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Abstract

The learning of a second language is distinct from other types of learning, and involves a complex interplay of cognitive, affective, motivational, and emotional factors. Two important factors are language mindsets, the beliefs that learners hold regarding their language learning ability, and foreign language anxiety, the language classroom-specific anxiety that many learners experience. The purpose of this quantitative correlational study was to discover whether a relationship exists between language mindsets and foreign language anxiety for second language students at a large university in Virginia. The study used four bivariate linear regressions to examine correlations between the predictor variable, foreign language anxiety, and four language mindset-related variables, overall language mindset and its three subdimensions. Results indicated a significant, moderate, positive correlation between foreign language anxiety and fixed mindsets on three of the variables, and a significant, small, positive correlation on the fourth. The study therefore demonstrated a relationship between language mindsets and foreign language anxiety, such that higher levels of anxiety correlate with fixed language mindsets, and lower levels with growth mindsets. These findings have implications for classroom practice; efforts at lowering anxiety and encouraging growth mindsets ought to mutually strengthen one another and improve student outcomes. Suggested areas of future research include duplicating this study with different demographics and conducting multiple regression analyses between language mindsets and several other variables of interest.

Introduction

The learning of a second language (L2) is distinct from other types of learning, and involves a complex interplay of cognitive, affective, motivational, and emotional factors (Dörnyei & Ryan, 2015; Ellis, 2010; Khajavy et al., 2021; Lou & Noels, 2016, 2017, 2019a, 2019b; Sadoughi & Hejazi, 2023; Wang et al., 2021; Williams, 1994; Zarrinabadi et al., 2021). Studies in educational psychology rarely address L2 learning as a domain distinct from other types of learning. At the same time, studies in L2 learning do not always appropriate and adapt the theories and models of educational psychology. Recently, studies have begun to incorporate the theory of mindsets, from the field of educational psychology, into L2 learning (Khajavy et al., 2021; Lou & Noels, 2016, 2017, 2019a, 2019b; Sadoughi & Hejazi, 2023; Wang et al., 2021; Zarrinabadi et al., 2021). These studies have concluded that

the belief that one brings into one's L2 learning process about one's L2 learning ability can actually determine one's L2 learning outcomes. That is, if students believe that they can improve in an L2 with hard work, they will engage in behaviors that lead to improvement; if they believe that L2 learning abilities are largely innate and unaffected by effort, they will avoid positive behaviors and engage negative behaviors, leading to less improvement.

Decades' worth of literature on mindsets has shown that growth mindsets correlate positively with learning outcomes and negatively with classroom anxiety, and that fixed mindsets correlate negatively with learning outcomes and positively with classroom anxiety (Burnette et al., 2013; Claro et al., 2016; Haimovitz & Dweck, 2017). However, since research in L2 learning has shown that learning an L2 is distinct from any other type of learning, findings on concepts such as motivation, anxiety, or mindsets, or other implicit theories, cannot extend to the domain of language learning without more research (Ellis, 2010; Kumar & Nazneen, 2016; Lou & Noels, 2016, 2017, 2019a, 2019b; Williams, 1994). Burnette et al. (2013), a systematic review of the literature on quantifiable assessment of mindset theory, somehow manages, despite analyzing findings from 85 publications (a number reduced from several thousand possible candidates), to not mention the word "language" once. This illustrates the immensity of the gap between mindset research and L2 learning research.

Bridging the Gap between Mindsets and Language Learning

Only recently have researchers begun to bridge this gap between findings in mindset research on one hand and L2 learning research on the other. Regrettably, many of these studies begin with the flawed assumption that learning mindsets for content areas such as history, science, math, etc., are relevant to language learning (Altunel, 2019; Yang & Priyadarshini, 2019). For brevity, mindsets for areas of learning other than language will be referred to here as content mindsets (CMs). A series of studies by Nigel Lou and Kimberly Noels (2016, 2017, 2019a, 2019b, 2019c, 2020a, 2020b) prove this assumption false, and establish the concept of language mindsets (LMs) as distinct from CMs. These authors created and validated an instrument for measuring LMs, and in several correlational and quasi-experimental studies have demonstrated that strong relationships exist between LMs and several L2 learning factors such as students' learning goals and consequent behaviors (Lou & Noels, 2016), migrants' sensitivity and anxiety toward being rejected by the majority language group due to their self-perceived L2 deficiencies (Lou & Noels, 2019a, 2020a), and more.

More research is necessary to connect the relatively new theory of LMs to other well-researched L2 learning theories. One such well-researched affective L2 learning factor is foreign language anxiety (FLA), a field whose literature has shown that higher levels of anxiety in the language classroom correlate to poorer performance and outcomes (Awan et al., 2010; Horwitz, 2010; Horwitz et al., 1986; Torres & Turner, 2016; Zhang, 2019; Zheng & Cheng, 2018). FLA exists as a well-established concept in L2 learning literature, with decades' worth of publications supporting its negative correlation to L2 classroom achievement, persistence in L2 classes, L2 learning motivation, self-efficacy, and more (Awan et al., 2010; Horwitz, 2010; Horwitz et al., 1986; Torres & Turner, 2016; Zhang, 2019; Zheng & Cheng, 2018). While studies in LMs point toward a likely relationship between FLA and LMs, no studies have as yet verified that this relationship exists. Because of the preponderance

of evidence in the literature showing that FLA predicts success in several measures, establishing such a relationship carries implications for the field of L2 pedagogy. If FLA is correlated to LMs, and if FLA predicts L2 success, then LMs must predict L2 success as well, and therefore merit more attention by L2 educators and researchers.

Problem, Purpose, and Significance of the Study

Because LM research is relatively new, many areas remain to be explored, including LMs' potential relationships to university L2 students' FLA. Exploring this relationship is critical for several reasons. First, studies on mindsets in other learning domains have shown that CM-based interventions lead to marked improvement in student achievement, learner goal orientations, anxiety, and more (Burnette et al., 2013; Claro et al., 2016). Second, other research has shown that FLA has a negative effect on student achievement (Alsowat, 2016; Horwitz, 2010; Horwitz et al., 1986; Torres & Turner, 2016; Zhang, 2019; Zheng & Cheng, 2018). L2 classrooms are ripe for interventions that might lead to student improvement in all outcomes; they are often classrooms characterized by low motivation, high anxiety, and low achievement (Molway & Mutton, 2019). In relating LM research to another important language learning variable, FLA, the author hopes to broaden the scope of LM research and highlight the importance of bringing an awareness of LMs to the L2 classroom. The purpose of this quantitative correlational study, therefore, was to discover whether a relationship exists between LMs and FLA for university L2 students at a large central Virginia university.

Nearly half of all universities in the United States require their undergraduate students to engage in some level of study in a language other than English (Flaherty, 2018). Roughly 1.5 million undergraduate students in the United States are enrolled in some form of L2 class, but this number is declining. Given both the prevalence of language requirements and the seeming decline in interest in language study across universities, understanding how to increase interest and success is important now more than ever. LM research shows promise for helping to increase student success in the L2 classroom. Given that mindset interventions in non-L2 domains have been successful in improving student outcomes and retention (Claro et al., 2016), it stands to reason that LM interventions ought to prove successful in the L2 classroom. That is, if LMs prove to be consequential to student outcomes in the L2 classroom, similar interventions ought to increase interest and retention in the L2 classroom. This assumption requires empirical exploration and exceeds the scope of this study. However, further establishing the significance of LMs by relating them to FLA would justify such further exploration in the future.

Studies in LMs thus far have focused primarily on native speakers of languages other than English. Nigel Lou and Kimberly Noels (2016, 2017, 2019a, 2019b, 2019c, 2020a, 2020b), the foremost originators of LM theory, have focused primarily on English language learners' (ELLs') experiences in learning English as immigrants to an English-majority country, Canada. More recently, a spate of LM research has emerged focusing on Iranian learners of English as an L2 (Iranian ELLs). Findings consistently demonstrate the importance of LMs in predicting several emotional learning factors such as grit, boredom, pride, and enjoyment, as well as such tangible factors as L2 classroom achievement. Several of the articles also focus on Iranian ELLs' perceptions of their teachers' attitudes toward them, and the impact of these perceptions on LMs. While limited to Iranian ELLs, these

studies further bolster the rationale for this current study, demonstrating the promise of LMs as a new field of inquiry. Several of these studies therefore warrant brief mention.

Wang et al. (2021) compared LMs to several classroom emotional factors. Growth language mindset was positively correlated with willingness to communicate (WTC), academic pride, and academic enjoyment, and negatively correlated with boredom. Zarrinabadi et al. (2021) also found that growth LMs correlated positively with WTC in the language classroom. Given that language learning is largely mediated by communication in the L2, WTC is crucial; that growth LMs predictably correlate to higher WTC has major implications for L2 pedagogy.

Khajavy et al. (2021) compared LMs to another important affective learning factor, grit. Grit consists of two higher-order dimensions, perseverance of effort (POE) and consistency of interest (COI), where “POE refers to tendency to work hard and sustain effort even when one faces challenges [and] COI means maintaining interest over time even when one faces setbacks and failures” (Khajavy et al., 2021, p. 380). The authors found that both POE and COI were negatively correlated with fixed LMs, and positively correlated with growth LMs. Further, they found that “growth mindset was a significant positive predictor of L2 achievement,” with L2 achievement measured by final grades (Khajavy et al., 2021, p. 391). Sadoughi and Hejazi (2023) also found that growth LMs correlated positively with grit and with higher academic engagement, another critical factor in students’ L2 learning outcomes.

While native English-speaking L2 learners in university-level classrooms have received some attention in the LM literature (Lou & Noels, 2016), this demographic, consisting of roughly 1.5 million students (Flaherty, 2018), warrants more examination. The present study expands the generalizability of others’ findings and amplifies the range of LM literature by examining the LMs of students at a university in Virginia, United States, focusing on English-speaking students of other languages exclusively. Further, this study integrates the well-established field of FLA research and the burgeoning field of LM research, thereby helping to bring LMs more deeply into the mainstream of L2 learning literature.

The Three Dimensions of Language Mindsets

The complexity of LMs goes beyond the binary of fixed and growth mindsets to three separate but related dimensions: general language intelligence beliefs (GLB), second language aptitude beliefs (L2B), and age sensitivity L2 learning beliefs (ASB) (Lou & Noels, 2016, 2017).

General Language Beliefs and Second Language Aptitude Beliefs

GLBs describe an individual’s overall mindset regarding whether language intelligence is fixed or growable, and are distinct from L2Bs, which describe an individual’s beliefs about whether effort in learning an L2 leads to an increase in his or her abilities in the L2 (Lou & Noels, 2016, 2017). The distinction between GLB and L2B is important, as studies show that a belief that overall or first-language abilities can be improved through effort

(GLB) does not predict such a belief toward the learning of an L2 (L2B) (Lou & Noels, 2016). In other words, some people may believe that language aptitude in general is a natural ability, while L2 learning requires effort, or that no amount of effort can improve either aptitude (Lou & Noels, 2016).

Age Sensitivity L2 Learning Beliefs

ASBs are conditioned by lay beliefs about age and language learning, often formed by misunderstandings of findings in second language acquisition (SLA) literature. The popularization of the critical period hypothesis has led to a strong reading of the hypothesis which fuels misunderstandings. The critical period hypothesis essentially states that SLA happens best before the onset of puberty due to brain plasticity changes which set in at puberty (Birdsong, 2018). The critical period has been proven; preadolescents do acquire certain elements of an L2 more quickly and more naturally than postpubescent and adults (Birdsong, 2018), and brain changes leading to overall decline in cognitive faculties as a result of aging indirectly lead to less apt SLA in adults (Birdsong, 2018; Li et al., 2014; Ullman, 2004). However, it is important to note that it is a matter of degree; proponents of the hypothesis argue only that preadolescents acquire certain features of language more naturally, not that they learn a language better in every way, nor that adults are unable to master an L2 (Abello-Contesse, 2008; Birdsong, 2018; Fromont et al., 2018; Li et al., 2014). In fact, adults learn and acquire certain language features better and more rapidly than children due to their higher cognitive abilities and learning strategies (Abello-Contesse, 2008; Birdsong, 2018; Ortega, 2008). It is more accurate to say, then, that there is a sensitive period, rather than a critical period, of L2 acquisition, and that any age-based acquisition sensitivity associated with younger learning ages is arguably offset by cognitive and learning strategies present in later learning ages. The lay misinterpretation of the critical period hypothesis, however, unfortunately leads many people to mistakenly believe that one cannot truly learn an L2 past a certain point of adolescence (Lou & Noels, 2016, 2017).

Due to this widespread misunderstanding regarding the effect of age on language learning and acquisition, many individuals believe that children learn an L2 better than adults, or even that adults cease to be able to learn an L2 after a certain age (Lou & Noels, 2016, 2017). ASBs therefore describe an individual's beliefs with regard to whether L2 learning abilities are growable until a certain age and fixed beyond it, or whether they are growable throughout a learner's life (Lou & Noels, 2016, 2017).

The Interaction of the Three Beliefs

Lou and Noels (2016, 2017) argue that GLB, L2B, and ASB are distinct; that is, people might have growth beliefs in one area and fixed beliefs in another. Specifically, there seems to be a hierarchy wherein people consider some language abilities as growable up to a certain age but fixed beyond a certain age. This means that, depending on the age of the persons in question, and depending on what they have heard and understood regarding the critical period hypothesis, their ASB may be more likely to lead to a fixed L2B.

The three aspects of language mindsets, GLB, L2B, and ASB, together with the two major categories of each, fixed or growth, lead to a six-factor, complex interaction, which Lou and Noels (2017) argue captures the overall

complexity of LMs. They base the development of their survey instrument, the Language Mindsets Inventory (LMI), on these six factors. Fixed mindsets break further into one of two categories: fixed with high perceived innate ability (fixed-high) and fixed with low perceived innate ability (fixed-low). Those with a fixed-high mindset will have mastery-oriented behaviors, meaning they seek challenges and are persistent, but with the goal of obtaining praise (Dweck & Leggett, 1988). Those with a fixed-low mindset will exhibit helplessness patterns, meaning they will avoid challenges and give up easily (Dweck & Leggett, 1988). It may be possible for an individual to tend more toward a growth mindset in one domain, and more toward a fixed-high or fixed-low in another.

Taken altogether and using the overall score of the LMI as the ultimate factor, it is possible to place an individual's mindset as more fixed (high or low) or growth. The contention of the hypotheses in this current study was that higher FLA will predict a tendency toward a more fixed LM, generally and in each of the three subdimensions. Given that the participants were young adults (postpubescent) who are likely to have been exposed to some version of the critical period hypothesis, it is likely that ASB will strongly coincide with overall LM; in particular, students will likely condition their belief in the malleability of L2 learning on their age.

Method

The purpose of this research study was to discover whether a relationship exists between language mindsets (LMs) and foreign language anxiety (FLA), as well as to discover whether relationships exist between the three subscales of LMs and FLA. To test for these relationships, this study used a correlational design, with four bivariate linear regressions to test the predictive ability of a predictor variable on four separate criterion variables. The predictor for all four was FLA, defined as “a distinct complex of self-perceptions, beliefs, feelings, and behaviors related to classroom language learning arising from the uniqueness of the language learning process” (Horwitz et al., 1986, p. 128). The criterion variables involved LM and its three subdimensions. These are general language intelligence beliefs (GLB), second language aptitude beliefs (L2B), and age sensitivity L2 learning beliefs (ASB).

Design

The study was cross-sectional, meaning that data were collected at one point in time, rather than longitudinal, with data collected over a period of time. Cross-sectional research is ideal when exploring relationships between variables in a new domain, or when relating a new variable to a more well-researched domain (Spector, 2019), as was the case in this exploratory study. Further, longitudinal research runs the risk of leading to erroneous inferences on relationships between variables, especially if there may be a causal relationship at play whose timeframe is unknown (Spector, 2019). In short, the cross-sectional approach was ideally suited to this exploratory study.

Research Questions and Hypotheses

The research questions for this study were:

RQ1: Can foreign language anxiety predict overall language mindset?

RQ2: Can foreign language anxiety predict general language intelligence beliefs?

RQ3: Can foreign language anxiety predict second language aptitude beliefs?

RQ4: Can foreign language anxiety predict age sensitivity L2 learning beliefs?

The null hypotheses for this study were:

H01: There is no significant predictive relationship between foreign language anxiety and language mindsets.

H02: There is no significant predictive relationship between foreign language anxiety and general language intelligence beliefs.

H03: There is no significant predictive relationship between foreign language anxiety and second language aptitude beliefs.

H04: There is no significant predictive relationship between foreign language anxiety and age sensitivity L2 learning beliefs.

Participants and Setting

The participants were drawn from a convenience sample of university students enrolled in beginner-intermediate and intermediate L2 classes at a large, private university in Virginia. For the purposes of this study, beginner-intermediate and intermediate students are those in their second, third, or fourth semester of study. At the university in question, these courses receive the numbers 102, 201, and 202. The 101, 102, 201, and 202 course sequence is meant to encompass the basics of grammar and vocabulary of the languages offered. 202-level courses are the prerequisite for junior- and senior-level, advanced-study courses at the 300- and 400-level. These higher-level courses are typically required only for those pursuing minors and majors in a language, while all Bachelor of Arts degrees at the university require that students complete the 101-202 sequence in a language. The languages offered with the 101-202 sequence are Spanish, French, German, Mandarin Chinese, Russian, and Arabic. While American Sign Language is also offered, these participants were excluded due to the modality difference (manual-visual language versus oral-aural).

A total of 198 students (64% female) took part in this study. The sample ranged in age from 18 to 29 years ($M = 20.17$, $SD = 1.65$). Of these students, 31 were enrolled in Arabic courses, 24 in French, 20 in German, 25 in Mandarin Chinese, 27 in Russian, and 71 in Spanish; 99 were enrolled in 102-level courses, and 79 in 202. Only 20 students were enrolled in 201-level courses, as many of these languages offer 201 and 202 levels in alternating fall and spring semesters, respectively, and data were collected in a spring semester.

The vast majority of participants (95.45%) spoke English as their native language. A minimum sample size (N) of 100 participants is recommended for a one-predictor bivariate analysis (Warner, 2013), and for populations around roughly 500, give or take a hundred, at least 50% of the population is recommended for the sample size (Mills & Gay, 2019). There were 324 students who met eligibility criteria; the sample size of this study ($N = 198$) represents 61% of this population and is therefore robust. Figures 1 and 2 below show participant target language

and language level distribution.

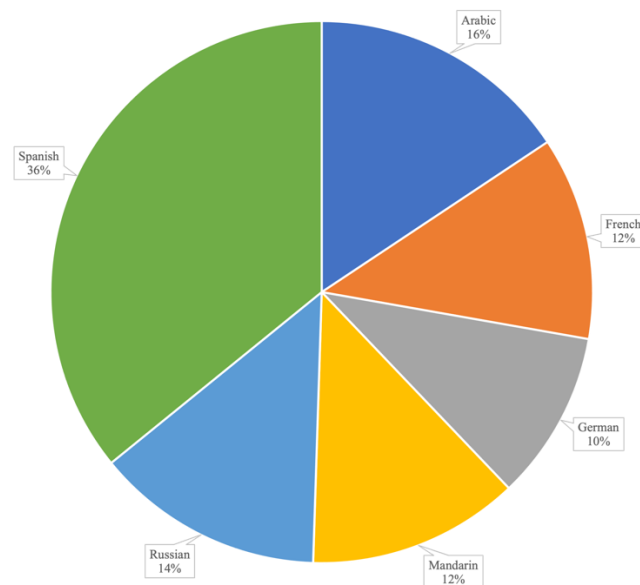


Figure 1. Participant Target Language Distribution

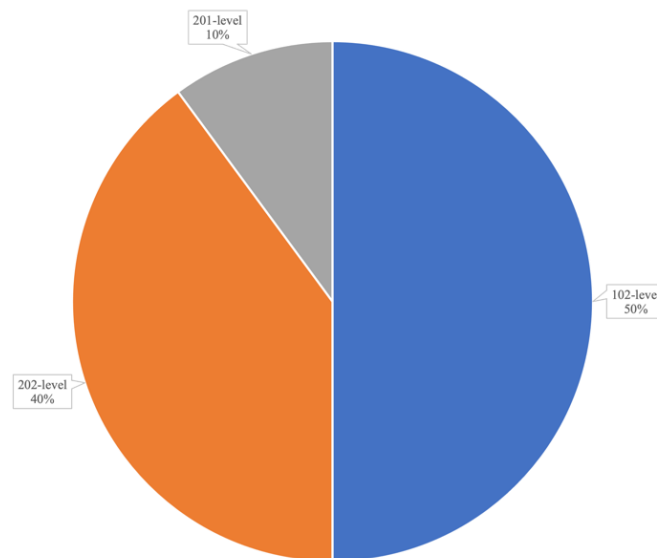


Figure 1. Participant Language Level Distribution

This sample was homogenous, appropriate, and large. It is important for a sample to have a high degree of homogeneity, as wide differences between participants can obscure causal relationships between variables (Gall et al., 2007). While there are differences in level (second through fourth semester) and language, these students all fit within the beginner-intermediate to intermediate category. Pure beginners (those in the 101-level) were excluded, due to their limited exposure to the L2 classroom at the host institution; their mindsets and anxieties might not have fully formed. Advanced students were also excluded, as this group comprises minor and major students. It is reasonable to assume that the advanced group self-selects for students who are likely to have a more positive disposition toward language learning generally, which might skew results. Finally, while there is some debate in the literature about whether FLA tends toward decline as students progress in their L2 studies, the

consensus seems to be that beginner-intermediate to intermediate students ought to be relatively homogenous in their overall FLA patterns and show little change at these levels of difference (Capan & Simsek, 2012; Casado & Dereshiwsky, 2001; Torres & Turner, 2016). In other words, though advanced students would likely hold lower levels of FLA (Zhang, 2019), the chosen participant range ought to be relatively homogenous in FLA.

Instrumentation

The study made use of two survey questionnaire instruments. The first instrument was Lou and Noels's (2017) Language Mindsets Inventory (LMI), whose overall score indicates the type of overall language mindset of participants, and whose subscale scores indicate their subscale language mindsets. The second instrument was Horwitz's et al. (1986) Foreign Language Classroom Anxiety Scale (FLCAS) to measure students' FLA.

The Language Mindsets Inventory

The LMI was developed and validated by Lou and Noels (2016, 2017) as a 21-question Likert scale, and later updated to an 18-question version (Lou & Noels, 2019c). The LMI uses a 6-point Likert scale that ranges from Strongly Agree to Strongly Disagree. Responses are as follows: Strongly Agree = 6, Moderately Agree = 5, Slightly Agree = 4, Slightly Disagree = 3, Moderately Disagree = 2, and Strongly Disagree = 1. The 18 items break into three subscales, measured by six items each; GLB, L2B, and ASB. The instrument measures whether participants have an overall growth or fixed LM, as well as whether they hold more of a growth or fixed mindset in each individual subscale. Nine total items reflect growth mindset views, and nine reflect fixed mindsets, with three each in each of the three subscale categories. The combined possible score ranges from 18 points as the lowest score, and 108 as the highest, as long as no items are left blank. Growth mindset items are reverse scored, such that a higher overall score on the instrument indicates a stronger fixed LM, while a lower overall score indicates a stronger growth LM. Within each subscale, scores range from 6 to 36. With reverse scoring of growth items, lower scores likewise indicate a stronger subscale-specific growth mindset, and higher scores a stronger subscale-specific fixed mindset.

The LMI was designed to indicate the strength of participants' fixed or growth overall LMs based on their overall score (Lou & Noels, 2017, 2019c). The instrument also allows for researchers to measure the overall strength of either the fixed or growth LM held by participants; however, LMs are multidimensional, and it is possible for a participant to hold more of a growth LM in one or two subscales, and more of a fixed LM in the other(s). Therefore, this study examined the overall score as one variable against FLA, as well as each subscale score in turn as separate variables against FLA.

The Foreign Language Classroom Anxiety Scale

The FLCAS was developed and validated by Horwitz et al. (1986). The instrument consists of 33 questions and uses a 5-point Likert scale that ranges from Strongly Agree to Strongly Disagree. Responses were as follows: Strongly Agree = 5, Agree = 4, Neutral = 3, Disagree = 2, and Strongly Disagree = 1. Scores on the instrument

can range from 33 to 165 points. A higher score indicates a higher degree of FLA, while a lower score indicates a lower degree of FLA. Most questions in the instrument are negatively formulated, but nine questions (2, 5, 8, 11, 14, 18, 22, 28, and 32) are positively formulated, and must therefore be reverse scored. The FLCAS, like the LMI, can be used to examine either total FLA alone, or FLA along with three of its own subscales, with certain items pertaining to different aspects of FLA (Horwitz et al., 1986). However, most studies use only the aggregate score in their analyses (Al-Shboul et al., 2013; Teimouri et al., 2019; Zhang, 2019), and so the author of this study did the same. In fact, the aggregate is the strongest for measuring FLA across varying learning contexts (Zhang, 2019), so it is best suited to the diverse target participant pool.

Assumption Tests

Data were first examined to screen for missing values and inconsistent responses, and to verify that data were normally distributed. Next, the researcher used scatterplots to test the three assumptions of Bivariate Outliers, Linearity, and Bivariate Normal Distribution (Warner, 2013). All three bivariate regression assumptions were tested with scatterplots between the predictor variables (x) and the criterion variable (y). The Assumption of Bivariate Outliers was tested by examining the scatterplots for extreme outliers. No extreme outliers were found for total FLA and LMI scores, nor for L2B and ASB scores, so this assumption was determined tenable for these variables. One outlier was found in the GLB data set. The researcher chose to eliminate this outlier for discussion of results. The Assumption of Linearity was tested by examining the scatterplots for a linear relationship. A linear relationship was found for every variable set, so this assumption was determined tenable. The Assumption of Bivariate Normal Distribution was tested by examining the scatterplots for the classic “cigar shape.” The “cigar shape” is present in all scatterplots, so this assumption was determined tenable for all variable sets.

Data Analysis

Data were analyzed using four separate bivariate linear regression analyses. Bivariate linear regression describes the predictive relationship between a predictor variable, such as FLA, and a criterion variable, or in this case, four separate criterion variables—LMs and the three subscales (Warner, 2013). For the null hypotheses to be rejected, scores on the FLCAS ought to increase as scores on the LMI and its subscales increase as well; this would indicate that higher FLA predicts more of a fixed, as opposed to growth, LM.

Since four bivariate linear regression analyses were used, the risk of Type I error was increased. Type I error refers to a researcher’s rejecting the null hypothesis or hypotheses when they are actually correct (Warner, 2013). To limit Type I error risk, the per-comparison alpha level ($PC\alpha$) was determined using a Bonferroni correction. The Bonferroni correction lowers the alpha level by dividing the experiment-wise α ($EW\alpha$) by the number of correlations tested (k) (Warner, 2013). By lowering the alpha level, the risk of Type I error is lowered, as “in theory the risk of committing a Type I error corresponds to the alpha level chosen by the researcher” (Warner, 2013, p. 85). $EW\alpha$ is most often set at .05, which indicates a 5% risk of mistakenly rejecting a correct null. The Bonferroni correction uses the formula $PC\alpha = EW\alpha/k$; for this study, then, $PC\alpha = .05/4 = .0125$. This alpha of .0125 is very conservative and lowered the risk of committing a Type I error.

The conservative nature of the Bonferroni correction is its strength, but also presents a weakness, as lowering Type I risk in this way can increase the risk of committing a Type II error (Warner, 2013). A Type II error is committed when a researcher fails to reject an incorrect null hypothesis. Researchers must do what they can to mitigate both types of risk; they “want the risk of both types of error (α and β) to be reasonably low” (Warner, 2013, p. 85). One way to reduce Type II error risk is to use a sufficiently large and appropriate sample size (Mills & Gay, 2019; Warner, 2013). The sample size of (N) = 198 is large and appropriate to the population and therefore robust against Type II error.

Results

Results demonstrated a relationship between the predictor variable, foreign language anxiety (FLA), and the four language mindset (LM)-related criterion variables. These criterion variables were the overall LM along with three subdimensions of LMs: general language intelligence beliefs (GLB), second language aptitude beliefs (L2B), and age sensitivity L2 learning beliefs (ASB). The mean, median, and standard deviation of scores for total FLA, Language Mindsets Inventory (LMI), GLB (outlier removed), L2B, and ASB are presented in Table 1.

Table 1. Descriptive Statistics for FLA and All LMI Scores

Variable	M	Mdn	SD	N
FLA_Total	99.67	100.00	24.64	198
LMI_Total	42.09	41.50	11.04	198
GLB	13.13	13.00	4.47	197
L2B	14.20	14.00	3.65	198
ASB	14.76	14.00	4.96	198

Based on the average of FLA scores, students in the sample are slightly anxious; Horwitz (2020) defines an average item score of 3 (total score divided by number of items, 33) as slightly anxious. The score of 99.67 divided by 33 gives an average item score of 3.02. Scores ranged from 45 to 161: not anxious to highly anxious. A majority of students in the sample suffers FLA in the L2 classroom; 53% of the sample registered as slightly or more than slightly anxious (N = 105)

The average of the LM scores indicates a tendency toward growth mindsets, as all four scores fall well below the midpoint of the scales, which is 54 for the LMI total and 18 for each subscale. Scores for the total LMI ranged from 18 on the low end—a “perfect” growth mindset score—to 75. Scores for subscales ranged from 6 to 25 (29 before removal of outlier), 6 to 24, and 6 to 27, for GLB, L2B, and ASB, respectively. Only 17% of the sample scored above the midpoint of 54 for the total LMI (N = 33), with 17% (N = 34) and 20% (N = 39) scoring above the midpoint of 18 for GLB and L2B. For overall LMI and these two subdimensions, then, roughly four fifths of the sample exhibited more of a growth than fixed mindset. However, 32% (N = 63) scored higher than the midpoint of 18 for ASB, indicating a slightly higher fixed mindset regarding age-related L2 learning mindset over other types of mindsets. In summary, while the sample exhibited a mixture of growth and fixed LMs, it tended toward slightly more growth than fixed, and the sample as a whole tended toward significant levels of FLA.

Research Questions and Null Hypotheses

Four separate bivariate linear regression analyses were run, one for each hypothesis. Results indicate a relationship between LMs and FLA. Research questions one through three asked whether FLA can predict overall LM, GLB, L2B, and ASB. Results indicate that yes, there is a statistically significant, moderate, positive correlation between FLA and LM ($r(198) = +.300$, $p < .001$), FLA and GLB ($r(197) = +.276$, $p < .001$), and FLA and L2B ($r(198) = +.305$, $p < .001$). As participants' FLA increased, their tendency toward overall fixed LM, GLB, and L2B, and away from growth mindsets in these dimensions, increased as well. Research question four asked whether FLA can predict ASB. Results indicate that yes, there is a statistically significant, small, positive correlation between FLA and ASB ($r(198) = +.213$, $p < .001$). As participants' FLA increased, their tendency toward fixed ASB and away from growth ASB increased as well. In short, then, fixed LM and FLA are positively correlated; all four null hypotheses were rejected. Results are summarized in Tables 2 through 5 below, with correlation significant at the 0.01 level (two-tailed).

Table 2. Correlation between Total FLA and Total LM

		FLA_Total	LMI_Total
FLA_Total	Pearson Correlation	1	.300
	Sig. (two-tailed)		.000
	N	198	198
LMI_Total	Pearson Correlation	.300	1
	Sig. (two-tailed)	.000	
	N	198	198

Table 3. Correlation between Total FLA and GLB

		FLA_Total	GLB
FLA_Total	Pearson Correlation	1	.276
	Sig. (two-tailed)		.000
	N	198	198
GLB	Pearson Correlation	.276	1
	Sig. (two-tailed)	.000	
	N	197	197

Table 4. Correlation between Total FLA and L2B

		FLA_Total	L2B
FLA_Total	Pearson Correlation	1	.276
	Sig. (two-tailed)		.000
	N	198	198
L2B	Pearson Correlation	.276	1
	Sig. (two-tailed)	.000	
	N	197	197

Table 5. Correlation between Total FLA and ASB

		FLA_Total	ASB
FLA_Total	Pearson Correlation	1	.213
	Sig. (two-tailed)		.000
	N	198	198
ASB	Pearson Correlation	.213	1
	Sig. (two-tailed)	.000	
	N	197	197

Discussion

These results are generally in keeping with expectations based upon findings in language mindset (LM) literature, foreign language anxiety (FLA) literature, content mindset (CM) literature, and more. Regarding LMs, previous research found comparable levels of LMs in a similar demographic. Lou and Noels (2017) found that university second language (L2) students enrolled in an L2 class at a large Canadian university (N = 189; 84.1% females; mean age = 19.11) scored an average of 50.04 (SD = 12.96) on the Language Mindsets Inventory (LMI). This current study's participants scored 42.09 (SD = 11.04). The average difference of 7.95 points on the LMI total amounts to a 7.39% total score difference between the two samples (the total LMI score being 108; $7.95/108 = .0739$). While this difference is appreciable, both demographics display a less-than-midline (i.e., toward growth) LMI score.

Regarding FLA, the literature shows that roughly 30% to 50% of L2 students experience at least a moderate level of FLA (Alsowat, 2016; Horwitz, 2016). In this current study, 53% of students registered at least a moderate level of anxiety. This higher-than-average level accords with the fact that the 30% to 50% figure includes studies with younger students, and that FLA tends to increase with age (Han, 2013); university students, therefore, ought to skew to the higher end. Further, FLA has been shown to significantly correlate with generalized anxiety (Sokolová & Suplatová, 2018). Given that generalized anxiety levels exceed 60% across American universities and have been rising in the past several decades (Anxiety in college: What we know and how to cope, 2019), and given that many FLA studies were conducted in years and decades prior, it stands to reason that FLA studies with American university students in future will show higher levels. This 53% figure, then, accords with trends.

Regarding the relationship between LMs and FLA, the overall significant, moderate correlation was to be expected, given that a) LM literature has shown that anxiety and fixed LM are correlated (though not FLA specifically, hence this current study) (Lou & Noels, 2016, 2017), and given that b) FLA typically correlates with other negative affective learning factors (Al-Shboul et al., 2013; Han, 2013). While Wang et al. (2021) found no significant correlation between LMs and anxiety, their measure included only five items for anxiety, as compared to the current study's use of the robust, 33-item Foreign Language Classroom Anxiety Scale (FLCAS); this measure can be assumed to more accurately depict students' domain-specific language-classroom anxiety.

CM literature further consistently shows a positive correlation between fixed CM and anxiety, along with other

negative affective learning factors (Burnette et al., 2013). Even though LMs are distinct from CMs, their relatedness in this regard is to be expected. To summarize, then, in keeping with findings from the literature, most criterion variables showed a moderate, positive correlation with the predictor. Age sensitivity L2 learning beliefs (ASB), however, showed only a small correlation, a result that the researcher found surprising, and which warrants discussion.

Age Sensitivity L2 Learning Beliefs

The Introduction briefly discussed the lay misinterpretation of the critical period hypothesis, which leads many people to believe that one cannot truly learn an L2 past a certain point of adolescence (Lou & Noels, 2016, 2017). Due to this widespread misunderstanding regarding the effect of age on language learning and acquisition, many individuals believe that children learn an L2 better than adults, or even that adults cease to be able to learn an L2 after a certain age (Lou & Noels, 2016, 2017). While an age-related affect has been proven to exist, it is better characterized as a sensitive period, rather than a critical period, of L2 acquisition, such that any age-based acquisition sensitivity associated with younger learning ages is arguably offset by cognitive and learning strategies present in later learning ages (Abello-Contesse, 2008; Birdsong, 2018; Ortega, 2008). In the Introduction, the researcher postulated that, given that the participants were young adults (postpubescent) who are likely to have been exposed to some version of the critical period hypothesis, it was likely that ASB would strongly coincide with overall LM; in particular, students would likely condition their belief in the malleability of L2 learning on their age. While this hypothesis exceeds the scope of this paper, the researcher reasonably expected, based on this discussion, to find that ASB would be more likely to correlate more strongly with FLA than the other criterion variables. This was not the case; in fact, this variable showed the weakest correlation.

Though this result is surprising, other elements of the ASB metric accorded with expectations. For instance, while only roughly one fifth of participants' scores for other criterion variables lay above the possible midpoint, nearly one third of ASB scores did. In other words, fully 50% more students lay on the fixed side of the midpoint in this subscale compared to the other variables. Further, of the three subdimensions, ASB showed the highest mean score and highest standard deviation. ASB therefore skewed more toward fixed than the other variables.

It seems, then, given the overall more fixed mindset nature of ASB compared to its lower-than-expected correlation with FLA, that this subdimension must have shown more variance than others, such that the correlation did not result as expected. This discrepancy led the researcher to suspect that one or more of the ASB-related LMI questions might have shown much higher variance than other survey items. This prompted the researcher to perform a post-hoc, informal analysis of question-by-question variance. While all other LMI questions' variance from their means (typically a mean of around 2.00 or 3.00 out of a possible total of 6.00 ranged from .50 to 1.82, one question, item 13: "How well a person speaks a foreign language depends on how early in life he/she learned it," showed a 2.33 variance from its mean, which was much higher than any other question. This seemed, then, to be the most polarizing question in the survey by far, and likely skewed the ASB results. Students showed much more consistency in answering other ASB questions. For example, they were more consistent in answering number 15, another negatively worded (fixed) question: "Even if you try, the skill level you achieve in a foreign

language will advance very little if you learn it when you are an adult,” whose variance was only 1.22 points away from its mean. In future studies, question 13 ought to be revisited and recalibrated, such that ASB results might show more consistency with other subscale results.

Implications

FLA was prevalent in this study’s sample, with 53% of participants registering moderate or higher levels of FLA. While LMs tended slightly toward growth rather than fixed, a clear correlation was found between movement toward fixed LMs and higher FLA. FLA and LMs are two important and related affective L2 learning factors. Both warrant attention by L2 educators and researchers and have implications for pedagogy and research.

A significant body of literature already exists that demonstrates that classroom interventions to lower FLA show excellent results, and lead to improvement in L2 achievement and affective factors (Awan et al., 2010; Capan & Simsek, 2012; Gomari & Lucas, 2013; Liu & Huang, 2011; Torres & Turner, 2016; Woodrow, 2006; Zhang, 2019; Zheng & Cheng, 2018). Similarly, a rich body of CM literature has shown conclusively that CM interventions are effective (Paunesku et al., 2015; Yeager & Dweck, 2012; Yeager et al., 2016, 2019). Though LMs and CMs are distinct, their relatedness lends credence to the idea that similar interventions in LMs ought to have similar effects. Those few studies that do exist examining interventions in LM and in LM-adjacent areas also demonstrate that interventions to encourage growth over fixed mindsets in the L2 classroom work, and that they improve student experiences and outcomes (Altunel, 2019; Brown & Siebert Hanson, 2019; Yang & Priyadarshini, 2019). Given that this current study has demonstrated a relationship between FLA and LMs, it stands to reason that such interventions ought to improve growth mindsets as well.

Studies indicate that successful interventions involve language educators taking action in three major areas. First, instructors ought to know the causes of and directly address FLA with their students (Alsowat, 2016; Kao & Craigie, 2018; Kruk, 2018). This implies that second language teacher education (SLTE) programs ought to include FLA as part of future language educators’ course of study. The same goes for LMs. Second, therefore, L2 educators ought to encourage growth mindsets early and often; targeted intervention on mindsets, wherein teachers seek to increase their students’ growth mindset, have proven effective again and again in CM literature (Paunesku et al., 2015; Yeager & Dweck, 2012; Yeager et al., 2016, 2019). Interventions in the L2 classroom have also improved LMs (even if not couched in LM terminology); interventions such as providing students with explicit training in mindsets and encouraging them to adopt growth mindsets (Molway & Mutton, 2019), providing metalinguistic, awareness-raising mentoring sessions with students (Lanvers, 2020), aiming for positive learning experiences in the L2 classroom (Brown & Siebert Hanson, 2019), and more. Therefore, instructors ought to explicitly and frequently address both FLA and LMs in their classrooms.

Since FLA and fixed LMs are positively correlated, it stands to reason that reducing anxiety creates space for more growth mindsets, and that promoting growth mindsets reduces learning anxiety. Addressing both together ought to create a positive feedback loop. In other words, a language educator bringing mindsets theory into the classroom explicitly and addressing it often, as well as seeking to prime a growth mindset, ought to lessen anxiety.

Lower anxiety ought to create space for more positive mindsets, and so on. Perhaps the greatest implication from this current study, then, is for SLTE programs and L2 educator continuing education programs. Namely, they should increase their focus on affective L2 learning factors, especially LMs and FLA, so that future language educators can bring awareness of these factors to bear on their pedagogy. These future educators will then be able to address these factors explicitly with their students and encourage their students to lower their anxiety and adopt growth LM.

Third, the importance of L2 educators' own beliefs about their students' abilities, and their role in inspiring or lessening anxiety and growth mindsets in students, cannot be understated. L2 teachers' attitudes about their students impact students' classroom behaviors (Pettit, 2011), and L2 teachers' beliefs about their students' abilities and the type of feedback teachers provide can influence or even change students' LMs for better or worse (Lou & Noels, 2020b; Sadoughi & Hejazi, 2023; Zarrinabadi et al., 2021). In fact, Lou and Noels (2020b) conducted a study in which English language learners

experienced challenges in an English test, and one group of learners received ability-consoling feedback, the second group received improvement feedback, while the third group received no additional feedback (i.e., control group). [They] found that compared to learners who received no feedback, those who received improvement-oriented feedback perceived that their teacher believed that they could improve their ability (i.e., growth meta-lay theory). In contrast, compared to learners who received no feedback, those who received ability-consoling feedback perceived the teacher believed less in their potential to improve and had a weaker sense of competence in English. (p. 9)

This means that teachers with a fixed view of LMs generally, and especially those with a fixed view of the LMs of their students, might be fostering fixed LMs in the classroom rather than creating environments for growth LMs to flourish. L2 educators ought to therefore be educated about LMs and FLA, and strive to both foster growth mindsets in themselves, and to provide growth-oriented feedback to their students.

Zarrinabadi et al. (2021) likewise found that "students who perceived their teachers to be more autonomy-supportive were more likely to endorse growth (vs. fixed) language-mindsets, and thereby [to feel] more competent and [to be] more willing to use English in the classroom," emphasizing the crucial impact that teachers' views on students' abilities have in fostering students' LMs (p. 1). Sadoughi and Hejazi (2023) found that growth LMs correlated positively with a willingness to communicate in the language classroom, and that students' perceptions of their teachers' support predicted their mindset and grit. In other words, students who perceived their teachers as highly supportive tended to exhibit growth, rather than fixed LMs, and therefore to exhibit both more willingness to communicate and more grit.

Once again, then, the role of L2 educators' own beliefs and the ways they communicate them to their students are of critical importance. If teachers can both improve their view of their students' abilities and foster growth LMs in their students, their students may be able to improve achievement and experience less FLA in the L2 classroom. Beyond pedagogical implications, this study also demonstrates the need for further research in LMs; some potential studies are discussed in the Recommendations section below. First, however, this study's limitations

need to be addressed.

Limitations

This study was carefully planned and executed, and methods and procedures accorded with best practices in educational research. Data conformed to assumption tests, and statistical analysis demonstrated robust findings. Regardless, this study, like any research study, suffered many limitations to validity, including threats to general validity, internal validity, external validity, and statistical conclusion validity.

Threats to General Validity

While both the FLCAS and the LMI have been proven valid and reliable, the LMI, as used in this study, reduces LMs to a binary measurement—either toward fixed or growth—and therefore does not capture the complexity of LMs. Specifically, scores cannot indicate whether a student has a fixed-high (fixed with high perceived innate ability), fixed-low (fixed with low perceived innate ability), or true growth mindset. Some of what may seem to be a growth mindset may in fact be a false growth, or fixed-high mindset (Dweck, 1999). Lou and Noels (2019c) warn that “some incautious educators may adopt [an] oversimplified framework and even differentiate students as either a fixed-mindset learner or a growth-mindset learner,” but that “this dichotomous formulation of mindsets has received little support in research” (p. 539). In other words, while this study’s participants tended toward growth LMs in their scores, it could be that many show a false growth (fixed-high) mindset instead. Lou and Noels’s (2016, 2017) paths analysis approach to data interpretation seems to allow for more nuance than the binary of higher/lower scores; future research ought to follow suit.

Threats to Internal Validity

For experimental research, internal validity “refers to the degree to which observed differences on the dependent variable are a direct result of manipulation of the independent variable, not some other variable” (Mills & Gay, 2019, p. 277). While the current study is correlational rather than experimental, it bears repeating that correlation does not imply causation. Though this study demonstrated a relationship between FLA and LMs, there is no empirical indication here that they are directly related such that manipulation of one would lead to change in the other. Further, this study was unable to account for several other variables which may have a mediating effect between the two variables of interest, variables such as participant characteristics (e.g., age, gender), participant native language (L1), L2 being studied, prior L2 study experience, L1-L2 distance (the historical and linguistic relatedness of the languages), and more. Future research ought to examine relationships between these and the target variables. Future research ought also to consider the complexity of FLA, with its three subdimensions, to determine whether generalized FLA relates differently to LMs than do its subdimensions.

Threats to External Validity

External validity “is the degree to which study results are generalizable, or applicable, to groups and environments

outside the experimental setting” (Mills & Gay, 2019, p. 278). Generalizability improves in proportion to how much the sample reflects the real-world population it is meant to represent. External validity threats also arise due to factors such as timing and setting of research collection.

That this study’s sample size was large and diverse in terms of age, gender, language studied, and more, recommends its generalizability to the broader American university L2 student population. That this study’s findings align well with other findings in LM and FLA literature also recommend their generalizability. However, two threats to generalizability arise. First, this was a convenience sample of adult university students enrolled in beginner to beginner-intermediate L2 classes. As such, the sample already self-selected for L2 students, meaning that findings cannot be extended to university students more broadly. Second, demographic details such as L1 background, other L2s studied, time studying the current L2 in high school, and more, were collected, but not analyzed. Each of these factors could prove to be a moderating variable. For example, it could be that students with prior L2 experience, who are currently studying a third or fourth foreign language, might pattern similarly with each other and differently from students who are only beginning an L2. As another example, it could be that non-native English speakers learning a third or fourth language pattern differently from native speakers learning an L2 as well. Future research ought to examine these nuances.

Timing and Setting

LMs are chronic, meaning that they are consistent over time without targeted intervention toward intentional change (Lou & Noels, 2016). However, Lou and Noels (2016, 2020b) show that LMs can be primed—that is, manipulated—via situational cues. Situational cues can have a strong effect temporarily, but “although priming can shift learners’ language mindsets, it is possible, perhaps even likely, that participants will return to their chronic tendency once the situational cues disappear” (Lou & Noels, 2016, p. 30). The current study made no use of manipulation or priming, and therefore findings were interpreted to represent chronic LMs. It is possible, though, that some unaccounted-for situational cue may have prejudiced results. For example, data were collected near the end of the semester, when students’ overall anxiety levels were likely higher due to impending final exams, papers, and projects. This might have skewed their answers. Future research could mitigate the situational and timing effect by collecting data at two or three times in the semester and averaging each students’ responses.

Conclusion

This study demonstrated that language mindsets (LMs) and foreign language anxiety (FLA) positively correlate for university second language (L2) learners. Establishing this relationship serves several aims. First, it highlights the importance of LMs as a predictive factor in L2 student outcomes. This has implications on the need for more research and for more second language teacher education (SLTE) program training in LMs. Second, it brings LMs further into the second language acquisition (SLA) research literature by relating them to a well-established area of research, FLA. Given that FLA interventions have been shown to improve learning outcomes, and given that FLA and LMs are related, LM interventions ought to improve outcomes, too. That is, efforts at lowering anxiety and encouraging growth mindsets ought to mutually strengthen one another and improve student outcomes.

Further, content mindset (CM) interventions have consistently proven successful in improving outcomes. While CMs and LMs are distinct, as L2 learning differs from content-area learning, it stands to reason that LM-focused interventions ought to improve L2 classroom outcomes. This hypothesis invites future quasi-experimental research on LM interventions. SLTE programs ought to take these findings into consideration and train their future language educators to know the cause of and directly address FLA with their students, encourage growth mindsets early and often, combine efforts in both areas to improve the overall classroom environment, and monitor and calibrate their own beliefs regarding students' abilities. In these ways, they can improve learning and retention in the L2 classroom, and improve their students' overall experience.

Recommendations

Future research can strengthen this study's findings and build upon its implications. Suggestions include duplicating this study at other universities in the United States and abroad to improve generalizability. Further, the relationship between LMs and many other variables warrant exploration via multiple regression analysis and may provide valuable insights; variables such as L1 background, L2 being studied, participant age, participant gender, participants' self-reported perceived L2 aptitude, participants' L2 aptitude as measured by L2 course grades and/or L2 proficiency tests, L1-L2 distance, participants' prior L2 study experience, and FLA subdimensions. Some of the study's limitations might also be improved upon by duplicating this study and collecting data at multiple different times to mitigate any situational primes, and/or duplicating Lou and Noels's (2017) semiexperimental LM-priming research with this demographic.

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