.34 %) were treated using full information maximum likelihood estimation (FIML); only participants with missing values on all variables were excluded. Descriptive statistics and bivariate correlations are displayed in Table 2 and Table 3, respectively. The ICC1 contains the proportion of variance explained by the grouping in classes, which ranges from 0.032 (i.e., almost no variation between classes) to 0.148.

#### **3.2. Measurement Models**

As a first step, we calculated multilevel confirmatory factor analysis for each of the included variables and samples (see Table 4). The majority of our models revealed a very good model fit at the within-level, with values above the cut-off values suggested by Hu and Bentler (CFI > .95, TLI > .95, RMSEA < .06, SRMR < .08; 1999). The model fit of the participation and knowledge scales showed an acceptable model fit, according to Little (2013). While we found no substantial decrease of model fit indices in constraining loadings to be equal across models, the model fit for the participation scale decreased when including equality constraints. To check whether this influences our results, we repeated our analysis with and without

equality constraints for this scale. At the between level, model fit was low, most likely due to the low level 2 variance of several items.

**Table 2**

*Descriptive Statistics*

| Model                  |  | <i>M</i> | <i>SD</i> | ICC1 | ICC2 | $\alpha$ | ICC1* |
|------------------------|--|----------|-----------|------|------|----------|-------|
| Open Classroom Climate |  | 2.97     | 0.61      | .110 | .574 | .79      | .136  |
| Enjoyment              |  | 2.68     | 0.98      | .032 | .281 | .84      | .031  |
| Shame                  |  | 1.99     | 0.92      | .058 | .418 | .82      | .063  |
| Anxiety                |  | 1.88     | 0.88      | .085 | .519 | .81      | .098  |
| Boredom                |  | 2.58     | 1.08      | .076 | .489 | .84      | .077  |
| Knowledge              |  | 6.22     | 3.11      | .148 | .661 | .84      | .197  |
| Participation          |  | 1.99     | 0.71      | .035 | .285 | .87      | .039  |

*Note.* *M*, *SD*, and Cronbach's alpha are calculated from manifest scale scores. ICC1\* is calculated manually based on estimated variances from the ML-CFA (see Table ). Open Classroom Climate and participation are measured on a 4-point scale, emotions on a 5-point scale, and knowledge scores could range from 0 to 15.

**Table 3**

*Manifest Bivariate Correlations*

|                           | 1       | 2       | 3       | 4       | 5       | 6    |
|---------------------------|---------|---------|---------|---------|---------|------|
| 1. Open Classroom Climate |         |         |         |         |         |      |
| 2. Enjoyment              | .20***  |         |         |         |         |      |
| 3. Shame                  | -.06    | .16***  |         |         |         |      |
| 4. Anxiety                | -.07*   | .19***  | .77***  |         |         |      |
| 5. Boredom                | -.17*** | -.47*** | .32***  | .31***  |         |      |
| 6. Knowledge              | .05     | .08**   | -.22*** | -.25*** | -.11*** |      |
| 7. Participation          | .08*    | .40***  | .17***  | .20***  | -.14*** | .08* |

*Note.* *N* = 880 – 1,048; Pairwise deletion was used to handle missing values

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

**Table 4**

*Multilevel Measurement Models and Test for Measurement Invariance Across Levels for Each Variable*

| Model                  | Description                      | $\chi^2$ | Df  | CFI   | TLI   | RMSEA | SRMR |      |
|------------------------|----------------------------------|----------|-----|-------|-------|-------|------|------|
|                        |                                  |          |     |       |       |       | W    | B    |
| Open Classroom Climate | ML-CFA, free loadings            | 60.648   | 19  | 0.960 | 0.937 | .045  | .034 | .094 |
|                        | ML-CFA, invariance across levels | 65.164   | 24  | 0.960 | 0.950 | .040  | .035 | .158 |
| Enjoyment              | ML-CFA, free loadings            | 29.717   | 4   | 0.983 | 0.949 | .078  | .023 | .157 |
|                        | ML-CFA, invariance across levels | 38.626   | 8   | 0.980 | 0.970 | .060  | .024 | .263 |
| Shame                  | ML-CFA, free loadings            | 42.450   | 5   | 0.966 | 0.918 | .084  | .032 | .072 |
|                        | ML-CFA, invariance across levels | 41.002   | 7   | 0.969 | 0.947 | .068  | .031 | .086 |
| Anxiety                | ML-CFA, free loadings            | 3.672    | 5   | 1.000 | 1.000 | .000  | .005 | .026 |
|                        | ML-CFA, invariance across levels | 5.028    | 8   | 1.000 | 1.000 | .000  | .006 | .067 |
| Boredom                | ML-CFA, free loadings            | 54.754   | 4   | 0.975 | 0.924 | .110  | .031 | .024 |
|                        | ML-CFA, invariance across levels | 73.138   | 7   | 0.967 | 0.944 | .095  | .032 | .158 |
| Knowledge              | ML-CFA, free loadings            | 381.511  | 178 | 0.879 | 0.857 | .034  | .100 | .233 |
|                        | ML-CFA, invariance across levels | 329.315  | 195 | 0.920 | 0.914 | .026  | .102 | .302 |
| Participation          | ML-CFA, free loadings            | 152.029  | 28  | 0.953 | 0.930 | .066  | .044 | .619 |
|                        | ML-CFA, invariance across levels | 239.535  | 34  | 0.923 | 0.904 | .077  | .043 | .244 |

$N = 1,009 - 1,094$ ;

### 3.3. Political Knowledge

As displayed in Table 5, models on political knowledge revealed a good overall fit but a poor fit for the between-SRMR. When inspecting the parameter trace plots, some paths at the between-level did not converge, most likely due to low variance on level 2. Therefore, we mainly focus on the interpretation of the within-level models and only discuss between-level paths which indicate convergence; results for the between-level should still be interpreted with caution. In the figures, standardizes estimates are reported.

Figure 1 displays the estimated paths of the model. We expected positive associations between open classroom climate and enjoyment and negative associations with shame, anxiety, and boredom. Our analysis revealed a positive relation between open classroom climate and enjoyment both on the within- and between-level. This means that the more open a classroom climate is experienced relative to one's classmates, the more enjoyment is experienced (= within level,  $R^2_w = .086$ ), and the higher the mean level of the open classroom climate of a class,

the higher the mean level of enjoyment experienced in that class (= between level;  $R^2_b = .840$ ). Regarding hypothesis 2, we did not find an association between open classroom climate and shame ( $R^2_w = .053$ ,  $R^2_b = .035$ ), but found significant negative associations with anxiety at the within level ( $R^2_w = .076$ ,  $R^2_b = .025$ ) and boredom at both levels ( $R^2_w = .067$ ,  $R^2_b = .367$ ).

**Table 5**

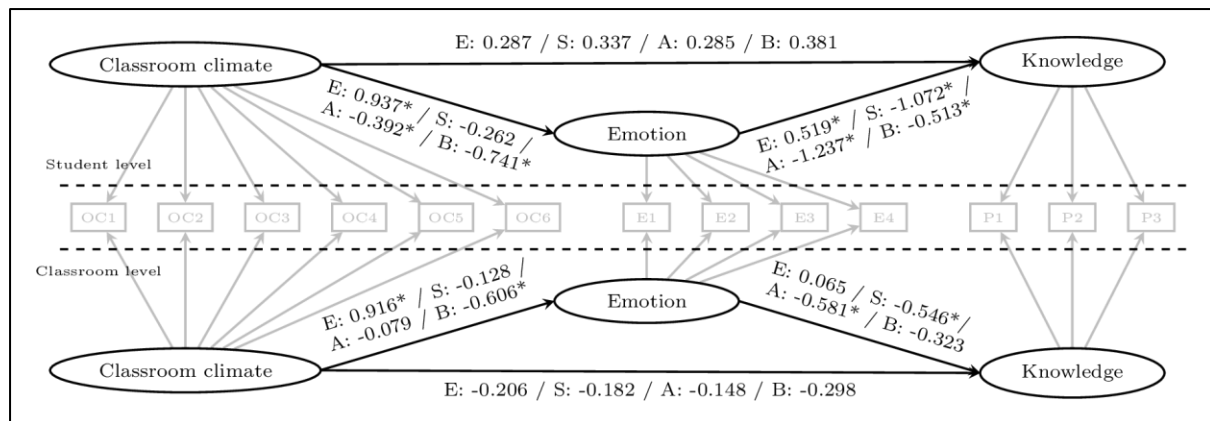
*Model Fit of Doubly Latent ML-Mediation Models on Knowledge (Without Random Slopes)*

| Model     | $\chi^2$ | df  | CFI   | TLI   | RMSEA | SRMR |      |
|-----------|----------|-----|-------|-------|-------|------|------|
|           |          |     |       |       |       | W    | B    |
| Enjoyment | 323.970  | 135 | 0.948 | 0.940 | .035  | .041 | .195 |
| Shame     | 315.125  | 135 | 0.948 | 0.940 | .035  | .037 | .183 |
| Anxiety   | 244.587  | 137 | 0.965 | 0.961 | .027  | .038 | .164 |
| Boredom   | 274.156  | 136 | 0.962 | 0.956 | .030  | .031 | .166 |

Note.  $N = 1,117$  (90 classes)

**Figure 1**

*Multilevel Mediation Model with Random Slopes on Knowledge*



Note. E = Enjoyment, S = Shame, A = Anxiety, B = Boredom.

\* signals posterior predictive  $p$ -value, indicating that the population parameter is included in a 95% credibility interval (Hox et al., 2012)

As for the relation between emotions and outcomes, enjoyment related positively to political knowledge ( $R^2_w = .147$ ), and all negative emotions (shame:  $R^2_w = .197$ , anxiety:  $R^2_w = .211$ , and boredom:  $R^2_w = .159$ ) revealed a negative path to political knowledge at the within-level (see Figure 1). However, the effect of classroom climate on political knowledge was not significantly mediated via emotions (see Table 6).

**Table 6***Estimated Indirect Effects and Posterior SD from Multilevel SEM on Knowledge*

| Emotion   | <i>Within</i> |       |                 | <i>Between</i> |        |                 |
|-----------|---------------|-------|-----------------|----------------|--------|-----------------|
|           | $\beta$       | SD    | CI              | $\beta$        | SD     | CI              |
| Enjoyment | 0.013         | 0.009 | [-0.003, 0.032] | 0.059          | 88.763 | [-8.859, 5.872] |
| Shame     | 0.002         | 0.009 | [-0.017, 0.019] | 0.061          | 0.084  | [-0.075, 0.265] |
| Anxiety   | 0.008         | 0.011 | [-0.012, 0.030] | 0.066          | 0.085  | [-0.080, 0.258] |
| Boredom   | 0.004         | 0.008 | [-0.013, 0.021] | 0.135          | 0.922  | [-0.094, 0.786] |

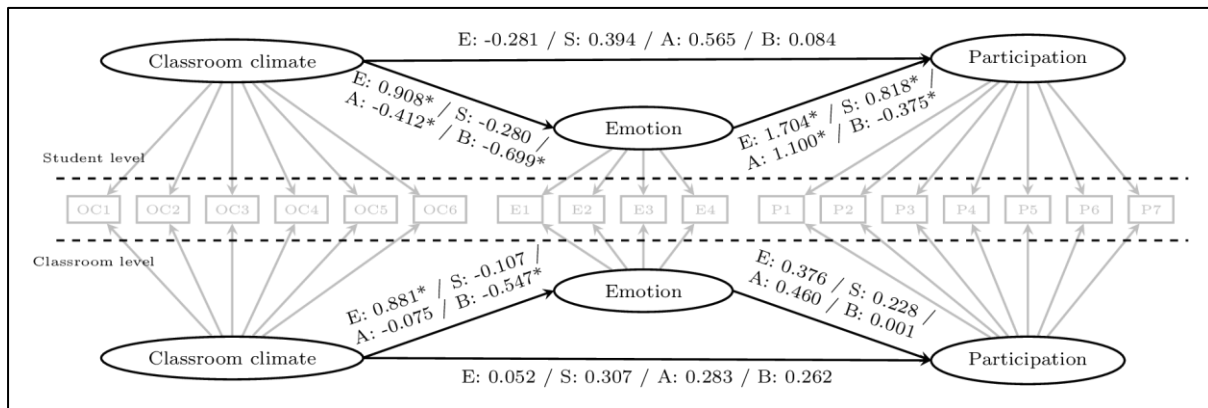
*Note.*  $N = 1,117$  (90 classes)**3.4. Political Participation**

The model fit of the mediation models on intended political participation was acceptable (see Table 7). Regarding hypothesis 3, we found a significant positive indirect effect in the model of enjoyment ( $R^2_w = .266$ ) and a significant negative indirect effect in the model of anxiety ( $R^2_w = .133$ ) at the within level (see Table 8). The latter results from diverging directions of paths a and b: while open classroom climate was associated negatively with anxiety, anxiety was associated positively with the intention to participate. Similarly, shame revealed a positive association with participation ( $R^2_w = .131$ ), and boredom related negatively to participation ( $R^2_w = .125$ ).

**Table 7***Model Fit of Doubly Latent ML-Mediation Models on Participation (Without Random Slopes)*

| Model     | $\chi^2$ | Df  | CFI   | TLI   | RMS<br>EA | SRMR |      |
|-----------|----------|-----|-------|-------|-----------|------|------|
|           |          |     |       |       |           | W    | B    |
| Enjoyment | 829.697  | 248 | 0.916 | 0.908 | .046      | .048 | .216 |
| Shame     | 764.609  | 247 | 0.921 | 0.912 | .043      | .048 | .223 |
| Anxiety   | 772.595  | 247 | 0.919 | 0.911 | .044      | .052 | .219 |
| Boredom   | 715.976  | 247 | 0.932 | 0.925 | .041      | .043 | .198 |

*Note.*  $N = 1,117$  (90 classes)

**Figure 2***Multilevel Mediation Models with Random Slopes on Participation*

Note. E = Enjoyment, S = Shame, A = Anxiety, B = Boredom.

\* signals posterior predictive  $p$ -value, indicating that the population parameter is included in a 95% credibility interval (Hox et al., 2012)

**Table 8***Estimated Indirect Effects and Posterior SD from Multilevel SEM on Participation*

| Emotion   | Within  |       |                  | Between |       |                 |
|-----------|---------|-------|------------------|---------|-------|-----------------|
|           | $\beta$ | SD    | CI               | $\beta$ | SD    | CI              |
| Enjoyment | 0.137   | 0.041 | [0.069, 0.228]   | 0.547   | 6.720 | [-3.567, 4.310] |
| Shame     | -0.038  | 0.028 | [-.100, 0.012]   | -0.046  | 0.108 | [-0.337, 0.098] |
| Anxiety   | -0.068  | 0.032 | [-0.140, -0.016] | -0.105  | 0.132 | [-0.414, 0.113] |
| Boredom   | 0.029   | 0.029 | [-0.025, 0.091]  | 0.061   | 0.250 | [-0.415, 0.521] |

Note.  $N = 1,117$  (90 classes)

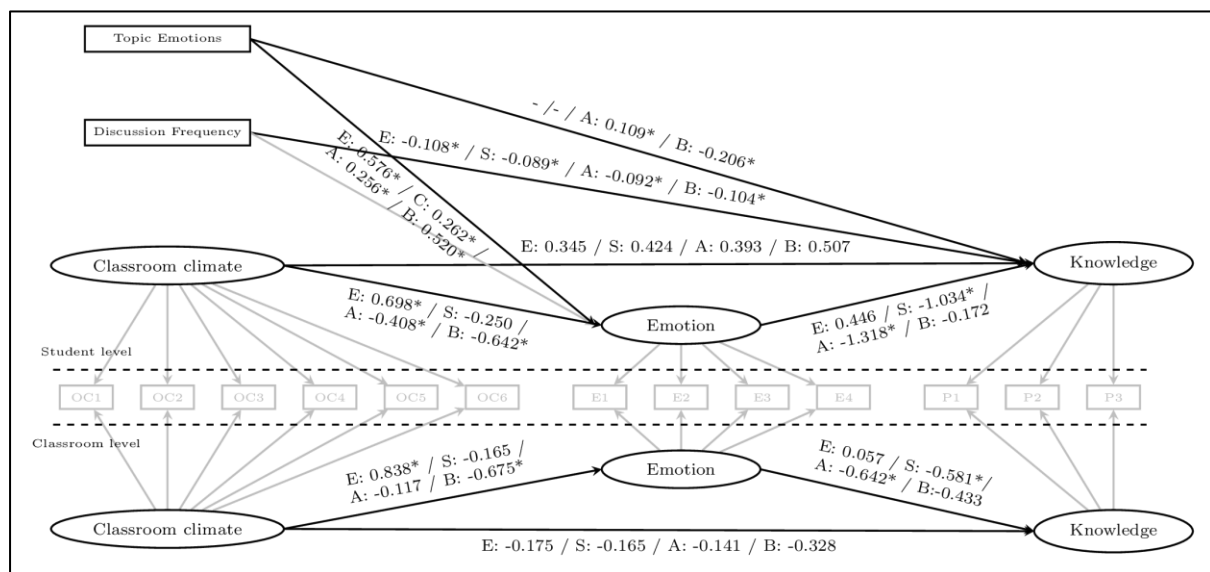
**3.5. Robustness Checks**

Reported results on associations between classroom climate and emotions and indirect effects hold when including topic emotions and the frequency of discussions in the model (see Figure 3 and Figure 4 and tables in the supplemental material) and when removing equality constraints across levels for the participation scale (see supplemental material). All topic emotions were related positively to their respective classroom emotion. The frequency of discussions was negatively related to political knowledge and not significantly related to political participation (except in the model for anxiety). Regarding paths from topic emotions

to outcomes, anxiety was positively related to knowledge and intended participation, and boredom was negatively related to both outcome variables. Enthusiasm and confusion predicted intention to participate, the former with a positive and the latter with a negative path. The paths from class-related boredom to the outcome variables are in contrast to the models above, not significant if including these control variables. The same applies to the path from class-related enjoyment to knowledge.

**Figure 3**

*Multilevel-SEM on Knowledge Including Control Variables*



*Note.* E = Enjoyment, S = Shame, A = Anxiety, B = Boredom. Paths from topic emotions: E = Enthusiasm, C = Confusion;

\* signals posterior predictive  $p$ -value, indicating that the population parameter is included in a 95% credibility interval (Hox et al., 2012)

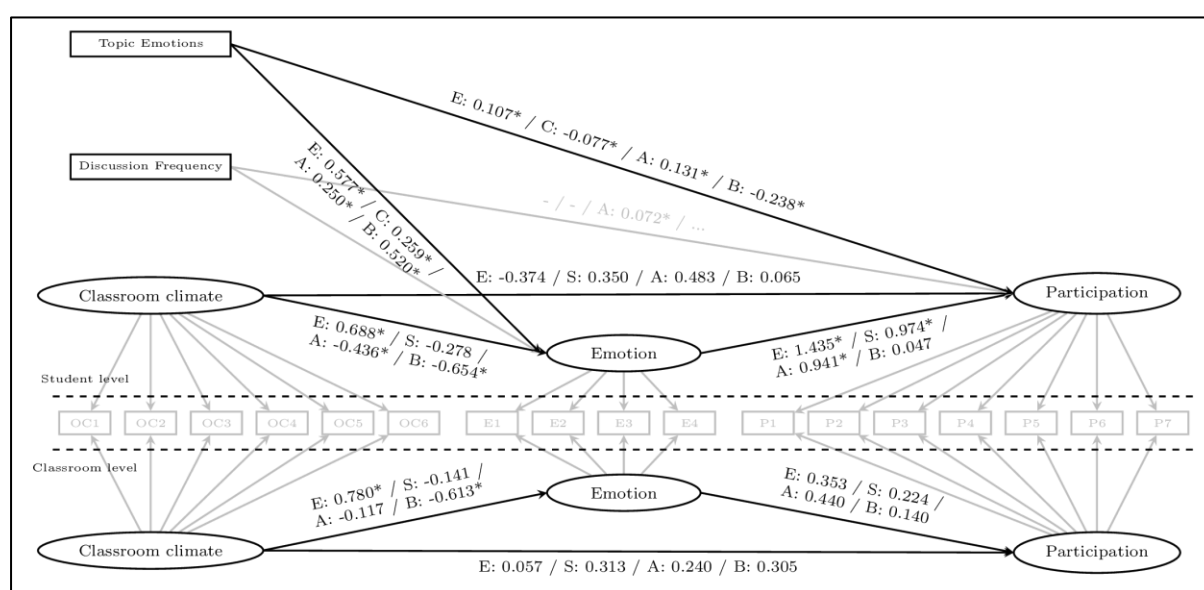
## 5. Discussion

Emotions accompany the students' everyday experiences in the classroom and are important predictors of learning outcomes. For the context of civic education, some initial evidence on proximal antecedents and associations of emotions to students' motivation, engagement, and knowledge exists (Graf et al., 2023), but less is known about distal antecedents and other outcomes, such as political participation. Using multilevel structural equation modeling, we tested how an open classroom climate relates to enjoyment, shame, anxiety, and boredom and whether there is an indirect effect through these emotions on political knowledge and intention to participate in politics. At the individual level, we found strong

support for positive relations between an open classroom climate and enjoyment and for negative relations with anxiety and boredom, but no support for a relation with shame. At the classroom level, we found these effects for enjoyment and boredom. The results also hold when taking students' topic emotions into account. Thus, emotions experienced in civic education classes do not just mirror pre-existing dispositions towards political and social topics but are also associated with the perceived social context when these topics are discussed.

**Figure 4**

*Multilevel SEM on Intention to Participate Including Control Variables*



*Note.* E = Enjoyment, S = Shame, A = Anxiety, B = Boredom. Paths from topic emotions: E = Enthusiasm, C = Confusion;

\* signals posterior predictive  $p$ -value, indicating that the population parameter is included in a 95% credibility interval (Hox et al., 2012)

Additionally, all emotions experienced in civic education showed significant paths to included outcome variables, underlining the importance of emotions in this context. Knowledge was predicted positively by enjoyment and negatively by shame, anxiety, and boredom. Participation, in contrast, was positively related to enjoyment, shame, and anxiety and negatively to boredom. Note that, however, for boredom, the associations to the outcomes seem to be driven by topic emotions, as the results did not hold in the robustness check. Further, we found support for the expected indirect effects on outcomes of civic learning in the model on enjoyment and intention to participate at the individual level. Relative to the classroom

means, the more open a classroom climate is perceived, the more enjoyment is experienced, and the more students report participating in politics in the future. This mediation also holds when including the frequency of discussions and topic emotions as control variables. For political knowledge, other aspects of instructional quality (e.g., cognitive activation; Alscher et al., 2022) might be more decisive, and future studies should investigate their relation to emotions and outcomes like civic knowledge.

Surprisingly, we found a significant negative indirect effect in the model including anxiety as a mediator and participation as the outcome. Anxiety experienced in civic education related positively to intended participation, revealing a competitive mediation (Zhao et al., 2010). That is, the more students perceived an open classroom climate, the less anxiety they experienced (negative path), which also related to less motivation to participate in politics in the future (positive path). In contrast, classroom anxiety was negatively related to political knowledge, whereas we found positive paths from topic anxiety to intended participation and knowledge for models with control variables included. Together, these results highlight two important aspects regarding the functioning of emotions in the context of civic learning. First, the relevance to distinguish the same emotion by its object focus (Muis et al., 2018; Sinatra et al., 2014) and the differential effects related to it. Whereas anxiety triggered by the topic itself can activate and motivate learning (Valentino et al., 2008) and thus relate to higher achievement, the anxiety experienced in the classroom might show detrimental effects on knowledge due to increasing task-irrelevant thinking (Pekrun et al., 2023).

Second, the results reveal differential effects of anxiety depending on the outcome considered. This is in line with prior studies showing that specifically for negative activating emotions such as anxiety, anger, and shame, no uniform pattern regarding relations to learning processes exists, for example, as shown by differences between relations to intrinsic and extrinsic motivation (Graf et al., 2023). As we found a positive path from classroom anxiety and shame to participation and a negative path to political knowledge, it might be that negative-activating emotions motivate behavioral outcomes of civic education rather than cognitive outcomes. This positive association of anxiety with participation is also in line with studies on political engagement, identifying negative-activating emotions like fear, anger, and concern as motivators for low-effort political action (Barrett & Pachi, 2019; Renström & Bäck, 2022). Shame is also classified as a negative-activating emotion, including the potential to motivate and activate coping behavior (Holodynski & Kronast, 2009). Thus, political action itself could

be a coping mechanism used to regulate negative emotions (Ford & Feinberg, 2020) activated by anxiety and shame experienced during civic education.

Finally, we expected a negative relation between an open classroom climate and shame, as in a less open climate, students might experience shame about saying something wrong. Though the direction of the path between open classroom climate and shame was as expected, its size was only half of the one of anxiety and was not significant. Shame is mainly characterized as a social emotion (Holodynski & Kronast, 2009) and, therefore, could be influenced by students' and their peers' opinions on the topic. While an open classroom climate might reduce shame for students who would otherwise not speak up, it might increase shame for students who feel pressured to say something due to being encouraged by an open classroom climate. The two opposing effects together might result in non-significant relations shown in our results.

### **5.1. Limitations**

One limitation of the present study is its' observational and cross-sectional character. Implementation studies on "openness" in civic education that allow causal claims are widely missing (Teegelbeckers et al., 2023). Future studies could combine randomized controlled implementation studies with an instrumental variable approach (Cunningham, 2021) to identify possible causal effects involved. Our estimated models are additionally limited by the relatively low model fits for the between-level models, which is also visible in some convergence problems of paths leading to the outcome variables, and partly limits our interpretation of the classroom-level effects. Relatedly, we found some constraints in multilevel measurement models, specifically differences between levels in loadings of items of the participation scale. Both might be explained by the low variance of some variables and items. While the missing invariance across levels did not affect our results, future studies using multilevel modeling are encouraged to evaluate scales using multilevel measurement models in more detail.

### **5.2. Implications for Future Studies and Practice**

Surprisingly, we did not find an association between an open classroom climate and political knowledge. Though testing for mediation still makes sense even if the initial path is not significant (Zhao et al., 2010), it might explain why we could not find indirect effects through emotions for this outcome variable. Although there is broad support for this relation in the literature, there are also several null findings reported (Geboers et al., 2013). The relation between classroom climate and political knowledge also seemed to be missing in prior studies

using data from Austria (Lin, 2014). In a study based on 38 countries, Lin (2014) found a significant relation between classroom climate and political knowledge for 25 out of 38 countries, arguing that an open classroom climate might be particularly important for schools in countries with lower socio-economic conditions. However, this is not fully convincing, as they also found these (and comparably stronger) effects in several countries with high socioeconomic backgrounds (e.g., England, the Netherlands). Future studies could investigate how these discrepancies can be explained.

An intriguing finding of our analysis was the high amount of variation in the perceived climate within classes. Still, it seems that the variance explained between classes (ICC1) is similar to climate variables used in other studies (often  $<.10$ ; rarely  $>.30$ ; Marsh et al., 2012). Low correlations between students' perceptions of the same classroom were also found in prior studies, evoking "skeptics that the results of classroom climate are anything more than a self-reinforcing perception of young people who are already engaged" (Campbell, 2019, p. 37). This opens up the question of what can explain the variance in perception of classroom climate within classes. Students' relative position in a classroom (e.g., representing a minority opinion) might be particularly important in the context of civic education. Whether and how individual characteristics can explain the variation within classrooms implies a need for a person-centered, social network (Grunspan et al., 2014), or situative approaches (Nolen, 2024) to deepen our understanding of the role of classroom climate in civic education.

Regarding our target population of students in vocational schools, we aimed for representativeness by drawing a random sample of schools from different regions, thereby including urban and rural areas. Though we are confident that results also apply to other countries implementing civic education as a single subject, future studies are encouraged to replicate and broaden our findings by investigating school types with different approaches to civic education and countries that differ in their political context.

Building on the theoretical approach of control-value theory, classroom context – and specifically, in this study, the classroom climate – is an important antecedent of academic emotions. This is supported by our results on enjoyment, anxiety, and boredom. The results reveal possibilities for civic education teachers to co-create a classroom climate that supports a positive emotional experience in class. Schools and teachers can try to improve the democratic climate during discussions by discussing current events (Siegel-Stechler, 2021), fostering student-teacher relationships, and students' collective efficacy for changes at schools (Maurissen et al., 2018). Additionally, our results extend prior evidence on the importance of

emotions for civic learning (Graf et al., 2023) to the outcome of intended political participation. Being aware of the functioning of these emotions and how they, at times, can differently relate to outcomes of learning could help civic education teachers to constructively deal with students' emotions in this context.

### 5.3. Conclusion

The current study provides clear evidence of associations between the open classroom climate as a distal antecedent of emotions experienced in civic education, specifically enjoyment, anxiety, and boredom. Emotions are further a relevant predictor for civic learning, with activating emotions (enjoyment, shame, anxiety) relating positively to political participation and enjoyment relating positively to knowledge. We found an expected indirect effect of an open classroom climate on participation through enjoyment. Other indirect effects – particularly regarding the outcome of political knowledge – were not supported. Future studies are encouraged to further investigate distal antecedents of emotions by extending our research to other contextual antecedents (e.g., active learning, student-teacher relationship) and outcomes of civic learning.

### **Declaration of Generative AI and AI-assisted technologies in the writing process**

During the preparation of this work the authors used Grammarly and QuillBot in order to improve fluency and writing style of part of the sections. After using this service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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## Supplemental Material

### 1. Knowledge Test – Policy Items

**Table S1**

*Policy Questions of the Knowledge Test*

|   | Original Question                                                                                                                                   | Response Options (original)                                                                                                          | Translation                                                                                                                                                          | Response Options (translated)                                                                                                              |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Welche der folgenden finanziellen Förderungen gibt es in Österreich nicht?                                                                          | <b>Hartz-4</b><br>Wohnbeihilfe<br>Familienbeihilfe<br>Pflegegeld                                                                     | Which of the following financial aid programs does not exist in Austria?                                                                                             | <b>Hartz-4</b><br>Housing Allowance<br>Family allowance<br>Care allowance                                                                  |
| 2 | Neben der neunjährigen Schulpflicht gibt es seit 2017 auch eine Ausbildungspflicht in Österreich. Bis zu welchem Alter gilt die Ausbildungspflicht? | Bis 14 Jahre<br>Bis 16 Jahre<br><b>Bis 18 Jahre</b><br>Bis 20 Jahre                                                                  | In addition to the nine-year compulsory education, there has also been compulsory training in Austria since 2017. Up to what age does the compulsory training apply? | Until 14 years<br>Until 16 years<br><b>Until 18 years</b><br>Until 20 years                                                                |
| 3 | Welche Institution unterstützt Arbeitnehmer*innen bei der Arbeitssuche?                                                                             | <b>Das Arbeitsmarktservice (AMS)</b><br>Die Arbeitsvermittlung (AV)<br>Das Institut für Arbeit (IFA)<br>Die Arbeiter*innenhilfe (AH) | Which institution supports employees in finding a job?                                                                                                               | <b>The Employment Service (AMS)</b><br>The Employment Mediation (AV)<br>The Institute for Employment (IFA)<br>The Workers' Assistance (AH) |
| 4 | Was regelt auf europäischer Ebene das sogenannte „Dublin-Verfahren“?                                                                                | <b>Asylwesen</b><br>Bankenregulation<br>Steuerpolitik<br>Studienabschlüsse                                                           | What is regulated at the European level by the so-called "Dublin Procedure"?                                                                                         | <b>Asylum system</b><br>Banking regulation<br>Tax policy<br>Degrees                                                                        |
| 5 | Für welchen der folgenden Bereiche werden die meisten Staatsausgaben verwendet?                                                                     | <b>Pensionen</b><br>Justiz<br>Bildung<br>Umwelt                                                                                      | For which of the following areas is most government spending used?                                                                                                   | <b>Pensions</b><br>Justice<br>Education<br>Environment                                                                                     |

|   |                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                              |                                                                                                                                                                                                                                                                                                                                                               |
|---|--------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6 | Was ist ein Ziel des 1-2-3 Klimatickets?                           | <b>Mit einem Jahresticket alle öffentlichen Verkehrsmittel nutzen zu können.</b><br><br>Stufenweise Reduktion der Treibhausgase (1: Industrie, 2: Verkehr, 3: Landwirtschaft)<br><br>Der Ausbau von Fernkälte und Klimaanlageanlagen.<br><br>Förderung für E-Mobilität (E-Fahrräder, E-Mopeds und E-Autos)                                                                                                 | What is one goal of the 1-2-3 climate ticket?                                | <b>To be able to use all means of public transport with an annual ticket.</b><br><br>Gradual reduction of greenhouse gases (1: industry, 2: transport, 3: agriculture).<br><br>The expansion of district cooling and air conditioning.<br><br>Promotion of e-mobility (e-bikes, e-mopeds, and e-cars).                                                        |
| 7 | Was ist ein Kollektivvertrag?                                      | <b>Übereinkunft zwischen Arbeitnehmer*innen- und Arbeitgeber*innenvertretung zu Arbeitsbedingungen in einer Branche</b><br><br>Verpflichtung zu gemeinsamem Vorgehen mehrerer Staaten beim Umweltschutz<br><br>Übereinkommen in der Schulgemeinschaftsausschuss (Schulen, Eltern und Schüler*innen) zu Bildungszielen<br><br>Ein Vertrag, der beim Besuch großer Veranstaltungen unterzeichnet werden muss | What is a collective agreement?                                              | <b>Agreement between workers' and employers' representatives on working conditions in an industry.</b><br><br>Commitment to joint action by several states on environmental protection<br><br>Agreement in school community committee (schools, parents, and students) on educational goals<br><br>A contract that must be signed when attending major events |
| 8 | Was ist laut der Genfer Flüchtlingskonvention kein Grund für Asyl? | <b>Wirtschaftliche Perspektivenlosigkeit</b><br><br>Verfolgung aufgrund ethnischer Herkunft<br><br>Bedrohung aufgrund politischen Engagements<br><br>Verfolgung aufgrund Zugehörigkeit zu sozialer Gruppe                                                                                                                                                                                                  | According to the Geneva Refugee Convention, what is not a reason for asylum? | <b>Lack of economic prospects</b><br><br>Persecution due to reasons of race<br><br>Threat due to one's political opinion<br><br>Persecution due to membership of a particular social group                                                                                                                                                                    |

*Note.* Response options were randomized in the questionnaire. Participants would additionally respond with “don’t know” to the questions. Correct answers are displayed in bold.

Additionally to these new items, we used questions from the Austrian National Election Study (Kritzing et al., 2020) in order to address knowledge about structures and parties.

## 2. Multilevel Correlation Table

**Table S2**

*Multilevel Correlation Table*

|                           | 1       | 2       | 3       | 4       | 5       | 6      | 7    |
|---------------------------|---------|---------|---------|---------|---------|--------|------|
| 1. Open Classroom Climate |         | .88***  | .12     | .09     | -.49**  | .04    | .62* |
| 2. Enjoyment              | .15***  |         | .20     | .13     | -.80*** | -.02   | .53  |
| 3. Shame                  | -.07*   | .16***  |         | 1.01*** | .54***  | -.55*  | .10  |
| 4. Anxiety                | -.08*   | .20***  | .75***  |         | .62***  | -.55** | .33  |
| 5. Boredom                | -.13*** | -.45*** | .30***  | .28***  |         | -.22   | .38  |
| 6. Knowledge              | .06     | .09***  | -.19*** | -.22*** | -.10**  |        | -.33 |
| 7. Participation          | .05     | .40***  | .17***  | .20***  | -.13**  | .11**  |      |

*Note.*  $N_{Students} = 878 - 1,043$ ;  $N_{Classes} = 90$ ; Correlations within classes are displayed in the lower triangular, correlations between classes in the upper triangular. Pairwise deletion was used to handle missing values

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

## 3. Robustness Checks: Models including Control Variables

### 3.1. Political Knowledge as Outcome Variable

**Table S3**

*Model Fit of Doubly Latent ML-Mediation Models on Knowledge (Without Random Slopes)*

| Model     | $\chi^2$ | <i>df</i> | <i>CFI</i> | <i>TLI</i> | <i>RMSEA</i> | <i>SRMR</i> |          |
|-----------|----------|-----------|------------|------------|--------------|-------------|----------|
|           |          |           |            |            |              | <i>W</i>    | <i>B</i> |
| Enjoyment | 417.612  | 182       | 0.944      | 0.935      | .034         | .040        | .255     |
| Shame     | 426.727  | 182       | 0.933      | 0.923      | .035         | .036        | .228     |
| Anxiety   | 349.090  | 183       | 0.951      | 0.943      | .028         | .037        | .203     |
| Boredom   | 383.277  | 183       | 0.952      | 0.945      | .031         | .031        | .251     |

$N = 1,117$  (90 classes);

**Table S4***Multilevel SEM on Knowledge with Controls*

| Emotion   | <i>Within</i> |           |                 | <i>Between</i> |           |                 |
|-----------|---------------|-----------|-----------------|----------------|-----------|-----------------|
|           | $\beta$       | <i>SD</i> | <i>CI</i>       | $\beta$        | <i>SD</i> | <i>CI</i>       |
| Enjoyment | 0.010         | 0.008     | [-0.005, 0.027] | 0.042          | 3.253     | [-5.852, 2.829] |
| Shame     | 0.001         | 0.010     | [-0.018, 0.019] | 0.080          | 0.107     | [-0.072, 0.341] |
| Anxiety   | 0.006         | 0.010     | [-0.015, 0.026] | 0.090          | 0.099     | [-0.079, 0.317] |
| Boredom   | -0.001        | 0.007     | [-0.015, 0.012] | 0.172          | 0.422     | [-0.184, 1.029] |

**3.2.Political Participation as Outcome Variable****Table S5***Model Fit of Doubly Latent ML-Mediation Models on Participation (Without Random Slopes)*

| Model     | $\chi^2$ | Df  | CFI   | TLI   | RMS<br>EA | SRMR |      |
|-----------|----------|-----|-------|-------|-----------|------|------|
|           |          |     |       |       |           | W    | B    |
| Enjoyment | 928.144  | 309 | 0.918 | 0.909 | .042      | .048 | .241 |
| Shame     | 914.142  | 310 | 0.912 | 0.903 | .042      | .046 | .240 |
| Anxiety   | 936.549  | 310 | 0.909 | 0.899 | .042      | .049 | .231 |
| Boredom   | 840.661  | 310 | 0.929 | 0.922 | .039      | .041 | .237 |

*N* = 1,117 (90 classes);**Table S6***Multilevel SEM on Participation with Controls*

| Emotion   | <i>Within</i> |           |                  | <i>Between</i> |           |                 |
|-----------|---------------|-----------|------------------|----------------|-----------|-----------------|
|           | $\beta$       | <i>SD</i> | <i>CI</i>        | $\beta$        | <i>SD</i> | <i>CI</i>       |
| Enjoyment | 0.096         | 0.035     | [0.038, 0.174]   | 0.394          | 3.836     | [-4.368, 2.856] |
| Shame     | -0.049        | 0.032     | [-0.118, 0.007]  | -0.066         | 0.354     | [-0.455, 0.087] |
| Anxiety   | -0.067        | 0.031     | [-0.138, -0.016] | -0.122         | 0.146     | [-0.465, 0.105] |
| Boredom   | -0.005        | 0.026     | [-0.057, 0.046]  | -0.074         | 1.773     | [-0.802, 0.500] |

#### 4. Models without Equality Constraints for Participation Scale

To test whether the missing measurement equivalence across levels in the participation scale affected our models, we conducted a robustness check using partial equality constraints. For the open classroom climate and emotion scales, equality constraints were set, whereas loadings on items of the participation scale were freely estimated. As displayed in Table A, the within model fit improved compared to the initial model (particularly if looking at the CFI), while the between-SRMR decreased. Results mainly hold, the only difference are now significant paths at the between-level between negative-activating emotions (shame and anxiety) and participation and a significant path from classroom climate on participation in the model on anxiety (see Figure S1). The indirect effects found in the manuscript hold when equality constraints are freed (see Table S8).

**Table S7**

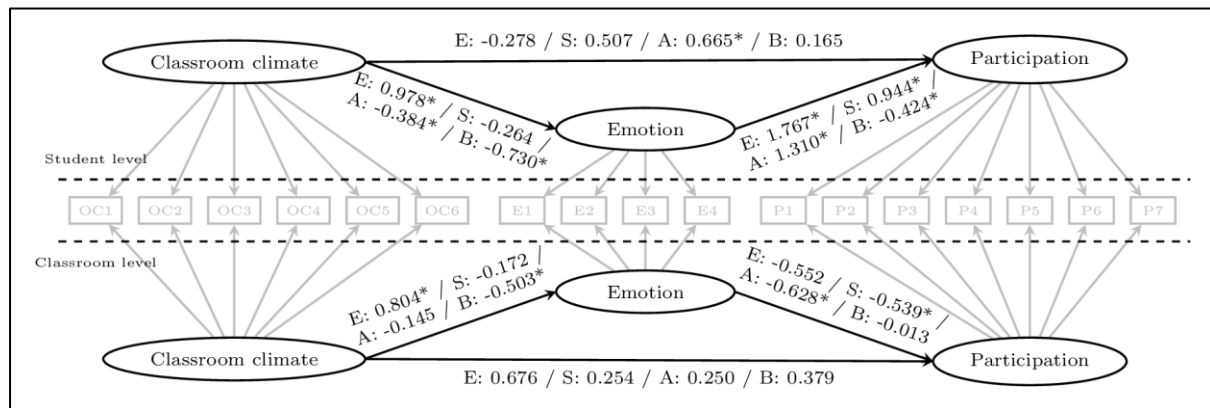
*Model Fit of Doubly Latent ML-Mediation Models on Participation (Without Random Slopes, Partial Equality of Loadings of Measurement Models)*

| Model     | $\chi^2$ | Df  | CFI   | TLI   | RMSEA | SRMR |      |
|-----------|----------|-----|-------|-------|-------|------|------|
|           |          |     |       |       |       | W    | B    |
| Enjoyment | 729.294  | 240 | 0.930 | 0.920 | .043  | .048 | .371 |
| Shame     | 660.976  | 241 | 0.936 | 0.927 | .039  | .049 | .387 |
| Anxiety   | 667.012  | 241 | 0.934 | 0.926 | .040  | .053 | .413 |
| Boredom   | 628.820  | 241 | 0.943 | 0.936 | .038  | .043 | .334 |

$N = 1,117$  (90 classes);

**Figure S1**

Multilevel SEM on Intention to Participate Including Control Variables Participation (Without Random Slopes, Partial Equality of Loadings of Measurement Models))



Note. E = Enjoyment, S = Shame, A = Anxiety, B = Boredom. Paths from topic emotions: E = Enthusiasm, C = Confusion;

\* signals posterior predictive p-value, indicating that the population parameter is included in a 95% credibility interval (Hox et al., 2012)

**Table S8**

Multilevel SEM on Participation with Controls (Partial Equality of Loadings of Measurement Models)

| Emotion   | Within  |       |                  | Between |        |                  |
|-----------|---------|-------|------------------|---------|--------|------------------|
|           | $\beta$ | SE    | CI               | $\beta$ | SE     | CI               |
| Enjoyment | 0.143   | 0.041 | [0.073, 0.233]   | -0.326  | 30.511 | [-11.404, 9.272] |
| Shame     | -0.039  | 0.029 | [-0.102, 0.011]  | 0.085   | 0.279  | [-0.125, 0.567]  |
| Anxiety   | -0.067  | 0.031 | [-0.137, -0.014] | 0.090   | 0.127  | [-0.084, 0.423]  |
| Boredom   | 0.027   | 0.029 | [-0.029, 0.086]  | 0.072   | 0.298  | [-0.472, 0.598]  |

## Abstract

When dealing with political matters, such as discussing political issues with friends, watching the news, or during civic education at school, emotions are likely experienced. From research in educational psychology, there is broad evidence that emotions are essential factors in explaining the learning process. However, little research has been conducted to determine which and how discrete emotions are engaged in learning about politics, particularly in the context of civic education. Based on the control-value theory, this dissertation aims to investigate antecedents and effects of emotions experienced during the political learning process. It attempts to first thoroughly synthesize current evidence on the links between emotions and political learning (Study 1) and to provide then novel insights into emotions experienced in civic education (Studies 2 and 3). Using data from Austrian upper secondary schools, I investigate the distal (open classroom climate, Study 3) and proximal antecedents (control- and value appraisals, Study 2) of discrete emotions and their associations with civic learning (e.g., engagement, motivation) and outcomes (political knowledge and participation). The findings substantially match assumptions of the control-value theory: Positive-activating emotions (e.g., enjoyment, curiosity) almost always exhibited positive relations with investigated antecedents and outcomes, while negative deactivating emotions (e.g., boredom) demonstrated the opposite. Negative-activating emotions (e.g., anxiety, anger) resulted in more complex patterns, where associations were frequently dependent on the antecedent and outcome considered. Though the varying effects of this group of emotions have been highlighted in previous studies, it appears to apply even more to civic education, where a wide range of outcomes must be considered. In sum, this dissertation contributes to our knowledge of emotions experienced in the academic setting by extending evidence to a new domain and investigating aspects of academic emotions and the control-value theory, which received little prior attention (e.g., negative value and component structure of epistemic emotions in Study 2, topic emotions and mediation between distal antecedents and outcomes in Study 3). Furthermore, it advances our understanding of the role of emotions for political learning by focusing on adolescents who are in a sensitive phase of their political development. Overall, the findings are highly important for promoting informed democratic engagement and, as a result, for civic education teachers. Knowing about antecedents and effects of emotions in this context can help teachers foster an emotional experience that is beneficial for political learning.

*Keywords:* emotions; political learning; control-value theory; civic education;

## **Zusammenfassung**

Bei der Beschäftigung mit politischen Themen, etwa wenn man mit Freunden über politische Themen diskutiert, die Nachrichten sieht oder auch im Rahmen der politischen Bildung in der Schule, werden häufig Emotionen erlebt. Aus der bildungspsychologischen Forschung gibt es zahlreiche Studien, die belegen, dass Emotionen bedeutend zum Lernprozess beitragen. Es gibt jedoch nur wenige Untersuchungen, die sich mit der Frage befassen, inwiefern Emotionen beim Lernen über Politik, insbesondere im Rahmen der Politischen Bildung, eine Rolle spielen. Basierend auf der Kontroll-Wert Theorie ist es das Ziel dieser Dissertation, Ursachen und Wirkungen von Emotionen zu untersuchen, die während des politischen Lernprozesses erlebt werden. Dabei wurde im ersten Schritt bisherige Forschung zu den Zusammenhängen zwischen Emotionen und politischem Lernen mittels meta-analytischen Methoden zusammengefasst (Studie 1) und im zweiten Schritt Emotionen spezifisch im Kontext Politischer Bildung an Schulen untersucht (Studien 2 und 3). Anhand von Daten aus österreichischen Schulen (AHS, BHS und Berufsschulen) untersuchte ich die distalen (offenes Klassenklima, Studie 3) und proximalen Ursachen (Kontroll- und Wertüberzeugungen, Studie 2) diskreter Emotionen und ihre Assoziationen mit politischem Lernen (z.B. Engagement, Motivation) und Lernerfolgen (politisches Wissen und Beteiligung). Die Ergebnisse stimmten im Wesentlichen mit den Annahmen der Kontroll-Wert Theorie überein: Positiv-aktivierende Emotionen (z. B. Freude, Neugier) wiesen fast immer positive Zusammenhänge zu den untersuchten Ursachen und Wirkungen auf, während negativ-deaktivierende Emotionen (z. B. Langeweile) gegenteilige Zusammenhänge zeigten. Analysen zu negativ-aktivierende Emotionen (z. B. Angst, Wut) ergaben komplexere Zusammenhangsmuster, die Assoziationen waren hier häufig von den untersuchten Ursachen und Wirkungen abhängig. Obwohl die unterschiedlichen Wirkungen dieser Gruppe von Emotionen bereits in früheren Studien hervorgehoben wurden, scheint dies noch mehr für die politische Bildung zu gelten, da sich diese durch ein breites Spektrum an Zielen auszeichnet. Diese Dissertation trägt zu unserem Wissen über akademische Emotionen bei, indem sie die Erkenntnisse auf einen neuen Bereich ausweitet und Aspekte der akademischen Emotionen und der Kontroll-Wert Theorie untersucht, die bisher wenig Beachtung fanden (z. B. negativer Wert und Komponentenstruktur der epistemischen Emotionen in Studie 2, themenbezogene Emotionen und eine Mediation zwischen distalen Ursachen und Ergebnissen in Studie 3). Darüber hinaus erweitert sie unser Verständnis der Rolle von Emotionen für politisches Lernen, indem sie die bisherige Forschung auf die Zielgruppe der Jugendlichen ausweitet, die sich in einer sensiblen Phase ihrer politischen

Entwicklung befinden. Insgesamt sind die Ergebnisse von großer Bedeutung für die Förderung von informierter, demokratischer Beteiligung und damit auch für Lehrkräfte im Bereich der politischen Bildung. Das Wissen um die Ursachen und Wirkungen von Emotionen in diesem Kontext kann Lehrenden dabei helfen, eine emotionale Erfahrung zu fördern, die für die Schüler\*innen und ihr politisches lernen von Vorteil ist.

*Keywords:* Emotionen; Politisches Lernen; Kontroll-Wert Theorie; Politische Bildung;