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The "emotional brain" of adolescent Spanish–German heritage speakers: is emotional intelligence a proxy for productive emotional vocabulary?

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Research Article

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Abstract

Autobiographical memories (AMs) are partly influenced by people's ability to process and express their emotions. This study investigated the extent to which trait emotional intelligence (EI) contributed to the emotional vocabulary of 148 adolescents – 60 speakers of Spanish as a heritage language (HL) raised in Germany, 61 first-language (L1) German speakers and 27 L1 Spanish speakers – in their written AMs of anger and surprise. The results revealed that heritage speakers with high trait EI used more emotional words in their AMs. These bilinguals also used more positive, negative and high-arousal words in their HL and in their AMs of anger. Similar patterns were observed in the AMs produced in Spanish (HL and L1), but L1 Spanish speakers used more emotional words in their AMs of surprise. By contrast, L1 German speakers used more emotional words than bilinguals in their AMs in German, and AMs of anger in German included more emotional vocabulary than those addressing surprise events.

1. Introduction

Recalling and expressing emotions is unique to each individual. For example, while some people may display a calm attitude and self-control when confronted with emotionally charged situations, others will be unable to restrain their emotions. This will become evident in the way that they behave, the words that they use and the intensity of their emotional reactions. Emotional intelligence (EI) is an essential component of emotional regulation, behaviour and communication. EI has been conceptualised from different perspectives. According to the ability model developed by Salovey and Mayer (1990), EI refers to the human ability to recognise and understand one's own and other people's emotions and to use this knowledge to regulate one's thoughts and behaviour (Mayer et al., 2000; Salovey & Mayer, 1990). The trait approach proposed by Petrides and Furnham (2000) suggests that EI consists of mental abilities and individual personality traits, such as empathy, adaptability, self-esteem and assertiveness, which influence the way in which people process affective information (Petrides & Furnham, 2000, 2001; Petrides et al., 2016). Trait EI is believed to be a stable component of personality across the life span (Petrides & Mavroveli, 2018; Petrides et al., 2016; Vernon et al., 2008).[1]

This study adopted the trait approach[2] to investigate the extent to which trait EI contributed to the emotional vocabulary that adolescent bilinguals with Spanish as their heritage language (HL) and German as their second language (L2) used in their written autobiographical memories (AMs) of anger and surprise in both their HL and L2. We also collected data from first-language (L1) Spanish and German speakers in order to examine whether similar patterns of emotional vocabulary would emerge in HL Spanish and L1 Spanish, as well as in L1 German and L2 German. Although previous studies of adolescents' EI have mainly focused on L1 speakers, the multilingual societies in which we currently live, which are characterised by an increasing number of L2 users, third-culture individuals, migrants and heritage speakers, have increased the demand for examining how EI influences young bilinguals' abilities to express and regulate their emotions not only in their L1s, but also in their L2s. It is therefore important to take the particularities of each individual into account – both in terms of their personality traits (trait EI in this case) and language background (e.g., without merely using general labels such as "heritage or native speakers" which only provide a limited account of the richness and diversity of the characteristics of their languages; see Darvin & Norton, 2022) –, as well as the specific features of the emotion elicitation stimuli (e.g., valence and arousal). As emotional processing and emotional expression are very broad terms and require different methodologies and data collection procedures, which component of either processing or expression each study aims to assess must be narrowed down. The current study focuses on

emotional expression, and particularly on emotional vocabulary elicited through AMs of different valence.[3]

Our study contributes to bilingualism and emotion research in several ways. First, heritage speakers represent a unique type of bilingualism; they have acquired their heritage language(s) naturally and in affective contexts, which may influence how they regulate and express their emotions (Montrul, 2015, 2019; Montrul & Polinsky, 2021) – two core facets of EI. Moreover, the number of heritage speakers across Europe – particularly of HL Spanish speakers in Germany – is increasing rapidly (Loureda Lamas et al., 2020); therefore, more research on these still underrepresented HL contexts is needed to achieve an in-depth understanding of the complexities and particularities of the emotional expression of these minority language groups. Second, although anger is a prototypical negative emotion, surprise has variable affective valence and can generate mixed or ambivalent emotions, which is probably the norm rather than the exception in real-life situations (see Mavrou & Dewaele, 2020). Previous studies with L1 Spanish and L1 German speakers have found differences in the conceptualisation and emotional processing of anger and surprise (Bormann-Kischkel et al., 1990; Durst, 2001; Fontaine et al., 2013; Oster, 2019; Soriano Salinas et al., 2015), but very little is known about how bilinguals who are proficient in both Spanish and German *express* and *verbalise* these emotions. Furthermore, the experience of anger and surprise may be expressed differently depending not only on the language that the heritage speakers use (the HL or the L2), but also on their levels of EI (MacCann et al., 2020). This is supported by recent studies revealing that individuals with high trait EI are able to adjust the valence of their emotions and to regulate their arousal levels (Bodrogi et al., 2022); for example, by experiencing negative emotions less intensely (Gao & Yang, 2023). Third, some recent studies have found that L2 learners with higher levels of trait EI are likely to perform better in L2 writing tasks (Beheshti et al., 2020) and in lexical retrieval tasks targeting emotional words (Mavrou, 2021; see also Barrett, 2017). However, these studies addressed general language abilities or specific language competences, rather than "contextualised" emotional expression, and this is another gap that the present study aims to fill. The above findings, along with the extensive research on the role of EI in various aspects of emotional processing (e.g., Fiori et al., 2022; Lea et al., 2018; Mikolajczak et al., 2008), provide us with reasonable grounds to hypothesise that this positive influence of trait EI on L2 performance and use will also extend to the verbal expression of emotionally charged experiences among heritage speakers, which constitutes an underexplored area of enquiry. Lastly, despite the abundant research using decontextualised stimuli (e.g., pictures of emotional scenes, isolated emotionally charged words or sentences), the current study employed AMs, which are understood as the recall of emotionally meaningful, personal past experiences that provide people with good opportunities to reflect on and verbalise their emotions (Brewer, 1986; Fivush, 1994). It has been suggested that the characteristics of these AMs depend on the narrators' EI (Houle & Philippe, 2020; Yamamoto & Toyota, 2013; see also Bohanek et al., 2005). As Houle and Philippe's (2020) study illustrates, those individuals who were able to regulate their emotions appropriately wrote coherent negative AMs in their L1 that were integrated into the story of the personal self, leading to increased levels of personal well-being. We can therefore hypothesise a similar link between AMs narrated by heritage speakers and their levels of EI.

2. Emotional intelligence and bi-/multilingualism

Before discussing the role of EI in emotional expression of heritage and bilingual speakers, which is the focus of the current study, it is important to understand how EI is involved in bi-/multilingualism in general. Recent evidence suggests that multilingualism and trait EI are mutually influential. Daga and Rajan (2023) argued that individuals who speak more than one language tend to have high levels of self-reported empathy and trait EI (assessed with the Trait Emotional Intelligence Questionnaire-Short form [TEIQue-SF]). Dewaele et al.'s (2008) study revealed that multilinguals with high trait EI (TEIQue-SF scores) tended to experience less self-perceived anxiety when communicating in their different languages. It has also been suggested that trait EI of adolescents raised in families with a heritage background is influenced by parenting practices. A study by Sung (2010) found that adolescents with Chinese or Korean as their HL and English as their L2 whose parents used rigid and directive parenting practices (i.e., practices based on the values of the heritage culture such as hard work, discipline, saving face, strict family hierarchy or the use of anger to control behaviour) had very low trait EI, which was assessed with the Bar-On Emotional Quotient Inventory (Bar-On, 2004). Conversely, adolescents with medium or high trait EI had parents who were open-minded and tolerant, adopted English cultural norms to some extent and supported their children's emotional development.

Additionally, trait EI has been found to correlate with bilinguals' linguistic practices and other personality factors. Bilinguals with more extroverted personalities and high trait EI (TEIQue-SF scores) were found to engage in more social interactions and thus developed greater L2 proficiency than did those with more introverted personality traits (Ożańska-Ponikwia, 2013; Surahman & Sofyan, 2021). However, introverts were more successful in L2 written tasks, whereas extroverts outperformed their peers in L2 oral tasks (Ożańska-Ponikwia, 2018). Furthermore, certain aspects of trait EI, such as adaptability and emotional expression, had a positive influence on the frequency and degree of L2 English use by HL Polish speakers with a migrant background, while assertiveness and emotional regulation emerged as the most influential factors for communicating in L2 English among Polish–English bilinguals without a migrant background (Ożańska-Ponikwia, 2016). Findings such as the ones described above highlight the need to continue investigating EI in multilingual settings, including heritage contexts. Although any comparison between monolingual and heritage/bilingual speakers, or the interaction between EI and other personality traits are topics that go beyond the scope of the current study, the aforementioned evidence points to the same direction: EI is an individual differences factor that appears to play a facilitative role in bilinguals' linguistic practices, and eventually in the emotional vocabulary used by heritage speakers, as will be discussed in the next section.

3. Emotional intelligence and emotional vocabulary

Emotional experience and language use are closely related, as we use words to describe our emotional experiences and explain their affective meaning by providing specific information about their valence and arousal (Barrett, 2004). A rich emotional vocabulary in the L1 has been associated with a wide variety of emotional experiences, and the number of positive and negative words contained in the emotional lexicon has been linked to personal experiences of positive or negative emotional events, respectively (Vine et al., 2020). Emotional vocabulary develops and increases

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in sophistication and diversity throughout adolescence. Bazhydai et al. (2019) found that emotional vocabulary was richer and more precise in late adolescence, while it was less diverse in early adolescence and mainly consisted of descriptors of emotional states. Similar findings were reported by Ros-Morente et al. (2022) in a study of L1 Spanish speakers aged between 12 and 16 who performed a 3-minute emotional vocabulary retrieval task; older participants used a greater number of negative words, while females used more emotional (positive and negative) words than did males.

The question that arises is whether having a richer and more diverse emotional vocabulary is a direct consequence of individual differences (such those in EI), beyond the impact of age, previous experiences and other contextual factors which have already been established in the literature. The available evidence suggests that trait EI influences domains in which the use of emotional words is key, such as emotional granularity (i.e., the ability to describe positive and negative states using a wide range of emotional words and concepts; see Lindquist & Barrett, 2008), emotional awareness (Agnoli et al., 2019) and alexithymia (Davidson & Morales, 2022; Taylor & Taylor-Allan, 2007). Barrett (2017) argued that high EI individuals are better equipped to use a wide variety of emotional concepts to describe their emotional states and experiences. Further links have been established between trait EI and emotional word recognition and retention (Lea et al., 2018; Mikolajczak et al., 2009). When it comes to the use of emotional words, Le Hoang and Grégoire (2021) found that L1 Vietnamese children with higher emotional awareness exhibited a richer emotional vocabulary to describe vignettes in which they had to explain the emotions of others. Another study by Mavrou (2021) revealed a positive association between trait EI (TEIQue-SF scores) of 174 students who were L1 or L2 Spanish and English speakers and their ability to retrieve emotional words, particularly positive ones. Moreover, the most frequently retrieved emotional words varied in accordance with the language of retrieval, thus suggesting that the emotional vocabulary in the L1 and in the L2 may be processed and represented differently by different speakers.

Research on emotional vocabulary acquisition and use among heritage speakers remains limited, and to our knowledge no study to date has investigated the role of EI in heritage speakers' emotional competencies and vocabularies. By contrast, general vocabulary acquisition in this population has received significant attention and appears to depend on multiple factors including age of onset, the quantity and quality of exposure to the HL, linguistic competence in the societal language, language maintenance and use in the HL community and formal instruction, among others (Montrul, 2015; Polinsky & Scontras, 2020). Heritage speakers have been found to have a smaller general vocabulary in their HL than in their societal language or in comparison to L1 speakers of the HL (Montrul & Mason, 2020; Montrul & Polinsky, 2021). However, findings pertaining to their *emotional* – and particularly their *productive* – vocabulary are scant. Vañó and Pennebaker (1997) found that bilingual children of HL Spanish and L2 English exhibited a smaller emotional vocabulary in HL Spanish when describing emotion-evoking pictures. They attributed these results to the reduced opportunities for affective communication in the HL, which mainly took place at home. However, the authors examined exclusively these children's emotional concepts referring to basic emotions (sadness, anger, happiness, fear and guilt), whereby the complete emotional vocabulary remained unexplored. In a more recent study, Driver (2022) investigated the impact of emotional valence on vocabulary learning with a sample of 64 HL Spanish and L2 English bilinguals and 57 students of Spanish as a foreign language from different language backgrounds. The participants were required to read three texts with positive, negative and neutral emotional valence, and were asked to learn a set of positive, neutral and negative words included in each text. The results revealed that retention of words in the neutral and negative texts was more successful, although words with neutral valence had better overall recall. A qualitative analysis further indicated that the emotional meaning and the affective arousal of the texts played a beneficial role in vocabulary learning, particularly when the topics concerned emotionally significant personal experiences.

4. The current study

Previous research has suggested that EI (both trait EI and ability EI) influences individuals' abilities to express their emotions in both positive and negative ways (Bodrogi et al., 2022; Gao & Yang, 2023; Larsen, 2009; Larsen & Augustine, 2008). However, evidence concerning the specific linguistic elements that are determined by EI – specifically trait EI – is scarce and has been largely obtained from L1 speakers (see, e.g., Alba-Juez & Pérez-González, 2019). Studies of trait EI among bilingual speakers have mainly focused on general language proficiency (Ożańska-Ponikwia, 2013, 2018; Surahman & Sofyan, 2021) or on the emotional words that were used in somewhat neutral production tasks (Mavrou, 2021). Nevertheless, the role of EI may become more evident when we reflect on and describe affective states and emotions related to our personal experiences. To the best of our knowledge, the present study is the first to investigate the role of EI in the productive emotional vocabulary of adolescent HL Spanish–L2 German bilinguals as elicited via their personal AMs of anger and surprise in both their HL and L2. Furthermore, we collected data from L1 Spanish and L1 German speakers based on the same AMs in order to examine whether similar patterns of emotional vocabulary would emerge in HL Spanish and L1 Spanish, as well as in L1 German and L2 German. The following research questions guided our study:

(1) To what extent do trait EI, the language of retrieval and the valence of the AMs influence the number of emotional (positive and negative) words produced by adolescent HL Spanish–L2 German bilinguals in their written AMs of anger and surprise in HL and L2? Are similar patterns observed in the same AMs of anger and surprise produced by L1 Spanish speakers and L1 German speakers?
(2) To what extent do trait EI, the language of retrieval and the valence of the AMs influence the number of high-arousal words produced by adolescent HL Spanish–L2 German bilinguals in their written AMs of anger and surprise in HL and L2? Are similar patterns observed in the same AMs of anger and surprise produced by L1 Spanish speakers and L1 German speakers?
(3) To what extent do trait EI, the language of retrieval (HL/L2) and the valence of the AMs (anger versus surprise) influence the diversity of these participants' emotional vocabularies?

We hypothesised that high trait EI participants would describe their experiences of anger and surprise using a broader emotional vocabulary in terms of positive/negative and high-arousal words (Barrett, 2017; Mavrou, 2021). We further speculated that high

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trait EI participants would use a more diverse emotional vocabulary, regardless of the valence of their AMs (Beheshti et al., 2020; Le Hoang & Grégoire, 2021). With regard to language status and following previous studies involving early or balanced bilinguals (Ferré et al., 2010; Vañó & Pennebaker, 1997; Vargas Fuentes et al., 2022), we expected that our bilingual participants would retrieve more emotional words in their L2 German. We also hypothesised that bilinguals' emotional vocabulary would be less diverse in their HL Spanish than in their L2 German due to the reduced availability of general vocabulary in the HL (Montrul & Polinsky, 2021). Regarding the valence of the AMs, our hypothesis was that AMs of anger would elicit more emotional words because events with negative valence and high levels of emotional arousal are likely to be recalled in more detail than neutral or positive events (Chae et al., 2011; Earles et al., 2016; Kensinger, 2007; Talarico et al., 2009). By contrast, we expected AMs of surprise to be described in a less elaborate way, i.e., with the use of fewer negative, positive and high-arousal words.

5. Method

5.1 Participants

The sample consisted of 148 adolescents aged between 13 and 18; there were 60 HL Spanish–L2 German bilinguals, 27 L1 Spanish speakers and 61 L1 German speakers. The Spanish–German bilinguals had been raised in Germany, and most of them had grown up in bicultural Spanish and German families ($n = 53$), while the remainder ($n = 8$) had L1 Spanish or HL Spanish parents. All of the bilingual speakers attended C1/C2 CEFR level (Council of Europe, 2001) Spanish language and culture classes (ALCE) in different German cities. ALCE is an extracurricular educational project that is supported by the Ministry of Education and Vocational Training of the Government of Spain and aims to promote the Spanish language and culture among child and adolescent heritage speakers in Germany. Although German was the main language of communication and socialisation in their environment (with friends and at school), they had acquired Spanish from their parents and mainly used it with their families. The L1 Spanish and the L1 German speakers attended secondary schools in Spain and Germany, respectively. All the L1 Spanish and L1 German speakers reported speaking only or mainly their L1 (Spanish and German, respectively) with their parents, teachers and peers. Information about the participants' demographic and language backgrounds, as collected via the pencil-and-paper children's version of the Language Experience and Proficiency Questionnaire (Marian et al., 2007), is summarised in Table 1.[4]

5.2 Procedure

Permission to conduct the study was obtained from the three governmental institutions involved in the education of the participants. The participants and their parents or legal caregivers were informed about the aims and procedures of the study via a letter that was distributed by the adolescents' teachers. All the parents or legal guardians, as well as the participants themselves, provided their written consent. Data collection took place during normal school hours. The participants wrote the AMs using writing templates that were provided by the first researcher (see next section for a detailed description of the prompts). The order of the AMs that they had to write (anger/surprise) was counterbalanced, and the instructions were given in the language in which they had to write each AM. The bilingual participants wrote four AMs in total – two about anger and two about surprise – in their respective languages (Spanish and German), while the L1 speakers wrote two AMs – one for each emotion – in their L1. The bilingual participants started with the AMs in Spanish to avoid the influence of German, the language in which they were slightly more proficient. The participants were not allowed to use additional resources, such as paper or online dictionaries and electronic devices (mobile phones or laptops), nor were they allowed to consult their classmates or their teacher. However, if they had questions regarding the completion of the AMs, they were encouraged to ask the first researcher, who was present during the entire data collection. After writing the AMs, the participants were asked to complete the TEIQue version for adolescents (TEIQue-ASF). The study was conducted in compliance with the Declaration of Helsinki and the ethical principles for research developed by the American Psychological Association.

5.3 Measures

5.3.1 Autobiographical memories

AM retrieval is a valid and widely implemented method in cognitive psychology and in linguistic research (Mills & D'Mello, 2014; Rubin, 2005; Schrauf & Durazo-Arvizu, 2006). AM recall involves two components: the knowledge related to the memory of the event and the activation of the emotional state experienced during the event (Mills & D'Mello, 2014). The prompts for the AMs were created in accordance with previous studies that also used a similar emotion elicitation method to examine the bilingual emotional vocabulary (e.g., Ho, 2009; Marian & Kaushanskaya, 2008). All the participants were asked to write AMs of anger and surprise based on the following prompt: "Write about a real personal experience in which you felt particularly angry/surprised in Spanish/German. Your text should be about one page long and you should complete the task in about 15 minutes". Participants were instructed to recall and include as much detail as possible about their emotions before, during and after the event in their AMs, as well as what they said and how they said it, how they acted, their physical response, their age, the other people involved and the consequences. A total of 416 AMs were collected and analysed, of which 230 reported events that occurred during adolescence and 80 events that took place during childhood (5 in early childhood and 75 in middle and late childhood). For the remaining 106 AMs no specific time frame was provided, although the context suggested that the event was recent, i.e., during adolescence.

5.3.2 Emotional intelligence

The participants' EI was assessed via the short version of the Trait Emotional Intelligence Questionnaire for adolescents (TEIQue-ASF; Petrides et al., 2016; Siegling et al., 2017). Bilingual participants had the option of completing the questionnaire either in Spanish or in German, while L1 speakers completed the questionnaire in their respective L1s. The TEIQue-ASF consists of 30 statements that assess four EI domains, namely well-being, self-control, emotionality and sociability. The participants were required to indicate their level of agreement with each statement using a 7-point Likert scale (1 = totally disagree, 7 = totally agree). The average score for each participant was calculated after applying reverse scoring procedures to a number of items, as recommended by the authors of the

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Table 1. Descriptive statistics for participants' language background

		Spanish–German bilinguals ($n = 60$) M (SD)	L1 German speakers ($n = 61$) M (SD)	L1 Spanish speakers ($n = 27$) M (SD)
Males/Females		21/39	26/35	16/11
Age		15.52 (1.31)	15.03 (0.73)	15.19 (0.56)
Age of onset (in years)	Spanish	0.42 (1.24)	0.25 (0.90)	0.38 (0.19)
	German	1.22 (2.12)		
Language learning contribution (0 = none, 10 = most important)				
Family	Spanish	9.02 (2.17)	8.75 (2.67)	9.81 (0.62)
	German	7.28 (3.18)		
Friends	Spanish	2.85 (2.96)	5.00 (3.10)	6.93 (2.74)
	German	7.47 (2.86)		
Teachers	Spanish	4.02 (3.33)	6.28 (2.72)	8.15 (2.48)
	German	8.00 (2.60)		
Additional lessons	Spanish	5.83 (3.22)	1.51 (3.00)	2.44 (3.43)
	German	2.80 (3.80)		
Current language exposure (0 = never, 10 = always)				
Family	Spanish	7.33 (2.61)	8.89 (1.97)	9.74 (0.59)
	German	9.02 (1.44)		
Friends	Spanish	3.10 (2.63)	9.10 (1.67)	9.74 (0.76)
	German	6.40 (3.16)		
Teachers	Spanish	3.20 (2.77)	8.25 (1.15)	8.56 (1.50)
	German	8.70 (1.99)		
Reading	Spanish	3.53 (2.65)	7.54 (2.68)	6.81 (3.20)
	German	6.38 (2.95)		
TV	Spanish	3.53 (3.04)	7.41 (2.17)	6.70 (3.45)
	German	5.67 (3.08)		
Music	Spanish	4.93 (3.21)	4.44 (2.59)	6.56 (2.39)
	German	3.53 (3.42)		
Self-perceived language competence in Spanish (0 = no competence, 10 = perfect)	Speaking	7.95 (1.42)	9.13 (0.92)	9.67 (0.78)
	Listening	8.82 (1.38)	9.69 (0.70)	9.85 (0.46)
Self-perceived language competence in German (0 = no competence, 10 = perfect)	Reading	7.82 (1.13)	9.06 (1.06)	9.37 (1.01)
	Writing	7.03 (1.36)	9.13 (9.97)	9.22 (1.12)
	Speaking	9.40 (0.92)		
	Listening	9.60 (0.89)		
	Reading	9.28 (1.16)		
	Writing	8.60 (1.55)		

questionnaire. Internal consistency was satisfactory: for bilinguals, Cronbach's $\alpha = .826$, 95% confidence interval (CI) [.783, .863], for L1 German speakers, Cronbach's $\alpha = .856$, 95% CI [.797, .902] and for L1 Spanish speakers, Cronbach's $\alpha = .848$, 95% CI [.743, .917].

5.4 Affective vocabulary analysis

The handwritten AMs were transcribed, and the texts were lemmatised according to the guidelines of the Real Academia Española (2023) for Spanish and the Dudenredaktion (2023) for German. EmoFinder (Fraga et al., 2018) and the Automatically Generated Norms (AGN) of abstractness, arousal, imageability and valence for 350,000 German lemmas (Köper & Im Walde, 2016) were employed to establish the affective vocabulary in Spanish and in German, respectively. These databases provide ratings of valence and arousal using different scales. Therefore, the AGN scale .00–10.00 (min, max) was normalised using the EmoFinder scale 1.00–9.00(a, b) by applying the algorithm $f(x) = (b - a)(x - \min)/(\max - \min) + a$. Words were then classified according to their valence as negative (1.00–3.99), neutral (4.00–5.99) or positive (6.00–9.00) (Hinojosa et al., 2016). Negative (e.g., accident) and positive (e.g., friend) words are considered to be affectively charged, as opposed to neutral ones (e.g., streetlight). In our study, emotional words represented the sum of negative and positive words. With regard to arousal, the cut-off points were 1.00–4.99 for low-arousal words and 5.00–9.00 for high-arousal words (Guasch et al., 2016; Võ et al., 2009). Emotional tokens and emotional types were estimated using V_Words v2.0 (Meara & Miralpeix, 2016). The diversity of the emotional vocabulary was assessed using the Uber index (Jarvis, 2002, 2013) which is based on the algorithm $LG10(Tokens)^2/(LG10(Tokens) - LG10(Types))$.

5.5 Data analysis

Linear mixed-effects regression models were computed in RStudio 2023.03.1 (Posit Team, 2023) using the *lmer* function in the *lme4* package (Bates et al., 2015), and the *performance*

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package (Lüdecke et al., 2021), which was used to calculate the indices of model performance. We checked model assumptions using residuals versus fitted plots, normal probability plots and variance inflation factor (VIF) values. Although the assumptions were generally met, we also computed the same models using the *robust* function (Wang et al., 2022). The language used in the AMs of the heritage speakers (HL Spanish, L2 German), the valence of the AMs (anger versus surprise), trait EI and gender were introduced as fixed effects, participant ID as random effects and emotional words, high-arousal words and the diversity of the emotional vocabulary as the outcome variables (see Table 3 for a summary of these models). We also included an interaction term for the language used in the AMs and the valence of the AMs, but as this did not improve the fit of the models, it was removed from the final analyses, except for one case – the model that tested high-arousal words in the bilingual group in which the interaction term resulted in statistical significance and was therefore maintained.

6. Results

Descriptive statistics for the number of emotional (positive and negative) words, the number of high-arousal words and the diversity of the total number of emotional words per group (heritage speakers, L1 speakers), language (HL, L1, L2) and valence of the AMs (anger, surprise) are summarised in Table 2. The results of the statistical models (Table 3) revealed a main effect of the language of retrieval and the valence of the AMs on emotional vocabulary; that is, our bilingual participants used more emotional (positive and negative) and high-arousal words in their AMs in the HL and in their AMs of anger. In addition, a statistically significant interaction was found in that our bilingual participants used a significantly greater number of high-arousal words in their AMs of anger that they wrote in their HL. Trait EI was a statistically significant predictor of both the number of emotional words ($B = 5.696$, $t = 3.449$, $p = .001$) and the number of high-arousal words that the participants produced ($B = 3.272$, $t = 2.756$, $p = .007$). The diversity of the emotional vocabulary was only predicted by the language of retrieval; that is, the participants used more diverse emotional words in their AMs in the HL. Separate yet complementary models for negative and positive words were computed and revealed that the language of retrieval and the valence of the AMs predicted the number of negative words, with AMs in the HL (Spanish) and AMs about anger including a significantly higher number of negative words compared to the AMs in the L2 (German) and the AMs about surprise. Furthermore, the language of retrieval ($t = -8.510$, $p < .001$), EI ($t = 3.700$, $p = .0004$) and gender ($t = 2.355$, $p = .022$) contributed significantly to the number of positive words; that is, female participants and those participants with higher trait EI produced more positive words in their AMs in the HL, particularly in those AMs about anger ($t = -2.176$, $p = .031$).

The aforementioned models for emotional words, high-arousal words and emotional vocabulary diversity were replicated in order to examine differences between the AMs in HL Spanish produced by our bilingual participants and the AMs in L1 Spanish written by our L1 Spanish speakers (see Table 4), as well as between the AMs in L2 German (bilingual participants) and the AMs in L1 German (L1 German participants) (see Table 5). In what follows, we only focus on the results that complement the previous analyses. Specifically, no considerable differences were observed between heritage speakers of Spanish and L1 Spanish speakers

Table 2. Descriptive statistics for the affective vocabulary per group, language of retrieval and valence of the AMs

Group	Spanish–German bilinguals				L1 Spanish speakers		L1 German speakers	
AMs	Anger		Surprise		Anger	Surprise	Anger	Surprise
Language	HL	L2	HL	L2	L1	L1	L1	L1
	M (SD)		*M* (SD)		*M* (SD)		*M* (SD)	
Emotional words	50.58 (18.15)	34.98 (12.32)	40.42 (10.71)	29.35 (10.26)	50.22 (12.44)	54.37 (11.05)	39.30 (11.01)	36.25 (9.47)
Positive words	41.32 (16.38)	27.77 (10.85)	36.18 (9.97)	27.12 (9.83)	40.15 (11.73)	48.07 (10.15)	31.15 (9.78)	33.95 (9.52)
Negative words	9.27 (4.13)	7.22 (4.20)	4.23 (3.71)	2.23 (2.36)	10.07 (3.25)	6.30 (3.74)	8.15 (3.84)	2.30 (2.62)
High-arousal words	44.90 (14.61)	19.02 (6.99)	33.27 (8.73)	14.98 (6.20)	48.96 (10.93)	45.85 (9.53)	21.95 (7.99)	17.93 (6.31)
Emotional vocabulary diversity	15.40 (5.51)	13.99 (5.89)	17.81 (9.32)	13.98 (8.34)	18.17 (6.63)	16.74 (3.08)	13.12 (3.85)	14.20 (4.80)

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Table 3. Emotional vocabulary as a function of language (HL Spanish versus L2 German), valence of the AMs (anger versus surprise), trait EI and gender (bilingual speakers only)

Dependent variable	Fixed-effects	*B*	SE	*t*	Pr(>|*t*|)	Robust model *t*
Emotional words	(Intercept)	18.566	8.462	2.194	.032*	**2.578**
	Language AM	−13.333	1.420	−9.392	$<2\times10^{-16***}$	**−9.838**
	Valence AM	−7.900	1.420	−5.565	$9.5\times10^{-8***}$	**−5.188**
	Trait EI	5.696	1.651	3.449	.001**	**3.524**
	Gender	3.744	2.265	1.653	.103	1.580
	Random effects variance (SD)	39.76 (6.31)				
	R^2 (cond.)	.493				.509
	R^2 (marg.)	.326				.344
High-arousal words	(Intercept)	28.239	6.116	4.617	$2.11\times10^{-5***}$	5.050
	Language AM	−25.883	1.557	−16.625	$<2\times10^{-16***}$	**−17.843**
	Valence AM	−11.633	1.557	−7.472	$3.48\times10^{-12***}$	**−7.611**
	Trait EI	3.272	1.187	2.756	.007**	**2.824**
	Gender	0.489	1.629	0.300	.765	−0.097
	Language × Valence AM	7.600	2.202	3.452	.0007***	**3.312**
	Random effects variance (SD)	18.00 (4.24)				
	R^2 (cond.)	.693				.735
	R^2 (marg.)	.617				.658
Emotional vocabulary diversity	(Intercept)	8.973	4.535	1.978	.052	4.641
	Language AM	−2.615	0.882	−2.964	.003*	**−3.545**
	Valence AM	1.198	0.882	1.358	.176	0.740
	Trait EI	1.519	0.883	1.720	.091	1.397
	Gender	−0.856	1.211	−0.707	.482	−1.057
	Random effects variance (SD)	8.33 (2.88)				
	R^2 (cond.)	.198				.066
	R^2 (marg.)	.055				.066

*$p < .05$, **$p < .01$, ***$p < .001$. Statistically significant *t*-values for the robust models are marked in bold.

in the emotional vocabulary (number of positive/negative and high-arousal words) they used in their AMs in Spanish. Moreover, both groups tended to use a greater number of these words in their AMs about anger as compared to their AMs about surprise. However, L1 Spanish speakers used a significantly greater number of both emotional words and high-arousal words in their AMs about surprise events. The comparison of the affective vocabulary in the AMs in L2 German (heritage speakers) and L1 German (L1 German speakers) further revealed a main effect of the language used and the valence of the AMs, that is, the AMs in L1 German included a significantly greater number of emotional (positive/negative) and high-arousal words than the AMs in L2 German, as did the AMs about anger compared to the AMs about surprise.

7. Discussion

EI is considered to be the key to success in interpersonal relationships, academic and professional settings and for mental well-being. Heritage speakers may also benefit from a developed EI when expressing their emotions; this hypothesis motivated our study. Specifically, we investigated the extent to which trait EI contributed to the emotional vocabulary that adolescent bilinguals with HL Spanish and L2 German used in their AMs of anger and surprise in both their HL and L2. Data from L1 Spanish and L1 German speakers were also gathered to explore whether similar emotional vocabulary patterns would be observed in Spanish L1 and HL and in German L1 and L2.

Overall, the results revealed that our bilingual participants who scored higher for trait EI used more emotional vocabulary, confirming our hypothesis that emotionally intelligent bilingual speakers are likely to describe their emotions in more detail (i.e., using more emotional words) because they are better aware of their emotional states and more well-equipped to reflect on them (Barrett, 2017; Mavrou, 2021; Petrides & Furnham, 2001; Petrides et al., 2016). Emotionally intelligent bilinguals may also be more adept in the use of a greater amount of emotional vocabulary because they have more emotional concepts at their

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Table 4. Comparison of the affective vocabulary in the AMs in HL Spanish (heritage speakers) versus L1 Spanish (L1 Spanish speakers)

Dependent variable	Fixed-effects	*B*	SE	*t*	Pr(>|*t*|)	Robust model *t*
Emotional words	(Intercept)	32.805	8.876	3.696	.0003***	**4.706**
	Language AM	1.235	3.230	0.382	.0703	0.482
	Valence AM	−10.167	2.067	−4.919	$4.2 \times 10^{-6***}$	**−3.897**
	Trait EI	2.782	1.701	1.636	.105	1.925
	Gender	5.971	2.474	2.414	.018*	**2.291**
	Language × Valence AM	14.315	3.710	3.859	.0002***	**3.241**
	Random effects variance (SD)	59.21 (7.69)				
	R^2 (cond.)	.439				.182
	R^2 (marg.)	.179				.182
High-arousal words	(Intercept)	31.113	7.346	4.236	$5.73 \times 10^{-5***}$	**4.516**
	Language AM	4.714	2.696	1.748	.082	**2.211**
	Valence AM	−11.633	1.756	−6.624	$3.01 \times 10^{-9***}$	**−6.779**
	Trait EI	2.482	1.407	1.764	.081	1.850
	Gender	2.140	2.046	1.046	.298	0.742
	Language × Valence AM	8.522	3.153	2.703	.008**	**2.894**
	Random effects variance (SD)	38.10 (6.17)				
	R^2 (cond.)	.477				.530
	R^2 (marg.)	.248				.278
Emotional vocabulary diversity	(Intercept)	14.877	4.501	3.305	.001**	**6.343**
	Language AM	2.519	1.656	1.522	.130	**2.095**
	Valence AM	2.406	1.083	2.222	.028*	1.544
	Trait EI	0.249	.862	0.288	.773	−0.429
	Gender	−1.101	1.254	−0.883	.380	−0.996
	Language × Valence AM	−3.845	1.944	−1.978	.051	−1.212
	Random effects variance (SD)	14.08 (3.75)				
	R^2 (cond.)	.309				.046
	R^2 (marg.)	.032				.046

*$p < .05$, **$p < .01$, ***$p < .001$. Statistically significant *t*-values for the robust models are marked in bold.

disposal due to speaking two languages (Paradis, 2008; Pavlenko, 2005).[5] With regard to arousal, our results revealed that high trait EI heritage speakers exhibited greater emotional expressivity in that they used more high-arousal words in their AMs as compared to low trait EI heritage speakers. As previous studies have suggested, the recall of emotionally charged AMs is closely related to expressive writing: individuals with high EI appear to be more confident, possibly because they have fewer inhibitions about writing and communicating highly intense personal emotional experiences (Bohanek et al., 2005; Pennebaker & Chung, 2007; Yamamoto & Toyota, 2013). Moreover, as our participants were adolescents, they may have been more prone to expressing their emotions with particular intensity (Coe-Odess et al., 2019; Denham, 2019). However, it is important to note that trait EI was only associated with the number of emotional words, not with emotional vocabulary diversity. Although this result contradicts previous studies (Beheshti et al., 2020; Le Hoang & Grégoire, 2021), any discrepancies could be attributed to methodological differences; for example, Beheshti et al. (2020) considered general (rather than emotional) lexical diversity, whereas Le Hoang and Grégoire (2021) focused on the link between emotional awareness and emotion-related types and tokens.

Furthermore, the language of retrieval proved to be a significant determinant of the emotional vocabulary used by our bilingual participants. The results revealed that AMs in the HL contained a greater number of emotional and high-arousal words and more diverse affective vocabularies than the AMs in L2 German. In other words, the HL – Spanish in our study – emerged as a particularly emotional language when recalling AMs, even if our participants self-reported a slightly lower proficiency level in their HL Spanish compared with the societal language (German). Although this finding differs from previous studies among bilinguals that used retrieval tasks or decontextualised emotional situations (Ferré et al., 2010; Vañó & Pennebaker,

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Table 5. Comparison of the affective vocabulary in the AMs in L2 German (heritage speakers) versus L1 German (L1 German speakers)

Dependent variable	Fixed-effects	*B*	SE	*t*	Pr(>|*t*|)	Robust model *t*
Emotional words	(Intercept)	18.291	5.881	3.110	.002**	**3.161**
	Language AM	5.203	1.939	2.683	.007**	**2.514**
	Valence AM	−5.633	1.621	−3.474	.0007***	**−2.546**
	Trait EI	2.925	1.132	2.584	.011*	**3.117**
	Gender	3.205	1.588	2.018	.045*	**2.569**
	Language × Valence AM	2.584	2.284	1.132	.260	1.139
	Random effects variance (SD)	32.58 (5.71)				
	R^2 (cond.)	.398				.149
	R^2 (marg.)	.150				.149
High-arousal words	(Intercept)	14.481	3.744	3.867	.0001***	**3.963**
	Language AM	3.189	1.267	2.518	.012*	**2.391**
	Valence AM	−4.033	1.111	−3.631	.0004***	**−2.965**
	Trait EI	0.758	0.719	1.055	.293	1.339
	Gender	1.146	1.009	1.135	.258	0.955
	Language × Valence AM	0.017	1.565	0.011	.991	−0.039
	Random effects variance (SD)	10.60 (3.25)				
	R^2 (cond.)	.320				.117
	R^2 (marg.)	.126				.117
Emotional vocabulary diversity	(Intercept)	7.598	3.285	2.313	.022*	**4.577**
	Language AM	−0.605	1.084	−0.558	.577	−0.098
	Valence AM	−0.009	0.909	−0.011	.991	−0.338
	Trait EI	1.331	0.632	2.015	.037*	1.409
	Gender	−0.388	0.887	−0.438	.662	−0.384
	Language × Valence AM	1.089	1.282	0.851	.396	0.884
	Random effects variance (SD)	10.08 (3.17)				
	R^2 (cond.)	.309				.014
	R^2 (marg.)	.029				.014

*$p < .05$, **$p < .01$, ***$p < .001$. Statistically significant *t*-values for the robust models are marked in bold.

1997; Vargas Fuentes et al., 2022), it allows us to conclude that the use of AMs as a methodological technique may provide useful information by uncovering heritage speakers' emotional competences. Using this technique, our study found that emotional vocabulary is particularly salient in the HL, especially when heritage speakers have the opportunity to express and explain their emotions in relation to contextualised memories that have a personal meaning for them. Notably, previous evidence suggested that heritage speakers had limited general vocabulary in their HL due to a lack of input, fewer opportunities to practice the HL and fewer people to communicate with in the HL (Belpoliti & Bermejo, 2019; Montrul & Mason, 2020; Montrul & Polinsky, 2021). However, the same factors that were considered limiting (intimate and affective contexts of language use, and interlocutors who are family members and loved ones) may actually provide an advantage for emotional vocabulary development, or the development of this vocabulary in the HL may be less dependent on the frequency and more on the quality of interactions (Daskalaki et al., 2020; Gollan et al., 2015).

To explain the above results, it is necessary to consider differences between the HL and the societal or majority language. The HL is acquired naturally and in emotionally charged contexts through interactions with parents and other family members – contexts in which positive affect and the expression of emotions tend to play important roles – whereas heritage speakers' L2s are usually acquired through later socialisation in educational contexts (Montrul, 2019; Pavlenko, 2008, 2012; Shablack & Lindquist, 2019). Moreover, the HL is acquired during early childhood, a sensitive and malleable life stage in which linguistic and emotional regulation systems develop simultaneously (Bloom & Beckwith, 1989; Cole et al., 2010), which could influence the way in which bilinguals (learn to) express their emotions in their HL. Another plausible explanation relates to the specific target languages examined in this study, in that Spanish (the HL) is

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considered to be a more emotionally expressive language than is German (Barañano et al., 2004; Den Ouden, 2016; Rehbein, 2011).

The results of our study further suggested that the emotional event that was recalled influenced the emotional vocabulary, at least to some extent. In line with our hypothesis, AMs about anger contained more emotional words and more high-arousal words than did AMs about surprise (with AMs of surprise in L2 German being the least emotional). Both anger and surprise are high-arousal emotions but have different durations (Fontaine et al., 2013; Soriano Salinas et al., 2015). While anger tends to be a prolonged emotion, often involving rumination, surprise is experienced briefly giving rise to other emotions (Scherer et al., 2004). Therefore, the above finding could be attributed to the increased memorability of negative emotions because they serve adaptive functions or are discussed more frequently and in more detail (Chae et al., 2011; Earles et al., 2016; Kensinger, 2007; Talarico et al., 2009), as well as to the greater or prolonged intensity with which anger is usually experienced, which could lead to more expressivity (Alia-Klein et al., 2020). The fact that the valence of the AMs did not influence emotional vocabulary diversity could be due either to methodological issues (e.g., the lexical diversity measure used in the current study) or to the wide range of extralinguistic factors which are more closely related to general lexical diversity, such as individual development of language skills (David & Wei, 2008), age and educational level (Sankoff & Lessard, 1975), the topics addressed in the AMs (see Van Gijsel et al., 2006) and cognitive anxiety (Bradac et al., 1980), to mention just a few.

It is interesting that our bilingual participants employed a significantly higher number of high-arousal words in their AMs of anger in their HL. High-arousal words in an HL are acquired through emotional and sensory experiences (Bloom & Beckwith, 1989), which explains why these words may be used more frequently in the HL than in the L2. In addition, challenging behaviours may arise during adolescence (such as rebellious attitudes, breaking the norms, problems at school or disagreements with parents), thus triggering emotionally charged or aggressive behaviours that are more likely to be exteriorised in the HL – the language of the heart (McKay, 2005; Shooter & Bailey, 2010).

Finally, it is important to highlight both the similar and dissimilar emotional vocabulary patterns that emerged from the comparisons between AMs in L1 Spanish and HL Spanish and between AMs in L1 German and L2 German. First, despite the differences in self-reported Spanish proficiency level between our heritage speakers and L1 Spanish speakers, both of them used a similar number of emotional words in their AMs in Spanish, which was significantly greater in their AMs of anger. Anger is experienced very often during adolescence, especially at home with parents (Coe-Odess et al., 2019; Denham, 2019). As almost all the parents of our Spanish HL and L1 participants were Spanish speakers themselves, it is likely that they also made a similar use of emotional vocabulary in situations of anger with their children at home – vocabulary which was later acquired by or was more accessible to their children. However, L1 Spanish speakers produced more emotional words in their AMs of surprise in Spanish than did our heritage speakers, which could be explained by the fact that surprise is experienced less frequently than other emotions (Scherer et al., 2004). Therefore, our bilingual participants might have had fewer available emotional words in their HL that they could associate with the emotion of surprise as they probably had fewer opportunities to experience this emotion and to acquire and practice the corresponding vocabulary in that HL, whereas L1 speakers might have had more opportunities to do so given their relatively more extensive use of their L1. Second, our L1 German speakers used more emotional words than did our bilingual participants in their AMs in L2 German. This may be due to emotional words being richer and more deeply encoded in the L1 than in the L2 (Altarriba et al., 1999); similarly, the retrieval of high-arousal words appears to be more prominent in the L1 than in the L2 (Baumeister et al., 2017). Taken together, these results indicate that for our bilingual group the HL functioned as the language of the heart, although they were highly socialised in the majority language. We also found that AMs of anger in German (L1 and L2) included more emotional words than AMs of surprise. This result could be explained by the fact that people from individualistic societies (such as Germany) tend to express anger more openly as they highly value their personal needs (Holodynski, 2006; Matsumoto et al., 2010; Mesquita & Frijda, 1992), and this may provide them with more emotional-linguistic resources to express this emotion in German.[6]

Nevertheless, our study is not without limitations. We only analysed written AMs, which might have conferred an advantage on our introverted participants, while oral AMs may have been more appropriate for extroverts (Ożańska-Ponikwia, 2018). Moreover, these AMs are sensitive to time (Friedman & de Winstanley, 1998), thus future studies need to consider the temporal distance of past events narrated in AMs. In addition, trait EI is a multidimensional construct. The TEIQue-ASF used in this study assesses four components of trait EI, namely well-being, self-control, emotionality and sociability. Due to space limitations we did not run statistical models for each trait EI dimension separately. However, we encourage future studies to conduct more in-depth analyses of the link between emotional vocabulary in L1/HL and different facets of multidimensional constructs such as EI, as well as to use alternative theoretical models and measurements to test not only trait EI but also ability EI. Furthermore, future studies should include indices of general vocabulary knowledge to disentangle whether differences in emotional vocabulary between heritage speakers and L1 or late L2 users may be due to differences in overall vocabulary size; if not, they should proceed to collect data related to broader contextual and social factors (see Kupisch & Rothman, 2018; Rothman et al., 2023, for discussions on this matter). Another important caveat refers to the analysis of the emotional vocabulary, which was limited to the word level. To overcome this limitation, holistic perspectives that consider the affective tone of the AMs and the emotional effects that these AMs arouse in L1 speakers would advance our understanding of heritage speakers' emotional discourse. Less studied emotions, such as solitude, anxiety or blended emotions, are also worthy of consideration in this line of enquiry.

8. Conclusions and implications

This study led to three main conclusions. First, trait EI appears to be a proxy for the breadth of emotional vocabulary used by heritage speakers to express their emotional states and experiences, at least with regard to anger and surprise. Second, the HL of adolescent bilinguals remains the language of the heart – the language that triggers more emotional vocabulary, affective expressivity and a varied emotional repertoire in comparison to the societal language. Third, AMs about negative emotions (anger in this

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study) elicited a greater emotional and expressive vocabulary than did AMs about positive or dynamic emotions, such as surprise.

The relationship between EI and emotional vocabulary has broad implications for linguistic research, educational policies and health services. The ability to express emotions appears to be inherently individual rather than language specific, albeit partly. Therefore, our study calls for a more careful consideration of emotional abilities and personality factors in studies that investigate emotional vocabulary and the expression of emotion among bi-/multilinguals, including heritage speakers, migrants and third culture individuals. Regarding language pedagogy, the teaching of emotional vocabulary and emotional expression should occupy an important position in L2/HL curricula and classrooms. HL teaching needs to be learner-centred and to make use of both the HL and the societal language. This would allow bilingual speakers to reflect on the differences between their HL and their L2 when expressing their moods and emotional states, and to increase their awareness of the cross-linguistic and cross-cultural differences between their languages; this would ultimately enable them to manage the communication challenges in multilingual societies in the twenty-first century.

Additionally, emotional vocabulary, particularly in the HL, becomes an external mirror of adolescents' inner psycho-emotional states and personalities and can serve as a diagnostic and therapeutic tool to be used by educators and health professionals to identify and treat potential socio-emotional and behavioural maladjustments sufficiently early (Yun et al., 2019). This is becoming increasingly relevant in the case of young refugees who have had traumatic experiences, as well as with regard to multilingual adolescents in foster care or who are experiencing vulnerable mental health circumstances. Yun et al. (2019) argued that "We can't start treatment until we hire a bilingual therapist" (p. 511). Therefore, language barriers should be addressed early and resolved effectively in the health care system. Furthermore, when an emotional barrier among young multilinguals and their parents, educators or therapists is created, being able to establish communication using the multilingual's different languages may be key to gaining access to their emotions and feelings and providing them with appropriate support (Serrani, 2023), as their ability to express their feelings may be more developed in one of their languages than in another.

The findings of our study have broader implications for other fields, such as human resources and population sciences. In the job market, recruiters may need to conduct interviews in multilinguals' or heritage speakers' different languages to gain insights into their personalities and to better assess their suitability for different positions. Governmental data collection tools, such as surveys that are used to obtain population-representative statistics measuring parameters related to psychological well-being, such as the psychological effects of isolation during a pandemic situation or the impact of home schooling on the mental health of children and adolescents, should allow multilingual speakers to express their emotions and opinions in their preferred language, possibly in their L1 if providing these data in their L2 may lead to biased or skewed results. We can only achieve more inclusive societies and ensure that all citizens benefit from equal opportunities by taking the diversity of the individuals who form modern societies, particularly young people, into account.

Data availability statement. The data that support the findings of this study are available from the first author of this study.

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Competing interests. None.

Notes

[1] Both approaches have led to the development of a number of assessment tools that attempt to provide insights into the nature and complexity of EI. Ability EI is usually assessed with maximum performance tests whereas trait EI with self-reported Likert-type scales (see O'Connor et al., 2019, for a comprehensive discussion of the advantages and limitations of EI measures).

[2] The present study uses the Trait Emotional Intelligence Questionnaire-Short form (TEIQue-SF; Petrides et al., 2016), specifically the version for adolescents (TEIQue-ASF) which taps into well-being, self-control, emotionality and sociability (see section 5 for a detailed description).

[3] Anger and surprise are discussed with reference to valence because in terms of arousal both are emotions of high arousal (see Fontaine & Scherer, 2013).

[4] An anonymous reviewer argued that some results might be due to differences in language proficiency. The reason why we did not use a language proficiency exam to assess our participants' language proficiency in their HL was that all of them attended C1/C2 level Spanish language and culture courses (ALCE) at the moment of data collection and spoke the HL at home. Regarding L2 German, all the heritage speakers in our study were living in Germany and attended German schools; therefore, German was the language in which they socialised and received instruction at school. This explains why their overall self-reported proficiency level in German ($M = 9.22$ out of 10, $SD = 0.99$) was slightly higher than their self-reported proficiency level in Spanish ($M = 7.91$ out of 10, $SD = 1.15$, $p < .001$). As expected, heritage speakers' self-reported proficiency level in HL Spanish was lower than L1 Spanish speakers' self-reported proficiency level in Spanish, the language they used both at home and to socialise at school ($M = 9.53$ out of 10, $SD = 0.78$, $p < .001$). However, no such differences were observed when we compared our heritage speakers' self-reported proficiency level in L2 German ($M = 9.22$ out of 10, $SD = 0.99$) and L1 German speakers' self-reported proficiency level in German ($M = 8.94$, $SD = 0.78$, $p = .090$). In this case heritage speakers slightly outperformed their peers and, interestingly, they also self-reported significantly higher writing skills in German ($p = .008$).

[5] An anonymous reviewer argued that this interpretation lacks statistical support because EI was not a statistically significant predictor of emotional vocabulary diversity. However, it is important to clarify that the use of a greater number of emotional words refers to the ability to use *more words* (including repetitions) of this kind (amount) and *more different words* of this kind (diversity). Our results support the above view, at least partially. Regarding diversity, it is worth noting that there are more than 20 measures of lexical complexity/diversity (see Mavrou & Ainciburu, 2019, p. 128, for a review), and thus future studies should employ more varied and sophisticated lexical complexity measures to corroborate the findings of the current study. Other extralinguistic factors that influence lexical diversity are mentioned in section 7.

[6] The collectivistic/individualistic labels are not rigid divisions. People belonging to a specific society share values and behaviours which are more associated with one or the other pole. The characterisation of Germany as an individualistic society is supported by studies on emotional expression and emotional regulation (see, e.g., Bender et al., 2012; Ogarkova & Soriano, 2014; Oster, 2019). While we do not intent to emphasise cultural differences – as this issue goes beyond the scope of the current study – it is perhaps a related background that could provide further explanations for our findings.

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