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Birds of a feather (might not) flock together: Exploring the complex interplay of motivation, autonomy and positive emotions in predicting anxiety levels in Hungarian secondary school language learners

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Abstract

Due to its importance in second/foreign language (L2) learning, anxiety appears to be one of the most important individual differences (IDs). Still, learners' experiences of anxiety tend to vary considerably, so we set out to investigate the anxiety levels, reported in our large-scale quantitative study involving 1,152 secondary school language learners in Hungary, by different learner groups. Cluster analysis was employed to create learner groups with different profiles, which were based on the learners' motivation, autonomy and selected positive emotions, that is, hope, pride, enjoyment and curiosity, thereby forming three profiles for autonomy and four groups for motivation and positive emotions. The resulting groupings were then entered into a univariate general linear model (GLM) to predict the anxiety levels of the learners. The results of the three-way analysis of variance (ANOVA) showed significant main effects

for motivation, autonomy and positive emotions, two significant second-order interactions between motivation and autonomy and motivation and positive emotions, and a significant third-order interaction between motivation, autonomy and learners' positive emotions. It appears that learners' motivation, autonomy, and positive emotion profiles jointly determined the level of anxiety experienced by them. The most important implication of our results is that simple linear relationships are untenable when it comes to describing the interplay of these individual differences both concerning the theoretical advancement of our knowledge as well as the pedagogical knowledge of English teachers.

Keywords: anxiety; motivation; autonomy; positive emotions; GLM

1. Introduction

Although studying the affective aspects of second or foreign (L2) language learning is an increasingly popular topic today, it is not particularly novel since anxiety research, for example, has been around for almost half a century. As a result, considerable knowledge has accumulated about the ways anxiety is likely to influence the language learning process and its outcomes. The importance of these research efforts cannot be denied since anxiety is known to be associated with diminished levels of language learning success (MacIntyre, 2017), and the input, processing and output stages of learning have all been shown to be affected by it (MacIntyre & Gardner, 1994). Therefore, the investigation of foreign language anxiety (FLA), in and of itself, is an important task in any L2 learning context.

In addition, little is known about how FLA is related to other individual difference (ID) variables affecting language learning success like motivation, autonomy, or positive emotions, such as hope, pride, enjoyment and curiosity (see, e.g., Csizér et al., 2025), and there is very limited research on how the interplay of these ID variables shapes FLA. Hence, studies that describe subtle differences among students in this respect are important to further our theoretical and pedagogical knowledge. Moreover, what we know about the relationship of these constructs either tends to come from quantitative studies describing general tendencies with the help of averages or qualitative studies focusing on a very limited number of learners. Since the theoretical construct of IDs was originally created to describe how learners differ from each other and how their differences might be held accountable for their differential success in language learning (Dörnyei, 2005; Dörnyei & Ryan, 2015), which is something averages tend to mask, we proposed a novel approach in our exploratory study. Specifically, cluster analysis was performed to establish participant profiles regarding a number of different ID variables; then these participant profiles and their combinations were utilized to predict learners'

FLA. In our empirical study, we attempted to shed light on how a combination of motivational characteristics, autonomy-related qualities and positive emotionality can be used to predict the level of FLA reported by our learners.

2. Theoretical background

2.1. Foreign language anxiety

Throughout the long history of researching FLA, several issues have been considered to shed light on "the feeling of tension and apprehension specifically associated with second language contexts, including speaking, listening, and learning" (MacIntyre & Gardner, 1994, p. 284). One such issue was whether the anxiety experienced in connection with language learning might be associated with the stable personality trait of anxiety or if the individual's actual situation is the source of this affective state. This contradiction was resolved by the introduction of the concept of FLA as a situation-specific emotion (MacIntyre & Gardner, 1991). Due to its importance in shaping learning processes, L2 learning anxiety has been investigated from various research methodological angles. A great number of quantitative studies spearheaded by Horwitz et al.'s (1986) 33-item scale measured FLA in a situated-manner, providing evidence for the existence of FLA in various contexts (Botes et al., 2020a). Moreover, it was established that FLA had an adverse effect on all phases of information processing, from input through processing to output (MacIntyre & Gardner, 1994), and it was generally linked to difficulties in language learning and overall lower achievement (MacIntyre, 2017). Studies also used qualitative research strategies to investigate student perceptions and experiences of FLA in depth. Early studies employed various methods, such as diaries online observations or interviews (Bailey, 1983; Oxford, 1999), but after the dynamic turn in applied linguistics, novel research strategies also appeared (Bourdeau et al., 2018; Elahi Shirvan et al., 2025; Piniel, 2024).

The dynamic approach to FLA attests to the fact that anxiety should be situated "among the multitude of interacting factors that affect language learning and development" (MacIntyre, 2017, p. 23). Moreover, changes across various timescales are also acknowledged, which means that its interconnectedness with other factors could also continuously change, as well as "contradictory conditions can co-exist" (Gregersen, 2020, p. 72). Several empirical studies have emphasized these characteristics by applying longitudinal approaches, and they found that FLA fluctuates both when it is examined over a short period, like in idiodynamic studies, or over much longer periods, like the course of a semester (e.g., MacIntyre, 2012; MacIntyre & Serroul, 2015; Piniel & Csizér, 2015; Waninge, 2015). In

our study, we also intended to capture the dynamic nature of language learning anxiety by comparing and contrasting how nuanced learner profiles can impact FLA.

2.2. Positive emotions: Enjoyment, hope, pride, and curiosity

Owing to the development of positive psychology, it is now a truism that positive emotions are an integral part of L2 learning processes. However, since specific positive emotions have been emphasized to a different extent in earlier studies, there is still room for further research in this area. It is foreign language enjoyment (FLE), defined "as a broad positive emotion experienced by FL [foreign language] learners when their psychological needs are met in the FL classroom" (Botes et al., 2022, p. 206) that has inspired the most research, and its role has been meticulously documented in our field. There are studies exploring its relationship to L2 learning, suggesting that FLE is positively associated with both measures of self-perceived proficiency and proficiency test scores (Botes et al., 2020b; Jin & Zhang, 2021). Various empirical investigations have mapped its connections to other emotions and self-related ID variables in different settings, where most of the findings suggested a negative relationship between FLE and FLA (Boudreau et al., 2018; De Smet et al., 2018; Dewaele & Alfawzan, 2018; Dewaele et al., 2023; Dewaele & Dewaele, 2020; Dewaele & MacIntyre, 2014, 2016; Pavelescu & Petrić, 2018; Resnik & Schallmoser, 2019). The ultimate proof that L2 learning enjoyment research has reached maturation is the fact that meta-analytical investigations have also been published. These have confirmed the above findings that FLA and FLE are negatively linked and that both perceived and actual language achievements are positively related to FLE (Botes et al., 2022).

Concerning hope, pride and curiosity, the picture is less clear. The definition of hope concerns "a cognitive set that is based on a reciprocally derived sense of successful (a) agency (goal-directed determination) and (b) pathways (planning of ways to meet goals)" (Snyder et al., 1991, p. 571). Although hope is implicitly present in L2 motivation research as a part of learners' ideal L2 self, that is, learners' future vision of themselves as proficient language users (Dörnyei, 2005, 2009), its role in language learning is still rarely investigated (see Ghadyani et al., 2022; Ross & Rivers, 2018, for exceptions). This is even more interesting in view of the fact that Ross and Rivers (2018) attributed a prominent role to hope based on their findings. The growing attention towards hope in our field is well demonstrated by the development of a questionnaire to measure this construct, that is, *Hope for Learning English as a Foreign Language* (HLEFL, Ghadyani et al., 2022). In this instrument, the authors presented seven sub-constructs contributing to HLEFL, which were labeled as anticipated effort, certainty, emotions,

goal setting, interpersonal relationship, social purpose, and source. The authors used structural equation modeling to test their proposed model of the relationships between these constructs leading to anticipated effort.

Pride, a positive outcome-oriented emotion tied to self-directed control attributions, is considered to be the positive counterpart of shame according to the control-value theory of emotions (Pekrun, 2006). Ross and Stracke's (2016) interview study with 12 English learners at an Australian university explored pride, distinguishing between authentic pride, focused on accomplishments, and hubristic pride, centered on the self (Tracy & Robbins, 2007). Authentic pride proved to be tied to learners' achievements in and outside the classroom, while hubristic pride was more characteristic when making significant others proud (Ross & Stracke, 2016).

Curiosity, defined as the desire for "new knowledge and new sensory experiences" (Litman & Spielberger, 2003, p. 75), was introduced into our field more than two decades ago, when Noels et al. (2003) outlined its role in L2 motivation research. It was only recently that systematic conceptualization began with the development of appropriate scales (Mahmoodzadeh & Khajavy, 2019). The authors argued convincingly that curiosity can be both a feeling-of-interest as well as a feeling-of-deprivation. Although a recent article on curiosity as a variable fueling teacher development (Mercer & Pawlak, 2024) provides a good summary of curiosity research in psychology, there are few SLA studies on students, investigating the motivational role of curiosity except for a few recent ones focusing on grit (Csizér et al., 2024; Pawlak et al., 2024).

2.3. Second language learning motivation and perceived importance of contact

L2 learning motivation is defined as "the direction and magnitude of human behavior, that is: the choice of a particular action, the persistence with it, the effort expended on it" (Dörnyei, 2001, p. 8). In the current investigation, Dörnyei's (2005, 2009) L2 motivational self system (L2MSS) was used, which comprises of the *ideal L2 self*, representing how the learners picture themselves as future competent users of the L2, *ought-to L2 self*, conveying the expectations of the social milieu, and the *L2 learning experience*, describing the current context of L2 learning. The L2MSS was chosen due to the fact that it seems to be a valid theory in Hungary (see Csizér et al., 2025), despite the fact that there is criticism concerning the model's cross-contextual generalizability (Al-Hoorie, 2018; Csizér, 2019). Moreover, processes of classroom teaching are still very much teacher-centered and coursebook-led in Hungary (Öveges & Csizér, 2018). In addition, students do use English outside the classroom to a great extent, but this use is not integrated into classroom language learning (Csizér et al., 2025). For

these reasons, we required a theory that can account for both experiences in the classroom and self-related variables concerning outside classroom use of English. The L2MSS seems to capture well the duality of students' experiences by conceptualizing ought-to L2 selves (reflecting the external pressures that the individual is aware of during the learning process) and ideal L2 selves (showing the extent to which the learner can imagine themselves as highly proficient users of the L2). In addition to the self measures, the model also includes students' dispositions towards L2 learning, conceptualized as their L2 learning experiences within the classroom.

Empirical research on the L2MSS has consistently shown the ideal L2 self as the strongest predictor of language learning motivation. For example, studies in China or Hungary (Csizér & Magid, 2012; Csizér et al., 2025; You & Dörnyei, 2016) confirmed that learners with a clear vision of themselves as proficient users exert significant effort in language learning. In contrast, the ought-to L2 self had minimal influence, suggesting that external pressures alone were insufficient motivators. Similarly, L2 learning experience demonstrated a weaker impact, as seen in Indonesia (Lamb, 2012), where urban students with strong ideal L2 selves exhibited higher motivation than rural learners with fewer opportunities for self-visualization. What remains unclear is how these constructs interact and collectively shape students' profiles, as well as their impact on other ID variables. Exploring this interplay could reveal more intricate connections between ID variables, such as the ones investigated in this study.

In order to complement the components of L2MSS and focus beyond classroom language learning, we included students' perceived importance of contact in our study. Research by Csizér and Kormos (2008, 2009) conducted in Hungary indicated that the perceived importance of contact strongly shaped students' motivation, particularly for those with low levels of direct contact. Even minimal contact could boost students' effort if perceived as meaningful. This finding aligns with the work of Clément (1980) and other scholars (Clément & Kruidenier, 1983), which showed that pleasant contact with L2 speakers enhances motivation, and with MacIntyre et al. (1998), who linked increased contact to willingness to communicate. However, negative effects of contact, such as language-based rejection (Sisk et al., 2018) and contextual challenges (Yim et al., 2019), were also found, which indicates the nuanced role contact may play in shaping students' experiences and learning processes. In the case of English in Hungary, though, Csizér and Kormos (2008, 2009) found that attitudes toward the language and perceived importance of contact were key motivators. Their results emphasized that the subjective evaluation of contact is often more influential than the quantity, suggesting that meaningful interactions should be considered and not the sheer quantity of contact.

2.4. Second language learning autonomy

Research on language learning autonomy in applied linguistics highlights learners' responsibility in managing their own learning processes, based on Little's (1999) classic definition of autonomy as learners' ability to plan and execute their L2 learning. Despite this seemingly simple definition, Benson's (2001, 2007, 2011) work underscored the complexity of autonomy, recommending nuanced research approaches by arguing that autonomy is a complex concept with various sub-components. Hence, the current study differentiates between classroom-related autonomy (autonomous language learning behavior) and technology-supported language learning autonomy outside the classroom (autonomous use of technology), aiming to capture the multifaceted nature of autonomy in L2 learning.

This investigation builds on several studies conducted in Hungary, especially a set of studies focused on mapping the connections between L2 motivation and learner autonomy. Csizér and Kormos (2012, 2014; Kormos & Csizér, 2014) examined how various aspects of L2 motivation influenced students' use of self-regulatory strategies, which in turn fostered autonomous learning behaviors. Based on correlations and regressions, their findings demonstrated a strong link between motivation and autonomy in L2 learning (Csizér & Kormos, 2012, 2014). Using structural equation modeling, Kormos and Csizér (2014) found that L2 motivation predicted the use of self-regulatory strategies such as seeking learning opportunities, managing time, and controlling boredom, which in turn fostered learners' autonomous language learning.

2.5. Research gap and research questions

When identifying and justifying our research gap, it is important to point out that investigations into the interrelationships of the constructs described above are varied, mostly concentrating on various pairs. For example, the relationships among anxiety and other positive emotions have been mapped relatively often, especially when it comes to anxiety and enjoyment (e.g., Dewaele & MacIntyre, 2014, 2016; Li & Wei, 2023; MacIntyre & Vincze, 2017; Tsang & Dewaele, 2023). Links between various constructs of the L2MSS and emotions have also been demonstrated (Saito et al., 2018) as well as support for the association between L2 learning motivation and autonomy (e.g., Csizér & Kormos, 2012, 2014). However, since all of these variables are likely to be effective concurrently, they should be investigated in concert according to Ryan (2019). In order to achieve this goal, we used the quantitative approach to collect data about our participants' motivation, autonomy, positive emotions, and anxiety in order to answer the following research questions:

1. How do participants' motivation-, autonomy-, and positive emotions-based profiles predict the level of anxiety reported by these learners?
2. To what extent do motivation-, autonomy-, and positive emotion-based profiles exert a main effect on anxiety?
3. What are the interaction effects between motivation-, autonomy-, and positive emotion-based profiles on anxiety?

3. Methods

3.1. Participants

Our sample consisted of secondary school students attending 11 high school in the three main regions of Hungary: the capital city, the Western, and the Eastern parts of Hungary. The final sample comprised of 1,152 secondary school students (467 males, 682 females, 3 missing). The students in the sample were between 14 and 20 years old (M = 16, SD = 1.22, 3 missing), and Hungarian was the mother tongue for all of them. They were all learning English at their respective high schools at the time of data collection although for some English was the first foreign language they learned while for others it was the second, making the average starting age for learning English 9.2 years (SD = 3.1). We could not measure students' proficiency levels; therefore, we had to rely on teachers' evaluation, who reported students' proficiency levels as ranging from A1 to C1.

3.2. Instrument

We used a validated questionnaire for data collection, where besides answering background questions on their age, gender, and language learning history, respondents had to indicate the extent to which they agreed with statements on 5-point Likert-scale items (1 – *not at all true*; 2 – *not really true*; 3 – *partly true, partly not*; 4 – *mostly true*; 5 – *completely true*). The questionnaire included four main IDs, namely, motivation, autonomy, emotions, and self-efficacy. The questionnaire was administered in Hungarian, the first language of the participants to ensure that they can answer the questions with ease.

The scales used in this study are presented below along with their descriptions, the number of items they contain (the scales were shortened for the purpose of this study in order not to have an excessively long instrument; for the validation process see Albert et al., 2021; Csizér & Öveges, 2019; Csizér et al., 2025), the internal consistency measured by Cronbach's alpha (α) and a translated sample item provided for each scale.

1. Anxiety (5 items, α = .69; Albert et al., 2019) taps into learners' feelings of inhibition experienced in connection with English language activities in school lessons (e.g., "I get frustrated if I can't understand an English-language text").
2. Ideal L2 self (5 items, α = .86; Kormos & Csizér, 2008) explores participants' vision about their future language use (e.g., "When I think of my future life, I imagine myself using English regularly").
3. Ought-to L2 self (6 items, α = .74; Kormos & Csizér, 2008) reflects what participants perceive as expectations in terms of their own language learning (e.g., "For all the people around me, English proficiency is an important part of general knowledge").
4. Language learning experience (4 items, α = .90; Kormos & Csizér, 2008) signals participants' positive experiences concerning learning English (e.g., "I have a good time during English classes").
5. Perceived importance of contact (5 items, α = .76; Csizér & Kormos, 2008) reflects the extent to which learners find it important to use English with native or non-native speakers outside the language classroom (e.g., "I believe it is good to speak to foreigners because I can get to know their ways of speaking, accents and vocabulary").
6. Autonomous language learning behavior (6 items, α = .82; Csizér & Kormos, 2012) reflects the extent to which participants are able to learn and practice English on their own (e.g., "I spend more time practicing elements in English that I find difficult to understand").
7. Autonomous use of technology (5 items, α = .83; Csizér & Kormos, 2012) signals learners' abilities to utilize the internet- and computer-based opportunities in order to improve their English knowledge (e.g., "I often use the Internet to improve my English").
8. Enjoyment (6 items, α = .78; Albert et al., 2019) refers to learners' feelings of enjoyment while taking part in the activities and topics during language lessons (e.g., "I enjoy the topics that we discuss in English lessons").
9. Hope (6 items, α = .78; Albert et al., 2019) measures how hopeful learners feel about achieving success in learning English at school (e.g., "I feel hopeful about overcoming challenges in the process of learning English").
10. Pride (5 items, α = .88; Albert et al., 2019) taps into the extent to which learners feel proud of their achievements in language learning (e.g., "I am proud of my achievements in language learning").
11. Curiosity (6 items, α = .83; Albert et al., 2019) measures how curious and interested learners feel about learning English and the topics and activities they encounter during the English lessons (e.g., "In English lessons, we deal with topics that arouse my curiosity").

3.3. Data collection procedures

Data collection started with paper-pencil questionnaires administered in the participating high schools in the autumn of 2019, but because of the COVID-19 pandemic and the lockdown of schools which followed, an online questionnaire was used in the later phases of the study. Participation in the research was voluntary; participants were informed of their right to opt out at any point of the data collection. The questionnaires were anonymous and contained no personal data with the help of which participants could be identified later. Participants were informed about the content and length of the questionnaire prior to data collection. As there was no ethics board at the research site at the time of the study, formal ethical clearance was not obtained.

3.4. Data analysis

As the first step of data analysis, the reliability of our questionnaire scales was checked using Cronbach's alpha scores to establish their internal consistency and principal component analysis (PCA) was later employed to ensure that each scale represents one underlying dimension (see Table 1). Next, different motivation-, autonomy-, and positive emotion-profiles were created using cluster analysis (Crowther et al., 2021), then in the general linear model (GLM) analysis, these clusters were used as input. Since the findings of the cluster analysis are discussed in detail in Csizér et al. (2025), we are only going to provide a brief descriptive summary of the clusters below to provide our readers with the necessary background information for interpreting our GLM findings.

As regards motivation, four different profiles were established after analyzing the ideal L2 self, ought-to L2 self, L2 learning experience, and perceived importance of contact scales. The most populous o*verall high motivation* group (*N* = 419) contained students who had high scores on all of these scales, while learners in the smallest *overall lower motivation* group (*N* = 136) exhibited relatively low scores overall. The third group was labelled *high motivation with negative L2 learning experience* (*N* = 276) since its members appeared to be motivated despite reporting less favorable L2 learning experiences. Finally, members of the i*nternal motivation with positive L2 learning experience* (*N* = 321) scored low on the ought-to L2 self and perceived importance of contact measures reflecting outside influences, but they demonstrated high scores on the other two scales.

The three autonomy profiles were formed by creating clusters using the autonomous use of technology and autonomous learning behavior scales. Members of the most populous *more autonomous overall* group (*N* = 485) reported high

scores on both of the autonomy scales whereas learners in the *less autonomous overall* group (*N* = 230), which was the smallest group, claimed to possess less autonomy. The third group contained learners who reported fairly high levels of autonomous use of technology but lower levels of autonomous learning behavior; thus, they were labeled the *technologically autonomous* group (*N* = 437).

The four positive emotion-clusters were based on how learners responded to those scales in our questionnaire that tapped into their positive emotions, namely, enjoyment, hope, pride, and curiosity. The most populous *more likely to experience positive emotions* group (*N* = 360) reported relatively high levels on all of these scales, while the smallest group contained learners who claimed to have reduced levels of positive emotions; thus, they were labeled the *less likely to experience positive emotions* group (*N* = 219). The third group contained learners who indicated high levels of hope and enjoyment but low levels of pride and curiosity; this was our *hopeful and enjoys learning* group (*N* = 312). Finally, members of the *hopeful and proud* group (*N* = 261) exhibited pride besides hope while scoring low on enjoyment and curiosity.

After performing the three cluster analyses, we saved learners' cluster membership in the motivation-, autonomy and positive emotions-clusters and used this information when performing a three-way analysis of variance (ANOVA) to predict learners' anxiety levels. Before conducting the ANOVA test, the assumption of normality was checked, and it was also established that the homogeneity of variance was not violated at the $p < .01$ level. In the three-way ANOVA test, anxiety measured on an interval scale was the dependent variable whereas motivation-, autonomy- and positive emotion-cluster memberships were entered as factors using nominal scales.

Table 1 Reliability analysis of the scales

IDs	Scales	*k*	*α*	PCA (%)
Anxiety	Anxiety	5	.69	1 (45)
Motivation	Ideal L2 self	5	.86	1 (64)
	Ought-to L2 self	6	.74	1 (45)
	Language learning experiences	5	.90	1 (71)
Autonomy	Perceived importance of contact	5	.76	1 (52)
	Autonomous learning behavior	6	.82	1 (52)
	Autonomous use of technology	5	.83	1 (62)
Positive emotions	Enjoyment	6	.78	1 (48)
	Hope	6	.78	1 (48)
	Pride	5	.88	1 (68)
	Curiosity	6	.83	1 (55)

Note. k = number of items in the scale; PCA = the number of dimensions yielded by Principal Components Analysis without rotation; % = the cumulative percent

4. Results

The results of the three-way ANOVA test are displayed in Table 2. As stated earlier, in the ANOVA model tested, anxiety was the dependent variable whose level we attempted to predict by motivation-, autonomy-, and emotion-profile memberships. The analysis revealed a statistically significant main effect for the motivation profiles, F (3, 1104) = 4.79, p = .003, partial eta squared = .013, for the autonomy profiles F (2, 1104) = 9.80, p <.001, partial eta squared = .017, as well as a statistically significant main effect for the positive emotion profiles, F (3, 1104) = 6.23, p < .001, partial eta squared = .017. Moreover, a statistically significant first order interaction was found between the motivation profile and the positive emotions profile indicating that the effects of motivation on anxiety are moderated by the positive emotion profile of the participant, F (9, 1104) = 2.19, p = .021, partial eta squared = .018. A significant first order interaction was also found between motivation cluster membership and autonomy cluster membership, which suggested that the effects of motivation on anxiety are influenced by the autonomy profile of the participant F (6) = 2.68, p = .014, partial eta squared = .014. Furthermore, the statistically significant second-order interaction identified between the motivation profiles, autonomy profiles and positive emotion profiles indicated that the effects of motivation on anxiety were moderated jointly by the learners' autonomy profile and their positive emotions profile, F (18, 1104) = 2.59, p < .001, partial eta squared = .040. The nature of this second-order interaction is illustrated in Figures 1-3. Simple effects analyses were used to further examine the second-order interaction between motivation profiles, positive emotion profiles and autonomy profiles (as recommended by Bennett et al., 2023). Bonferroni correction was applied to adjust the alpha levels for the univariate analyses, which was set at alpha = .0042 since 12 univariate analyses have been performed.

Table 2 Tests of between-subject effects with FLA as a dependent scale

Source	Type III sum of squares	df	Mean square	F	p	Partial eta squared
	Main effects					
1. Motivation clusters	8.017	3	2.672	4.790	.003	.013
2. Positive emotions clusters	10.425	3	3.475	6.229	<.001	.017
3. Autonomy clusters	10.928	2	5.464	9.795	<.001	.017
	Second-order effects					
1 * 2	10.981	9	1.220	2.187	.021	.018
1 * 3	8.971	6	1.495	2.680	.014	.014
2 * 3	4.942	6	.824	1.476	.183	.008
	Third-order effect					
1 * 2 * 3	25.969	18	1.443	2.586	<.001	.040

Note. R squared = .209 (adjusted R squared = .176)

One of the univariate analyses indicated that those learners who were less likely to manifest positive emotions but were more autonomous at the same time significantly differed in their level of anxiety depending on which motivation group they belonged to, F (3, 1104) = 6.04, p < .001, partial eta squared = .016 (see Figure 1). The overall low motivation group experienced the lowest levels of anxiety in this case while the anxiety level of the overall high motivation group was the highest. Those with high motivation and negative learning experiences also exhibited high levels of anxiety, while the anxiety levels of the internally motivated group with positive learning experiences tended to be low.

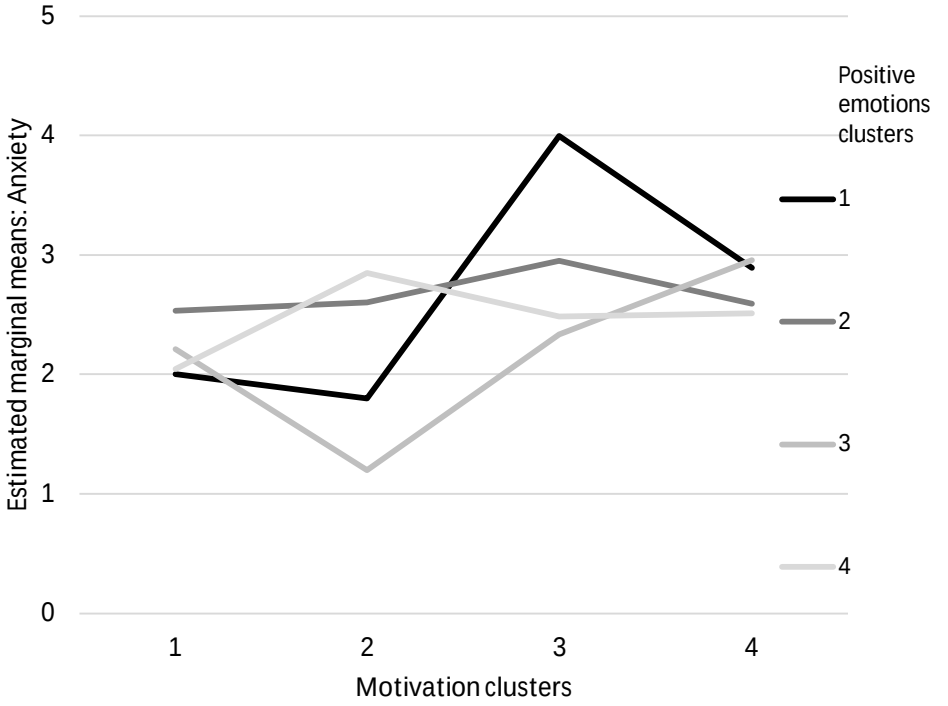

Figure 1 Second-order effects on FLA: Motivation clusters and positive emotions clusters for overall autonomous students (Motivation cluster 1 = internally motivated with positive learning experiences; Motivation cluster 2 = overall low motivation; Motivation cluster 3 = overall high motivation; Motivation cluster 4 = high motivation with negative learning experiences. Positive emotions cluster 1 = less likely to experience positive emotions; Positive emotions cluster 2 = hopeful and enjoys learning English; Positive emotions cluster 3 = more likely to experience positive emotions; Positive emotions cluster 4 = hopeful and proud)

Another univariate analysis established that those respondents who were less likely to experience positive emotions and were technologically more autonomous

also significantly differed in the level of anxiety they experienced depending on their motivation profile F (3, 1104) = 6.41, p < .001, partial eta squared = .017 (see Figure 2). In this case, the highly motivated group with negative learning experiences reported significantly more anxiety than learners belonging to the other three motivation constellations. Interestingly, those learners whose positive emotion profile was characterized by hope and enjoyment and who were technologically autonomous also displayed significantly different anxiety levels depending on their motivation profiles F (3, 1104) = 7.65, p < .001, partial eta squared = .020 (see Figure 2). The trends displayed here are very similar to those of the less likely to experience positive emotions group: The highly motivated group with negative learning experiences displayed significantly more anxiety than learners belonging to the other three motivation groups.

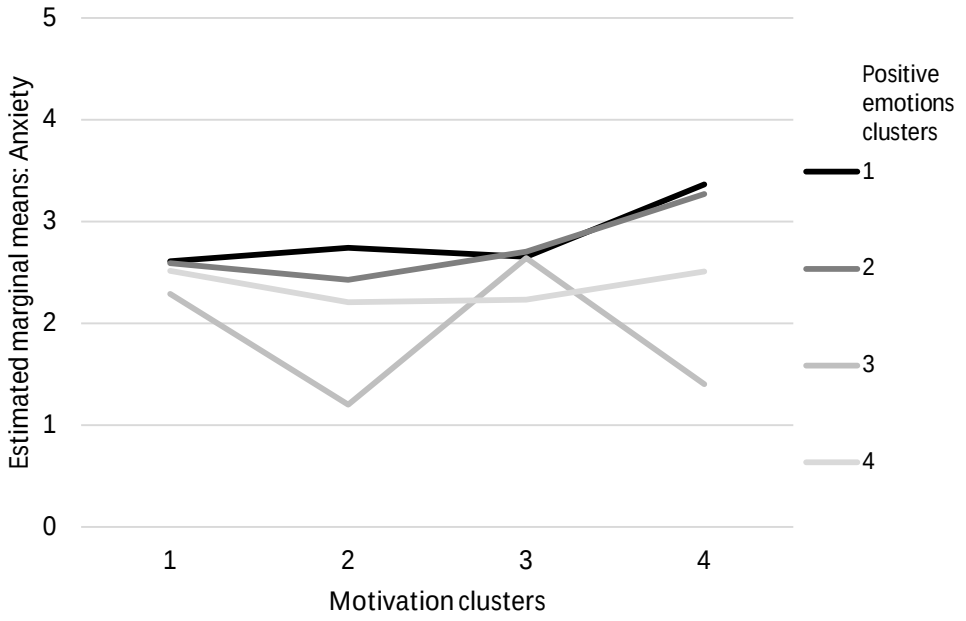

Figure 2 Second-order effects on FLA: Motivation clusters and positive emotions clusters for technologically autonomous students (Motivation cluster 1 = internally motivated with positive learning experiences; Motivation cluster 2 = overall low motivation; Motivation cluster 3 = overall high motivation; Motivation cluster 4 = high motivation with negative learning experiences. Positive emotions cluster 1 = less likely to experience positive emotions; Positive emotions cluster 2 = hopeful and enjoys learning English; Positive emotions cluster 3 = more likely to experience positive emotions; Positive emotions cluster 4 = hopeful and proud)

Moreover, the overall highly motivated and more autonomous learners also exhibited significantly different anxiety levels depending on the positive emotion profile they belonged to F (3, 1104) = 12.72, p < .001, partial eta squared = .033 (see Figure 1). The group which was more likely to have positive emotions and the one that was more hopeful and prouder showed the lowest levels of anxiety, while the anxiety level of the group that is hopeful and enjoys learning was somewhat higher, and the less likely to experience positive emotions group reported the highest levels of anxiety.

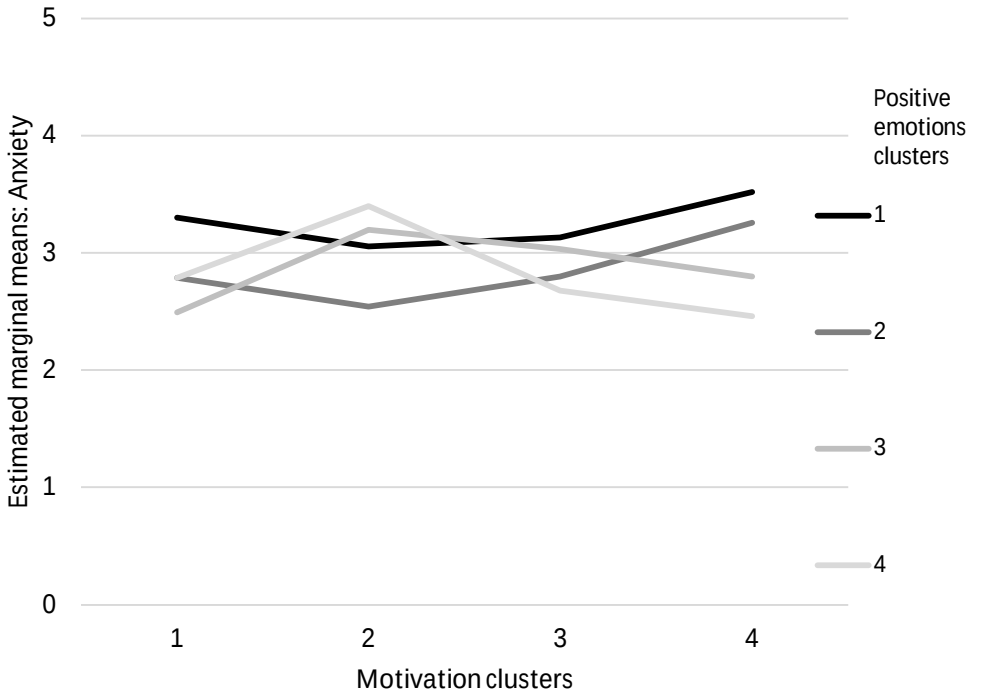

Figure 3 Second-order effects on FLA: Motivation clusters and positive emotions clusters for overall less autonomous students (Motivation cluster 1 = internally motivated with positive learning experiences; Motivation cluster 2 = overall low motivation; Motivation cluster 3 = overall high motivation; Motivation cluster 4 = high motivation with negative learning experiences. Positive emotions cluster 1 = less likely to experience positive emotions; Positive emotions cluster 2 = hopeful and enjoys learning English; Positive emotions cluster 3 = more likely to experience positive emotions; Positive emotions cluster 4 = hopeful and proud)

Technologically autonomous learners who were also characterized by high motivation and negative learning experiences also had significantly different

anxiety levels depending on their positive emotion profiles F (3, 1104) = 12.72, p < .001, partial eta squared = .033 (see Figure 2). The more likely to have positive emotions group reported the lowest anxiety levels followed by the hopeful and proud group, while the hopeful and enjoys learning and the less likely to experience positive emotions group had similarly high anxiety levels.

Moreover, if the high motivation and negative learning experiences profile was associated with a less autonomous profile, the positive emotions profiles also significantly moderated the learners' anxiety levels F (3, 1104) = 4.67, p = .003, partial eta squared = .013 (see Figure 3). The trend is quite similar to what could be seen in the case of the technologically autonomous learners although in this case the hopeful and proud group had the lowest anxiety level followed by the more likely to have positive emotions group. The other two profiles displayed higher values, with the less likely to have positive emotions group being the highest.

Finally, the overall less motivated learners who were also less likely to experience positive emotions displayed significantly different levels of anxiety based on their autonomy profiles F (3, 1104) = 4.67, p = .003, partial eta squared = .013 (see Figures 1-3). Among them more autonomous learners displayed the lowest levels of anxiety while the other two autonomy groups exhibited higher anxiety levels, with less autonomous learners being the most anxious.

5. Discussion

We set out to answer three research questions in this article, and while the first two appear to have rather straightforward answers, finding a response to the third one proved to be quite complicated. Our first research question inquired how participants' motivation-, autonomy-, and positive emotions-based profiles predicted the level of anxiety reported by these learners. Based on the GLM analysis (see Table 2), 17.6% of the variance in learners' anxiety scores can be explained by the model, that is, the variables' main and interaction effects. This suggests that learners' motivation, autonomy and their positive emotions of hope, pride, enjoyment and curiosity were moderate determinants of FLA. Perhaps this should not be surprising considering the fact that anxiety experienced in connection with learning an L2 also has many situational determinants, like the students and teacher and the whole classroom learning experience (MacIntyre & Gardner, 1991). This means that while the contribution of motivation, autonomy and positive emotions to FLA is statistically significant, there must be various other factors also playing a role in determining learners' anxiety.

Our second research question referred to whether the predictors in our model, that is, the motivation-, autonomy-, and positive emotion-based profiles had

main effects on FLA. Based on the GLM analysis (see Table 2), the above variables all influenced FLA independently, but their small effect sizes signaled a moderate impact. These findings bring further support for studies that have found evidence for links existing between pairs of these constructs like FLA and motivation (Papi, 2010), and FLA and enjoyment (Dewaele & MacIntyre, 2014, 2016). However more importantly, they substantiate the independent effect of all of these factors due to the fact that even when examined within the same model, motivation, autonomy and positive emotions still had significant individual contributions to determining FLA, which is something that has not been demonstrated before.

We posed our third research question about any potential interactions between motivation-, autonomy-, and positive emotion-based profiles that had an influence on FLA. The effect sizes of the GLM analysis (see Table 2) showed that the interaction effects were more influential than the individual contribution of any of the factors, suggesting more complex interrelationships between the variables than what could be described by simple linear relationships, just as MacIntyre (2017) and Gregersen (2020) proposed earlier. However, since the interpretation of second-order interactions is quite complicated because learners' profiles need to be considered with respect to three dimensions at the same time, instead of discussing each scenario separately, we attempt to highlight the most prominent trends below.

The most prominent interaction pattern that could be witnessed in our data was related to the moderating role of positive emotions, which seemed to signal a cumulative effect. This means that the higher the level of positive emotions reported, the lower the level of anxiety found. This was what we witnessed in the case of highly motivated and highly autonomous learners (see Figure 1), and a similar pattern could be observed when looking at the technologically autonomous group whose members were also highly motivated but had negative learning experiences (see Figure 2). Furthermore, students displaying high motivation with negative learning experiences who were also less autonomous reported similar patterns (see Figure 3). These findings highlighting an inverse relationship between positive emotions and FLA are in line with previous research, which often evidenced a negative relationship between positive and negative emotions (Dewaele et al., 2018; Dewaele & MacIntyre, 2014; Resnik & Dewaele, 2020). What might count as a novel finding in this respect is that the effects of positive emotions seem to have added up, leading to the lowest level of anxiety in the more likely to experience positive emotions group in the majority of cases. Although not quite analogous, this finding is reminiscent of Fredrickson and Joiner's (2018) upward spiral of lifestyle change, where repeated encounters with contextually appropriate positive emotions were associated with increases in a range of personal resources, which in turn led to decreases in depressive symptoms.

Another interesting trend revealed by the interaction effects, which should be explored in further studies since to date there is no empirical research available on this topic, concerns how likely certain positive emotions were to be associated with anxiety. Our data suggested that students hardly ever reported high anxiety levels when their level of curiosity was high, and high pride was also less likely to be associated with a high level of anxiety. At the same time, hope and enjoyment were more often found to accompany higher levels of anxiety (see Figure 1 for highly motivated and highly autonomous learners, Figure 2 for the technologically autonomous group whose members were also highly motivated but had negative learning experiences, and Figure 3 for students displaying high motivation with negative learning experiences who were also less autonomous). Although there is some evidence that interactions between FLA and FLE can range from negative to positive (Boudreau et al., 2018) suggesting that a positive association between enjoyment and anxiety is sometimes possible, further research is needed to substantiate the relationship of anxiety with hope, pride and curiosity. Since hope is essentially a future-focused emotion (Snyder et al., 1991) while pride refers to past achievements (Ross & Stracke, 2016), it is easy to see why hope might be more likely to be associated with anxiety than pride from a theoretical point of view. The lack of association between curiosity and anxiety found in our study is more puzzling since, according to Mahmoodzadeh and Khajavy (2019), a potential source of curiosity can be a feeling-of-deprivation, which might be hypothesized to be linked to anxiety as well on theoretical grounds.

A further tendency that can be deduced from the interaction effects is that external factors, especially higher reported levels of ought-to L2 self and perceived importance of contact may increase anxiety. This was true for learners who were highly autonomous but reported low levels of positive emotions (Figure 1). While these learners reported moderate levels of anxiety when their motivation was either high overall or they had strong ideal L2 selves and positive learning experiences, anxiety levels increased sharply for those learners who also had strong ought-to L2 selves and attributed high importance to contact with English. This suggests that without having a positive affective orientation towards learning English, these learners found both ascribing high importance to contact with English and pressures from significant others anxiety-provoking. The latter finding is in line with earlier studies that found a positive relationship between the ought-to L2 self and anxiety (Papi, 2010; Tahmouresi & Papi, 2021). Nevertheless, the proposed positive link between external factors and anxiety should be confirmed in further research.

Interaction effects also seem to suggest that higher levels of reported autonomy might coincide with lower levels of anxiety. This was the case for our less motivated learners who were less likely to experience positive emotions; for them,

autonomy was a factor moderating their anxiety levels (Figures, 1, 2, 3). In their case, being more autonomous overall was associated with lower anxiety levels and being less autonomous with higher anxiety levels, while the anxiety levels of technologically autonomous learners were between these two. The finding that higher levels of autonomy coincided with lower levels of anxiety and vice versa should not be surprising since Ghorbandordinejad and Ahmadabad (2016) also found evidence for the negative correlation of autonomy and L2 learning anxiety in their large-scale questionnaire study conducted on Iranian English as foreign language learners.

Finally, a detailed examination of the interactions suggested that negative learning experiences usually tended to raise learners' anxiety levels. Students with high technological autonomy, who either had low levels of positive emotions (see Figure 2) or had high hope and enjoyment (see Figure 2), tended to display somewhat higher anxiety almost regardless of their high, low, or intrinsic motivation profiles. In terms of motivation, learning experience was also a decisive factor because having negative learning experiences was associated with higher anxiety levels for learners. This should probably not come as a surprise since several social factors which are integral to learning experiences are known to contribute to language learning anxiety (Horwitz et al., 1986).

6. Conclusion

Based on our results, it is clear that language learning anxiety, as reported by students through quantitative measures, is a complex phenomenon. Our key takeaways include the finding that investigating students' language learning anxiety is most effective when both linear and non-linear relationships are considered. It is also important to note that as students internalize their motivation, their anxiety appears to decrease, indicating that anxiety could be associated with motivation as an external pressure. Furthermore, our results suggest that high levels of negative emotions may be coupled with anxiety, but there is a positive cycle: The more positive emotions students experience, the lower their anxiety tends to be. Regarding autonomy, language learning experiences may provide an important, yet unexplored, mediating effect shaping student anxiety: Regardless of perspective, negative language learning experiences are likely to be associated with increased anxiety. Therefore, the most important theoretical implication is that theorizing about anxiety and its antecedent ID variables should consider heterogenous student profiles. It is not only that one size does not fit all but also that dynamic theories should account for the interplay of ID variables and not just their individual impacts.

This means that pedagogical implications should also be nuanced in the sense that no ready-made blueprint can be offered to teachers in the classroom,

but they need to be made aware of the possible interplay of ID variables and the characteristics of the most important student profiles in order to be able to decide how to decrease the level of anxiety in a classroom attended by a heterogeneous group of students. Research seems to support teachers' tacit knowledge about the uniqueness of their learners and the unsuitability of a uniform treatment when it comes to error correction, giving feedback or evaluation. Learners might experience quite different levels of anxiety, for example, depending on how positively they feel about L2 learning overall, how autonomous they are or what kind of learning experiences they had in their classrooms. Furthermore, although a cross-sectional study like ours can only provide a snapshot of the situation under examination, teachers should also be reminded that the intricate relationships revealed by our study are not likely to remain stable, and changes brought about by the passing of time should also be addressed on an individual basis.

Obviously, our study is not without shortcomings that could point to further research directions. First, switching to online questionnaires from paper-based ones might have caused unintended changes in respondents' behavior along with the disruption that necessitated this switch: the breakout of the COVID-19 pandemic and the ensuing shift to online education (for an in-depth discussion of this issue see Csizér et al., 2025). Furthermore, the low effect sizes require further investigation, as they may obscure significant and meaningful effects at the individual level, which appear to be an exciting new research direction (Elani Shirvan et al., 2025). Based on our results, interview guides could be developed to explore the debilitating anxiety of individuals and give voice to students grappling with anxiety on a daily basis (Hiver, et al., 2019). Such interviews could offer novel insights into learners' cognitions regarding the interrelationships of the constructs examined by us. Also, it would be interesting to see idiodynamic research linking task motivation and various positive emotions with L2 anxiety, for example. Additionally, it would be fascinating to examine how teachers perceive the relationships between the individual difference variables outlined here and what pedagogical strategies they employ to mitigate students' negative experiences while fostering positive L2 learning processes.

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