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The Effectiveness of Mindfulness Training on Foreign Language Anxiety and Intolerance of Ambiguity among English Language Students

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A B S T R A C T

Purpose: The present study aimed to examine the effectiveness of mindfulness training in reducing foreign language anxiety and improving tolerance of ambiguity among students majoring in English Language and Literature.

Methods and Materials: This quasi-experimental study employed a pretest–posttest design with a control group. The study population consisted of students majoring in English Language and Literature at Islamic Azad University, Rasht Branch, during the 2024–2025 academic year. Thirty eligible students were selected using purposive sampling and randomly assigned to an experimental group (n = 15) or a control group (n = 15). The experimental group received eight 60-minute mindfulness training sessions, whereas the control group received no intervention. Both groups completed the Foreign Language Classroom Anxiety Scale (FLCAS) and the Ambiguity Tolerance Questionnaire (ATQ) at pretest and posttest. Data were analyzed using multivariate analysis of covariance (MANCOVA) in SPSS version 27, with the significance level set at .05.

Findings: The multivariate analysis showed a statistically significant effect of mindfulness training on the combined dependent variables, Wilks' Lambda = .410, $F(2, 25) = 18.03$, $p < .001$. Follow-up univariate analyses indicated that mindfulness training significantly reduced foreign language anxiety, $F(1, 27) = 18.62$, $p < .001$, $\eta p^2 = .408$, and significantly improved tolerance of ambiguity, $F(1, 27) = 24.58$, $p < .001$, $\eta p^2 = .477$.

Conclusion: The findings suggest that mindfulness training may serve as a complementary psychological–educational intervention for reducing foreign language anxiety and improving tolerance of ambiguity among students majoring in English Language and Literature.

Keywords: *mindfulness training; foreign language anxiety; tolerance of ambiguity; English language students; foreign language education*

1. Introduction

Learning a foreign language is not merely a cognitive process involving the acquisition of vocabulary, grammar, pronunciation, and communicative rules; it is also an emotionally demanding experience in which learners continuously evaluate their competence, compare their performance with that of others, and respond to uncertain or

unpredictable communicative situations. Among the affective factors associated with foreign language learning, foreign language anxiety has received sustained attention because it can interfere with learners' willingness to communicate, concentration, information processing, classroom participation, and perceptions of their own competence. The construct was systematically conceptualized by Horwitz, Horwitz, and Cope as a situation-specific form of anxiety arising from the distinctive demands of language learning rather than simply reflecting a learner's general tendency toward anxiety (Horwitz et al., 1986). Foreign language classroom anxiety is commonly associated with communication apprehension, fear of negative evaluation, and anxiety related to performance and assessment, all of which can become particularly salient when learners are required to speak or demonstrate competence in a language in which they perceive themselves as insufficiently proficient. Subsequent theoretical work further clarified the role of anxiety in second-language learning by emphasizing the reciprocal relationship between anxiety, cognitive processing, perceived competence, and language performance (MacIntyre, 1992). Accordingly, anxious learners may allocate cognitive resources to self-monitoring, worry, anticipated failure, or concern about others' evaluations rather than to the linguistic task itself, thereby producing performance difficulties that may reinforce subsequent anxiety. Research has also demonstrated that negative and positive classroom emotions can coexist, with foreign language anxiety and foreign language enjoyment representing distinguishable yet dynamically related aspects of learners' emotional experiences (Dewaele & MacIntyre, 2014). More recent longitudinal evidence indicates that foreign language anxiety should not necessarily be regarded as a fixed personal characteristic; instead, its level may change over time in response to learning experiences, contextual factors, pedagogical practices, and psychological interventions (Sun et al., 2025). This malleability is particularly important from an educational perspective because it suggests that interventions directed at learners' emotional regulation and responses to challenging language-learning situations may contribute to more adaptive academic experiences.

Foreign language anxiety is closely intertwined with another psychological characteristic of particular relevance to language acquisition: tolerance of ambiguity. Language learners inevitably encounter uncertainty. They are frequently exposed to unfamiliar vocabulary, incomplete comprehension, ambiguous grammatical structures, multiple meanings, culturally unfamiliar expressions, implicit pragmatic meanings, and communicative situations in which complete certainty is impossible. Tolerance of ambiguity refers broadly to an individual's capacity to experience complex, unfamiliar, uncertain, contradictory, or insufficiently structured situations without immediately interpreting them as threatening or intolerable. McLain conceptualized ambiguity tolerance as a measurable individual-difference variable and developed a multidimensional approach to assessing individuals' reactions to different forms of ambiguity (McLain, 2009). In foreign language learning, a student with greater tolerance of ambiguity may be more willing to infer meaning from context, continue communicating despite incomplete understanding, experiment with unfamiliar linguistic forms, and postpone the need for absolute certainty, whereas a learner characterized by intolerance of ambiguity may experience discomfort, cognitive rigidity, avoidance, or heightened anxiety when meaning is not immediately clear. Empirical findings have supported a meaningful relationship between second-language tolerance of ambiguity and foreign language classroom anxiety. Among Chinese learners, Dewaele and Ip found that tolerance of ambiguity was associated with foreign language anxiety and learners' perceptions of their English proficiency, highlighting the interconnected nature of emotional responses, uncertainty processing, and perceived competence in language learning (Dewaele & Ip, 2013). Similarly, research among EFL learners has identified ambiguity tolerance as an important predictor of anxiety alongside perceived communicative competence (Asmalı, 2019). The importance of this construct is not limited to affective responses, as ambiguity tolerance may also influence specific learning outcomes; for example, differences in ambiguity tolerance have been associated with grammar acquisition across face-to-face, blended, and flipped EFL learning environments (Khodabandeh, 2024). Evidence from Iranian psychological research has likewise supported the relevance and measurable nature of uncertainty and ambiguity tolerance in individual adaptation and psychological functioning (Dabiri et al., 2024). Thus, intolerance of ambiguity may represent an important vulnerability factor for English-language students because language learning requires sustained engagement with imperfect information and the ability to remain psychologically flexible in situations where certainty cannot immediately be achieved.

The association between foreign language anxiety and intolerance of ambiguity can be understood partly through

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the way learners relate to internal experiences such as thoughts, bodily sensations, emotional discomfort, and uncertainty. When students interpret anxious thoughts as evidence of likely failure or experience uncertainty as something that must be eliminated immediately, they may engage in excessive self-monitoring, avoidance, rigid attempts to control linguistic performance, or withdrawal from communication. Such reactions may be especially problematic in English-language education, where successful learning often depends on repeated exposure to mistakes, approximation, incomplete understanding, and communicative risk-taking. Consequently, psychological approaches that modify learners' relationships with anxiety, uncertainty, and self-evaluative thoughts may complement conventional instructional strategies. Mindfulness has emerged as one such approach. Although definitions of mindfulness vary across theoretical and applied traditions, contemporary reviews generally emphasize purposeful or receptive awareness of present-moment experience accompanied by an attitude characterized by openness, acceptance, and reduced judgment (Chems-Maarif et al., 2025). Within the influential framework associated with mindfulness-based stress reduction, mindfulness practice involves learning to attend intentionally to present experience and to observe sensations, thoughts, and emotions without automatically reacting to them or attempting to suppress them (Kabat-Zinn, 2013). Practices such as mindful breathing, body scanning, sitting meditation, observation of thoughts, and nonjudgmental awareness are intended to strengthen attentional regulation and cultivate a different relationship with distressing experiences. Rather than requiring the individual to eliminate anxiety or resolve every uncertainty, mindfulness encourages awareness of these experiences as temporary events that can be noticed without immediate avoidance or overidentification. This orientation may be particularly relevant to foreign language learners because anxiety and ambiguity are often intrinsic to communicative learning environments and cannot realistically be eliminated altogether.

Several mechanisms may explain why mindfulness could reduce foreign language anxiety. Mindfulness practices can train learners to redirect attention from repetitive worry and negative self-evaluation toward current sensory and task-related information, potentially reducing the cognitive interference caused by anxiety. By cultivating nonjudgmental observation, mindfulness may also weaken automatic interpretations of linguistic mistakes as personal failures and may enable learners to experience physiological arousal without interpreting it as evidence that successful communication is impossible. Furthermore, present-centered awareness may reduce anticipatory worry about forthcoming classroom performance and post-event rumination concerning past errors. Research within foreign language education increasingly supports these theoretical links. Fallah found that mindfulness was related to foreign language anxiety and identified coping self-efficacy as an important psychological mechanism within this relationship (Fallah, 2017). In a later study, mindfulness was associated with foreign language anxiety through psychological resources, with psychological capital playing a mediating role in predicting language-related anxiety (Gordani & Sadeghzadeh, 2023). Research focusing specifically on second-language writing has similarly demonstrated a meaningful association between mindfulness and writing anxiety while drawing attention to learner characteristics such as proficiency and gender (Khatami et al., 2025). A systematic review of correlational and intervention research has provided broader support for the relevance of mindfulness to foreign language anxiety, suggesting that mindfulness-related capacities and mindfulness interventions may contribute to reductions in anxiety across different language-learning settings (Yang & Li, 2025). More directly, classroom-based mindfulness training among Iranian EFL learners has been associated with favorable changes in foreign language anxiety as well as emotion regulation, perceived stress, self-efficacy, and speaking performance, indicating that mindfulness can be incorporated into language-learning environments rather than being restricted to clinical settings (Sabzevari & Saraei, 2026). Qualitative and intervention-oriented evidence has also indicated that EFL students may use mindfulness practices as a means of coping with speaking anxiety and managing the emotional demands associated with oral communication (Koçali & Aşık, 2026).

Mindfulness may be equally relevant to intolerance of ambiguity because the practice explicitly trains individuals to remain in contact with changing and incompletely controllable experiences without immediately attempting to resolve, avoid, or judge them. Intolerance of ambiguity often involves an aversive response to uncertainty together with a desire for rapid cognitive closure. Mindfulness, by contrast, encourages curiosity toward unfolding experience and an ability to observe uncertainty without automatic defensive reactions. Experimental evidence supports this proposed relationship. Spinelli and colleagues demonstrated through a

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randomized mindfulness induction study that mindfulness practice could contribute to the cultivation of ambiguity tolerance, providing evidence that the capacity to tolerate ambiguous experiences may be responsive to relatively brief mindfulness-based manipulation rather than functioning exclusively as a stable personality characteristic (Spinelli et al., 2023). Related findings have emerged in intensive professional education settings, where mindfulness-based stress reduction has been examined in relation to ambiguity tolerance as well as psychological outcomes such as depression and burnout (Grubb et al., 2025). Of particular relevance to language education, recent research has proposed ambiguity tolerance as a mechanism through which mindfulness intervention can improve English-language performance; Huang found that ambiguity tolerance played a mediating role in the relationship between mindfulness intervention and English reading comprehension among university students (Huang, 2026). Such findings suggest that mindfulness may affect language learning not only by directly reducing emotional distress but also by increasing learners' ability to remain cognitively and emotionally engaged when linguistic information is unclear. For students learning English, improved ambiguity tolerance could facilitate greater willingness to infer meaning, continue reading despite unknown vocabulary, participate in communication without complete certainty, and interpret temporary confusion as a normal part of learning rather than as evidence of incompetence.

The possible educational utility of mindfulness is also supported by the broader literature concerning student psychological and cognitive functioning. A systematic review and meta-analysis of mindfulness interventions in school contexts identified a range of outcomes associated with mindfulness-based programs, demonstrating that their potential influence extends across psychological, behavioral, and educational domains (D'Souza & Smyth, 2025). Among students in tertiary education, systematic review and meta-analytic evidence has likewise examined the effects of mindfulness-based interventions on cognitive functions, suggesting that mindfulness may affect attentional and cognitive processes that are directly relevant to learning (Jong et al., 2025). Such findings are important because successful foreign language acquisition requires sustained attention, working with competing linguistic information, inhibition of distracting thoughts, flexible switching between meanings, and the capacity to continue processing despite temporary confusion. More broadly, contemporary intervention science increasingly emphasizes the importance of systematically designed, standardized, and empirically evaluated interventions across educational and clinical domains rather than assuming effectiveness on the basis of theoretical plausibility alone. Controlled intervention studies in other behavioral and health contexts exemplify the importance of comparing structured interventions under rigorous research designs when determining whether observed changes can plausibly be attributed to the intervention itself (Ober et al., 2025). In foreign language education specifically, accumulated intervention research indicates that anxiety is amenable to intervention, although the magnitude of effects can vary according to intervention type, methodological characteristics, participant population, and educational context. A systematic review and meta-analysis of interventions targeting foreign language anxiety confirmed that deliberate intervention can reduce anxiety among students, while also highlighting heterogeneity across studies and the continuing need for carefully designed research (Xiong et al., 2024). These findings strengthen the rationale for examining theoretically grounded interventions such as mindfulness training through controlled pretest–posttest designs.

Despite increasing attention to mindfulness in second-language research, several issues justify further investigation. First, a substantial proportion of the literature has focused on foreign language anxiety as an isolated emotional outcome, whereas language learning involves multiple interconnected psychological processes. Examining anxiety together with intolerance of ambiguity can provide a more integrated account of how learners respond both to evaluative threat and to uncertainty inherent in foreign language use. Second, existing research has frequently been correlational, making it difficult to determine whether mindfulness itself produces changes in language-related psychological outcomes. Although recent intervention research is increasingly addressing this limitation, additional quasi-experimental and experimental studies are needed across diverse educational and cultural settings (Sun et al., 2025; Yang & Li, 2025). Third, the relationship between ambiguity tolerance and foreign language learning has often been investigated as an individual-difference predictor rather than as a potentially modifiable outcome. Findings showing that mindfulness can increase ambiguity tolerance challenge the assumption that learners must simply adapt to a fixed level of tolerance and instead suggest that this capacity may be strengthened through systematic psychological training (Huang, 2026; Spinelli et al., 2023). Fourth, Iranian EFL learners operate within a sociocultural

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and educational context in which opportunities for spontaneous English communication may be relatively limited compared with settings where English is widely used outside formal instruction. Consequently, classroom performance, speaking tasks, examinations, and perceived errors may acquire heightened emotional significance. Although Iranian research has established links between mindfulness and foreign language anxiety and has begun examining classroom-based mindfulness programs (Fallah, 2017; Gordani & Sadeghzadeh, 2023; Sabzevari & Saraei, 2026), comparatively less attention has been given to whether mindfulness simultaneously reduces anxiety and strengthens learners' capacity to tolerate linguistic ambiguity.

This gap is especially relevant for university students majoring in English Language and Literature, for whom English is not simply one academic subject but a central medium of sustained educational performance. These students are routinely required to read linguistically complex texts, interpret meanings that may not have exact equivalents, participate in classroom discussions, produce oral and written language under evaluative conditions, and manage uncertainty arising from cultural, semantic, grammatical, and pragmatic differences. Persistent foreign language anxiety may therefore impair not only immediate classroom performance but also students' willingness to engage in the repeated practice necessary for advanced proficiency. At the same time, intolerance of ambiguity may encourage rigid processing strategies, excessive dependence on exact translation, discomfort with multiple interpretations, avoidance of unfamiliar structures, and premature withdrawal from cognitively demanding language tasks. The documented association between ambiguity tolerance and anxiety suggests that these difficulties may reinforce each other (Asmalı, 2019; Dewaele & Ip, 2013). Mindfulness is theoretically suited to interrupt this cycle because it trains attention to present experience, decreases automatic judgment, encourages acceptance of temporary discomfort, and promotes observation of thoughts and feelings without treating them as definitive indicators of reality (Chems-Maarif et al., 2025; Kabat-Zinn, 2013). Evidence connecting mindfulness with reduced foreign language anxiety, better coping, and improved ambiguity tolerance provides a convergent empirical basis for testing this possibility in an Iranian university context (Fallah, 2017; Grubb et al., 2025; Huang, 2026; Koçali & Aşık, 2026). Accordingly, examining both outcomes within the same intervention may clarify whether mindfulness training can influence complementary emotional and cognitive-affective processes that are directly relevant to successful English-language learning.

Therefore, the aim of the present study was to determine the effectiveness of mindfulness training on foreign language anxiety and intolerance of ambiguity among English Language and Literature students at Islamic Azad University, Rasht Branch.

2. Methods and Materials

2.1. Study Design and Participants

This applied study employed a quasi-experimental pretest–posttest design with an experimental group and a control group. The statistical population consisted of students majoring in English Language and Literature at Islamic Azad University, Rasht Branch, during the 2024–2025 academic year. Participants were initially recruited through purposive sampling based on the study eligibility criteria and were subsequently randomly assigned to the experimental and control conditions. A total of 30 eligible students participated in the study, with 15 students allocated to the experimental group and 15 to the control group. The inclusion criteria consisted of obtaining a relatively high score on the measure of foreign language anxiety, obtaining a relatively low score on the measure of ambiguity tolerance, not using psychotropic medication during the study period, and providing written informed consent for participation. The exclusion criteria included previous participation in a structured mindfulness-based training program, repeated absence from intervention sessions, voluntary withdrawal from the study, failure to complete the pretest or posttest questionnaires, the occurrence of physical or psychological problems that interfered with continued participation, and personal, family, or educational circumstances that prevented completion of the intervention or assessment procedures. Following approval of the research proposal and acquisition of the necessary institutional permissions, the researcher attended the Faculty of English Language and Literature at Islamic Azad University, Rasht Branch, and invited potentially eligible students to participate in the study. Students who met the initial eligibility criteria completed the screening measures, after which those satisfying the inclusion requirements were provided with detailed information regarding the study objectives, procedures, duration, voluntary nature of participation, confidentiality of the collected data, and their right to withdraw from the study at any stage without academic or

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personal consequences. Written informed consent was obtained before enrollment. The 30 eligible participants were then randomly allocated to the experimental and control groups using a lottery procedure. Demographic characteristics, including age and gender, were recorded for descriptive purposes. Before the intervention, both groups completed the study instruments as pretest measures. Participants in the experimental group subsequently received eight 60-minute sessions of mindfulness training based primarily on the mindfulness framework developed by Kabat-Zinn, whereas participants in the control group received no psychological or educational intervention during the same period and continued their usual academic activities. After completion of the intervention period, both groups completed the same instruments as posttest measures. To address ethical considerations, information concerning the mindfulness program and its principal practices was made available to participants in the control group after completion of the posttest assessment.

2.2. Data Collection Tools

Foreign language anxiety was assessed using the Short-Form Foreign Language Classroom Anxiety Scale (S-FLCAS). The original Foreign Language Classroom Anxiety Scale was developed by Horwitz et al. in 1986 and consisted of 33 items designed to assess anxiety specifically associated with foreign language learning situations. A shorter eight-item version was subsequently developed by MacIntyre in 1992 and was later employed in studies of foreign language emotions, including the work of Dewaele and MacIntyre. Botes et al. later subjected the eight-item version to comprehensive psychometric evaluation and formally presented it as the Short-Form Foreign Language Classroom Anxiety Scale. The S-FLCAS contains eight statements rated on a five-point Likert scale ranging from 1, representing strongly disagree, to 5, representing strongly agree. Two items are reverse-scored before calculation of the total score. Accordingly, possible total scores range from 8 to 40, with higher scores indicating greater levels of foreign language classroom anxiety. Psychometric investigations of the instrument have supported its unidimensional structure and demonstrated acceptable evidence of internal consistency, convergent validity, discriminant validity, and measurement invariance. Exploratory and confirmatory factor analytic findings reported by Botes et al. supported the adequacy of the short form as an efficient measure of foreign language anxiety. Evidence concerning the applicability of the instrument in the Iranian context has also been reported. Gholami et al. examined its construct validity using both exploratory factor analysis and confirmatory factor analysis and found that all questionnaire items had factor loadings exceeding the conventional minimum criterion of 0.30. In the present study, the S-FLCAS was administered at both the pretest and posttest stages to determine changes in participants' foreign language anxiety following mindfulness training.

Tolerance of ambiguity was assessed using the Ambiguity Tolerance Questionnaire developed by McLain in 2009. The questionnaire was designed to assess individuals' tendency to perceive unfamiliar, complex, uncertain, contradictory, or insufficiently structured situations as acceptable rather than threatening or aversive. The instrument contains 13 items that are scored on a five-point Likert scale ranging from 1, indicating strongly disagree, to 5, indicating strongly agree. Items 1, 2, 3, 4, 5, 6, 9, 11, and 12 are reverse-scored before calculation of the overall score. The possible total score ranges from 13 to 65, with higher scores reflecting greater tolerance of ambiguity and, correspondingly, lower intolerance of ambiguity. In the context of foreign language learning, this construct is particularly relevant because learners are frequently required to cope with incomplete linguistic knowledge, unfamiliar vocabulary, uncertain meanings, multiple interpretations, and communication situations in which complete understanding is not always possible. McLain reported satisfactory internal consistency and acceptable evidence of construct validity for the questionnaire. Evidence supporting its psychometric adequacy in Iranian samples has also been reported. Dabiri et al. obtained a Cronbach's alpha coefficient of 0.85 for the scale and reported a construct validity coefficient of 0.48, indicating acceptable reliability and validity. In the present study, the questionnaire was administered to both groups before and after the intervention. Although the instrument directly measures tolerance of ambiguity, lower scores were interpreted as indicating greater intolerance of ambiguity, consistent with the conceptual orientation of the present study.

2.3. Intervention

The mindfulness training program was primarily developed on the basis of the mindfulness-based stress reduction framework described by Kabat-Zinn, particularly the practices presented in the revised edition of Full Catastrophe Living. The intervention consisted of eight 60-

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minute sessions delivered to participants in the experimental group. The program incorporated fundamental mindfulness principles and practices, including present-moment awareness, mindful breathing, body-scan meditation, mindful eating, sitting meditation, mindful yoga, nonjudgmental observation of internal experiences, acceptance, letting go, beginner's mind, non-striving, awareness of difficult thoughts and emotions, cognitive distancing from thoughts, self-compassion, and the integration of mindfulness into everyday activities. The first session introduced the aims and structure of the program, explored participants' expectations, addressed unrealistic expectations, and introduced mindful eating and body-scan meditation. The second session included a review of home practice and introduced the attitudes of non-striving and beginner's mind, together with sitting meditation and mindful yoga. The third session emphasized sitting meditation and attention to sensory experiences, including seeing, hearing, and smelling, and introduced nonjudgmental awareness, divided attention, and mindful dialogue. The fourth session focused on mindfulness of breathing, bodily sensations, sounds, and thoughts, while also introducing the three-minute breathing space and discussing acceptance, letting go, and coping with difficult emotional experiences. The fifth session concentrated on developing a different relationship with distressing thoughts, emotions, and memories through sitting meditation and mindful observation, with further practice of the three-minute breathing space. The sixth session aimed to reduce cognitive identification with thoughts by teaching participants to observe thoughts as temporary mental events rather than objective facts, while also using breathing practices to respond more adaptively to difficult cognitions. The seventh session addressed self-care and self-compassion and encouraged participants to consolidate the mindfulness practices learned in previous sessions. The eighth and final session included a body-based mindfulness exercise, a comprehensive review of the skills practiced during the program, discussion of barriers to continued mindfulness practice, identification of possible sources of support, and development of individualized strategies for maintaining regular practice and integrating mindfulness into daily and academic life. Each session generally consisted of a brief review of the previous session and homework, presentation of the new mindfulness principles, guided experiential practice, discussion of participants' experiences, corrective feedback, and assignment of between-session exercises. The content was adapted to the participants' educational context and reviewed in accordance with established mindfulness-based intervention principles. Participants in the control group did not receive mindfulness training or another structured psychological intervention during the study period.

2.4. Data Analysis

Data analysis was conducted using descriptive and inferential statistical procedures. At the descriptive level, the demographic characteristics of the participants were summarized using appropriate frequency and percentage indices, while the main study variables were described using means and standard deviations for the pretest and posttest assessments in the experimental and control groups. At the inferential level, multivariate analysis of covariance (MANCOVA) was used to evaluate the effectiveness of mindfulness training on the combined dependent variables of foreign language anxiety and ambiguity tolerance while statistically controlling for corresponding pretest scores. Posttest foreign language anxiety and ambiguity tolerance scores were entered as the dependent variables, group membership was entered as the independent variable, and the corresponding pretest scores were treated as covariates. Before conducting the primary analysis, the assumptions required for covariance analysis were examined. These included assessment of the normality of the dependent-variable distributions, homogeneity of error variances across groups, homogeneity of regression slopes between the covariates and posttest outcomes, linear relationships between covariates and dependent variables, absence of problematic multicollinearity among dependent variables, and equality of covariance matrices. Normality was evaluated using appropriate statistical indices and distributional inspection, homogeneity of variances was assessed using Levene's test, and equality of covariance matrices was examined using Box's M test. The group-by-pretest interaction terms were also examined to evaluate the assumption of homogeneity of regression slopes. After confirmation of the required assumptions, the overall multivariate group effect was examined. When the multivariate effect was statistically significant, separate univariate analyses of covariance were conducted for foreign language anxiety and ambiguity tolerance to determine the specific effect of mindfulness training on each outcome after adjustment for baseline scores. Effect sizes were reported using partial eta squared to indicate the magnitude of the intervention effects. All statistical analyses were performed

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using IBM SPSS Statistics, Version 27, and the level of statistical significance was set at $\alpha = .05$.

3. Findings and Results

The participants in the study consisted of 30 students majoring in English at Islamic Azad University in Rasht. The experimental group comprised 7 female students (46.7%) and 8 male students (53.3%), while the control group also comprised 7 female students (46.7%) and 8 male students (53.3%). Table 1 presents the means and standard deviations of the participants' scores by group, both before and after the intervention.

Table 1

Descriptive Statistics of Foreign Language Anxiety and Tolerance of Ambiguity by Group

Variable	Group	Pretest	Posttest
		M (SD)	M (SD)
Foreign Language Anxiety	Experimental (n = 15)	32.03 (2.98)	26.75 (3.61)
	Control (n = 15)	30.83 (2.33)	31.20 (3.36)
Tolerance of Ambiguity	Experimental (n = 15)	26.19 (3.07)	32.71 (2.75)
	Control (n = 15)	27.09 (2.53)	27.56 (4.25)

As shown in Table 1, the mean score for foreign language anxiety in the experimental group decreased from 32.03 at pretest to 26.75 at posttest. Conversely, the mean score for tolerance of ambiguity increased from 26.19 at pretest to 32.71 at posttest.

Prior to conducting the multivariate analysis of covariance (MANCOVA), the relevant statistical assumptions were examined using Box's M test, the Kolmogorov–Smirnov test, and Levene's test. Box's M test was used to assess the homogeneity of covariance matrices. The results yielded a significance level of $p = 0.53$, indicating that the assumption of equality of the covariance matrices was satisfied.

The Kolmogorov–Smirnov test was conducted to assess the normality of the distributions of the pretest and posttest scores. The significance levels obtained for all variables were greater than 0.01, indicating that the assumption of normality was satisfied.

Levene's test was also conducted to examine the homogeneity of variances. The results were nonsignificant for all dependent variables, indicating that the assumption of equal variances was satisfied. Taken together, these findings indicated that the relevant assumptions for conducting the MANCOVA were adequately met, supporting the suitability of the data for the planned multivariate analysis.

Table 2

Multivariate Test Results for the Effect of Group on the Dependent Variables

Effect	Multivariate Test	Value	F	Hypothesis df	Error df	P
Group	Pillai's Trace	0.591	18.03	2	25	< .001
	Wilks' Lambda	0.410	18.03	2	25	< .001
	Hotelling's Trace	1.442	18.03	2	25	< .001
	Roy's Largest Root	1.442	18.03	2	25	< .001

As shown in Table 2, the multivariate tests, including Wilks' Lambda and the other multivariate criteria, indicated a statistically significant difference between the experimental and control groups in the combined dependent variables **(**$p < .001$**).** Specifically, the multivariate effect of group on the combined posttest scores of foreign language anxiety and tolerance of ambiguity was statistically significant after controlling for the corresponding pretest scores. Therefore, separate univariate ANCOVAs were conducted to examine the specific effect of the intervention on each dependent variable.

Table 3

Results of Analysis of Covariance for the Effect of Group on Foreign Language Anxiety and Tolerance of Ambiguity

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Dependent Variable	Source of Variation	SS	df	MS	F	*p*	Partial η²
Foreign Language Anxiety	Group	26.188	1	26.188	18.62	< .001	.408
Tolerance of Ambiguity	Group	18.240	1	18.240	24.58	< .001	.477

As shown in Table 3, the results of the analysis of covariance (ANCOVA) indicated that, after controlling for pretest scores, the effect of group on foreign language anxiety was statistically significant, $F(1, 28) = 18.62$, $p < .001$, $\eta p^2 = .408$. The effect of group on tolerance of ambiguity was also statistically significant, $F(1, 28) = 24.58$, $p < .001$, $\eta p^2 = .477$. Thus, significant differences were observed between the experimental and control groups in posttest scores of foreign language anxiety and tolerance of ambiguity after controlling for the corresponding pretest scores.

The partial eta squared values indicated effect sizes of $\eta p^2 = .408$ for foreign language anxiety and $\eta p^2 = .477$ for tolerance of ambiguity. In conjunction with the descriptive statistics presented in Table 1, these findings indicate that the observed group differences were characterized by lower foreign language anxiety and higher tolerance of ambiguity in the experimental group than in the control group. Overall, the findings suggest that mindfulness training was associated with reduced foreign language anxiety and increased tolerance of ambiguity among English language students.

4. Discussion and Conclusion

The findings of the present study indicated that mindfulness training was effective in reducing foreign language anxiety among English Language and Literature students. After controlling for pretest scores, participants who received the mindfulness intervention demonstrated lower posttest levels of foreign language anxiety than those in the control group. This finding supports the view that foreign language anxiety is not necessarily a fixed or stable characteristic but can be modified through systematic psychological and educational intervention. The result is consistent with the conceptualization of foreign language anxiety as a situation-specific emotional response emerging from the distinctive demands of language learning, including communication apprehension, fear of negative evaluation, concern about mistakes, and anxiety associated with classroom performance (Horwitz et al., 1986). It also corresponds with MacIntyre's theoretical account emphasizing that anxiety interferes with language processing through self-focused attention, worry, and cognitive disruption (MacIntyre, 1992). From this perspective, mindfulness may reduce foreign language anxiety by shifting learners' attention away from repetitive self-evaluation and anticipated failure toward immediate experience and task-relevant information. Instead of becoming preoccupied with whether their pronunciation, grammar, vocabulary, or performance is sufficiently accurate, students may learn to observe anxious thoughts and physiological arousal without automatically interpreting them as evidence of incompetence. The present findings are therefore consistent with the broader proposition that foreign language anxiety can change over time and can respond to interventions that influence learners' emotional regulation and coping processes (Sun et al., 2025).

The observed reduction in foreign language anxiety is also in line with a growing body of empirical research examining mindfulness in foreign language education. Fallah found that mindfulness was negatively associated with foreign language anxiety and showed that coping self-efficacy played an important mediating role in this relationship (Fallah, 2017). This suggests that mindful learners may not only experience less automatic emotional reactivity but may also perceive themselves as more capable of managing stressful language-learning demands. Similarly, Gordani and Sadeghzadeh demonstrated that mindfulness predicted lower foreign language anxiety and that psychological capital contributed to explaining this association (Gordani & Sadeghzadeh, 2023). Their findings support the interpretation that mindfulness may strengthen adaptive psychological resources such as confidence, resilience, hope, and flexible coping, all of which may reduce the threatening quality of language-learning situations. The present results are also consistent with Khatami and colleagues, who reported meaningful relationships between mindfulness and second-language writing anxiety, indicating that the anxiety-reducing relevance of mindfulness may extend across different language skills rather than being restricted to general classroom anxiety (Khatami et al., 2025). More directly, classroom-based mindfulness research among Iranian EFL learners has shown that mindfulness training can reduce foreign language anxiety while simultaneously improving emotion regulation, perceived stress, self-efficacy, and speaking performance (Sabzevari & Saraei, 2026). The convergence between that study and the present findings is especially noteworthy because both were conducted in

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Iranian EFL contexts and suggest that mindfulness may be meaningfully integrated into language education rather than being treated solely as a clinical or therapeutic technique.

The present finding regarding foreign language anxiety is further supported by recent intervention and review evidence. Koçali and Aşık showed that mindfulness can help EFL students cope with speaking anxiety by enabling them to respond more adaptively to distressing thoughts, bodily tension, and evaluative concerns during oral communication (Koçali & Aşık, 2026). Yang and Li's systematic review similarly concluded that both correlational and intervention studies generally support a beneficial role for mindfulness in relation to foreign language anxiety (Yang & Li, 2025). Furthermore, Xiong and colleagues, in their meta-analysis of foreign language anxiety interventions, demonstrated that foreign language anxiety can be reduced through targeted intervention, although outcomes vary according to design, sample, context, and intervention characteristics (Xiong et al., 2024). The present results fit within this broader intervention literature by indicating that mindfulness-based training is one viable approach for addressing language-related emotional distress. The mechanism may involve several interacting processes. Mindfulness emphasizes present-moment awareness, nonjudgment, acceptance, and reduced automatic reactivity (Kabat-Zinn, 2013). Such capacities may help learners tolerate the discomfort associated with speaking, answering questions, receiving corrective feedback, making mistakes, or not immediately understanding linguistic material. Contemporary conceptual reviews also emphasize that mindfulness involves receptive awareness of internal and external experience rather than avoidance or suppression of difficult states (Chems-Maarif et al., 2025). Therefore, mindfulness may not eliminate anxiety by removing challenging language situations; instead, it may weaken the secondary emotional reactions that make such situations overwhelming.

The second major finding of the study was that mindfulness training improved ambiguity tolerance, or equivalently reduced intolerance of ambiguity, among students in the experimental group compared with the control group. This result is theoretically important because ambiguity is an unavoidable feature of foreign language learning. Students regularly encounter unfamiliar vocabulary, incomplete grammatical knowledge, multiple possible interpretations, idiomatic expressions, implied meanings, uncertain pronunciation, and communicative contexts in which exact understanding is not immediately possible. McLain conceptualized ambiguity tolerance as an individual's capacity to remain engaged with uncertain, unfamiliar, complex, or contradictory information without reacting with excessive discomfort or avoidance (McLain, 2009). In this sense, the improvement found in the present study suggests that mindfulness training may help learners remain psychologically open when linguistic information is incomplete or uncertain. Rather than responding to ambiguity through immediate frustration, withdrawal, rigid interpretation, or excessive need for certainty, mindful learners may become more capable of observing uncertainty and allowing it to remain unresolved while continuing to participate in the learning task.

This interpretation is strongly supported by previous work on ambiguity tolerance and mindfulness. Spinelli and colleagues found in a randomized controlled induction study that mindfulness could cultivate ambiguity tolerance, demonstrating that this construct is not merely a stable personality characteristic but can be influenced through intervention (Spinelli et al., 2023). Their findings closely align with the present results and support the proposition that mindful awareness can modify the way individuals respond to uncertain situations. Mindfulness training repeatedly exposes participants to fluctuating sensations, thoughts, emotions, and internal experiences without requiring immediate judgment or resolution. Through this process, individuals may learn that uncertainty can be experienced without immediate avoidance. The present finding is also consistent with Grubb and colleagues, who examined mindfulness-based stress reduction in relation to ambiguity tolerance and psychological outcomes among physician assistant students and found evidence that mindfulness-based training may improve the capacity to manage uncertain and demanding situations (Grubb et al., 2025). Although the educational setting differs from foreign language learning, the underlying psychological process is comparable: both medical training and language learning require individuals to function effectively despite incomplete information, potential error, and uncertainty.

The present finding concerning ambiguity tolerance also accords closely with Huang's study demonstrating that mindfulness intervention enhanced English reading comprehension through ambiguity tolerance as a mediating mechanism (Huang, 2026). This finding is particularly relevant because it situates ambiguity tolerance directly within language learning and suggests that improved tolerance may represent one of the pathways through which mindfulness supports academic performance. A learner who can tolerate uncertainty may continue reading despite

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encountering unknown vocabulary, infer meanings from context, accept provisional interpretations, and avoid interrupting comprehension in search of complete certainty. In contrast, intolerance of ambiguity can produce excessive monitoring and rigid processing that impede fluent engagement with language. Khodabandeh also showed that ambiguity tolerance influences grammar acquisition across face-to-face, blended, and flipped learning environments, suggesting that tolerance of uncertainty is relevant across different instructional formats (Khodabandeh, 2024). The present study extends these observations by suggesting that ambiguity tolerance itself can be strengthened through a structured mindfulness intervention.

The simultaneous reduction in foreign language anxiety and improvement in ambiguity tolerance is particularly meaningful because these two constructs are theoretically and empirically connected. Dewaele and Ip found that second-language tolerance of ambiguity was related to foreign language classroom anxiety and self-perceived English proficiency, indicating that learners who are less comfortable with uncertainty may also experience greater language-related anxiety (Dewaele & Ip, 2013). Likewise, Asmalı reported that ambiguity tolerance was an important predictor of foreign language anxiety among EFL learners, alongside self-perceived communication competence (Asmalı, 2019). These findings provide a useful framework for understanding the present results. When learners perceive ambiguity as threatening, ordinary features of foreign language learning, such as not understanding every word or being unsure whether an utterance is grammatically correct, may become triggers for anxiety. Conversely, as learners become more tolerant of ambiguity, the emotional significance of imperfect comprehension may diminish. Mindfulness may therefore operate on both variables through an overlapping process: it reduces automatic judgment and avoidance while increasing willingness to remain in contact with uncomfortable or uncertain experiences. This shared mechanism may help explain why participants in the mindfulness group showed favorable changes in both foreign language anxiety and ambiguity tolerance.

The relationship between the two outcomes may also be understood in terms of attentional control and cognitive flexibility. Foreign language anxiety often narrows attention toward perceived threats, including mistakes, negative evaluation, and signs of failure, whereas intolerance of ambiguity promotes premature closure and rigid attempts to eliminate uncertainty. Mindfulness training may counter these tendencies by strengthening sustained attention and flexible awareness. Evidence from systematic review and meta-analysis indicates that mindfulness-based interventions can influence cognitive functioning among tertiary students, including processes relevant to attention and executive control (Jong et al., 2025). Broader evidence from educational settings also suggests that mindfulness interventions are associated with multiple psychological and academic outcomes rather than affecting only a single symptom domain (D'Souza & Smyth, 2025). These findings support the possibility that the effects observed in the present study were not produced solely through relaxation. Instead, mindfulness may have influenced the way participants directed attention, processed uncertainty, and responded to emotional discomfort. Such changes would be particularly useful in language learning, where learners must simultaneously attend to linguistic form, meaning, social feedback, and incomplete information.

The present results can additionally be interpreted within the framework of positive and negative emotional dynamics in foreign language learning. Dewaele and MacIntyre showed that anxiety is only one dimension of learners' classroom emotional experience and that foreign language anxiety and enjoyment can coexist as distinct but related emotional processes (Dewaele & MacIntyre, 2014). Although enjoyment was not directly measured in the present study, lower anxiety and greater ambiguity tolerance may create conditions in which learners can participate more openly and experience language learning as less threatening. When students are not overwhelmed by fear of error or uncertainty, they may be more willing to communicate, experiment with language, and engage in challenging tasks. This interpretation is compatible with recent evidence suggesting that foreign language anxiety is malleable and sensitive to changes in educational and psychological conditions (Sun et al., 2025). It is also consistent with the broader logic of intervention research, which emphasizes that targeted, structured programs should be evaluated in controlled designs to determine whether meaningful changes follow intervention exposure rather than ordinary variation over time. Although research in other clinical and educational domains, including randomized intervention studies such as that reported by Ober and colleagues, addresses different populations and outcomes, it similarly illustrates the value of systematic comparison between intervention and control conditions when assessing causal effectiveness (Ober et al., 2025). In the present study, the use of a control group and adjustment for baseline scores

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strengthened the interpretation that the observed posttest differences were associated with participation in mindfulness training.

Taken together, the results suggest that mindfulness may be relevant to foreign language education at both emotional and cognitive-affective levels. Its effect on foreign language anxiety indicates that students may become better able to manage performance-related worry, self-critical thoughts, and physiological tension, while its effect on ambiguity tolerance suggests that they may also become more capable of remaining engaged with uncertain or incomplete linguistic information. These findings reinforce a growing body of evidence that mindfulness in language learning should not be understood simply as a relaxation technique. Rather, it may function as a form of attentional and emotional training that changes the learner's relationship with internal discomfort and uncertainty. Theoretical accounts of mindfulness emphasize nonjudgmental awareness, openness, and acceptance (Chems-Maarif et al., 2025; Kabat-Zinn, 2013), while empirical studies in EFL settings increasingly associate these capacities with reduced anxiety and improved adaptation to challenging language-learning experiences (Fallah, 2017; Gordani & Sadeghzadeh, 2023; Sabzevari & Saraei, 2026; Yang & Li, 2025). The present study adds to this literature by demonstrating that an eight-session mindfulness intervention may simultaneously improve two closely related but conceptually distinct outcomes among English Language and Literature students.

One limitation of the present study was the relatively small sample size and the inclusion of students from a single university, which limits the extent to which the findings can be generalized to English-language learners in other universities, educational levels, geographical regions, or cultural contexts. The quasi-experimental nature of the study also places limits on causal interpretation, despite the use of random allocation after recruitment and a control group. In addition, the study relied primarily on self-report questionnaires, and participants' responses may have been influenced by social desirability, expectations regarding the intervention, or temporary emotional states. The absence of a long-term follow-up assessment represents another limitation because the study cannot determine whether reductions in foreign language anxiety and improvements in ambiguity tolerance were maintained after the intervention ended. Moreover, the control group received no active comparison intervention; therefore, nonspecific factors such as instructor attention, group interaction, expectancy effects, and structured participation cannot be fully separated from the specific effects of mindfulness training. Finally, variables such as language proficiency, previous meditation experience, personality traits, baseline stress, academic achievement, and individual adherence to home mindfulness practice were not examined as potential moderators of intervention effectiveness.

Future research should replicate the present study using larger and more diverse samples drawn from multiple universities and educational settings and should include learners at different levels of English proficiency. Randomized controlled trials with active comparison groups would provide stronger evidence regarding the specific effects of mindfulness training relative to other psychological or educational interventions. Longitudinal designs with follow-up assessments several weeks or months after intervention completion are also recommended to determine whether treatment effects are sustained. Future studies could examine potential mediating mechanisms, including emotion regulation, coping self-efficacy, psychological flexibility, attentional control, self-compassion, metacognitive awareness, and perceived communicative competence. It would also be useful to investigate whether ambiguity tolerance mediates the effect of mindfulness on foreign language anxiety or whether reductions in anxiety facilitate greater tolerance of ambiguity. Behavioral and performance-based indicators, including speaking performance, reading comprehension, classroom participation, willingness to communicate, and actual language achievement, should be incorporated alongside self-report measures. Additional research could compare different intervention durations, delivery formats, instructor characteristics, and levels of home-practice adherence to identify the most efficient and educationally feasible mindfulness protocols.

From a practical perspective, the findings suggest that brief and structured mindfulness programs may be incorporated into university English-language education as a complementary strategy for supporting students who experience high levels of anxiety or difficulty coping with ambiguity. Language instructors, academic counselors, and university psychological services may consider providing short mindfulness exercises before speaking activities, oral presentations, examinations, reading tasks, or other situations that typically evoke anxiety and uncertainty. Teacher-training programs could also introduce educators to basic mindfulness principles so that they can create classroom environments in which mistakes, temporary

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uncertainty, and incomplete comprehension are treated as normal components of language development rather than as indicators of failure. Mindful breathing, brief body awareness, nonjudgmental observation of anxious thoughts, and short present-focused exercises can be integrated into regular classes without replacing formal language instruction. Universities may also offer group-based mindfulness workshops for students with elevated foreign language anxiety, particularly at the beginning of academic terms or before periods of intensive assessment. Such practices should be implemented as supportive educational strategies rather than compulsory therapeutic activities and should be adapted to students' cultural, academic, and individual needs.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

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