

The Effectiveness of Resilience-Based Group Training on Uncertainty Intolerance, Future Orientation, and Stress Appraisal in High School Students

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ABSTRACT

Objective: The present study aimed to investigate the effectiveness of resilience-based group training on intolerance of uncertainty, future orientation, and stress appraisal among high school students.

Methods and Materials: The present study employed a quasi-experimental design with a pretest-posttest structure and a control group. The statistical population consisted of high school students in Ahvaz during the 2025–2026 academic year. Using multistage cluster sampling, 40 students were selected and randomly assigned to an experimental group ($n = 20$) and a control group ($n = 20$). Data collection instruments included the Intolerance of Uncertainty Scale developed by Freeston et al., the Future Orientation Questionnaire developed by Seginer, and the Stress Appraisal Measure developed by Peacock and Wong. The experimental group participated in eight 90-minute sessions of resilience-based group training, while the control group received no intervention during the study period. Data were analyzed using descriptive statistics and multivariate analysis of covariance (MANCOVA) in IBM SPSS Statistics version 27.

Findings: The results of multivariate analysis of covariance revealed a statistically significant overall effect of resilience-based group training on the combined dependent variables of intolerance of uncertainty, future orientation, and stress appraisal (Wilks' $\Lambda = 0.29$, $F = 28.94$, $p < .001$, $\eta^2 = 0.71$). Univariate analyses further indicated that the intervention significantly reduced intolerance of uncertainty ($F = 41.28$, $p < .001$, $\eta^2 = 0.53$) and maladaptive stress appraisal ($F = 44.36$, $p < .001$, $\eta^2 = 0.56$), while significantly increasing future orientation among students in the experimental group compared with the control group ($F = 46.91$, $p < .001$, $\eta^2 = 0.57$). The obtained effect sizes demonstrated that the resilience-based intervention exerted substantial positive effects on students' adaptive psychological functioning.

Conclusion: The findings of the present study suggest that resilience-based group training is an effective psychological intervention for reducing intolerance of uncertainty and maladaptive stress appraisal while enhancing future orientation among high school students. Strengthening resilience-related capacities may improve adolescents' emotional adjustment, coping flexibility, and positive future-directed thinking.

Keywords: Resilience-Based Training, Intolerance of Uncertainty, Future Orientation, Stress Appraisal, High School Students, Adolescents.

1. Introduction

Adolescence is widely recognized as one of the most sensitive developmental periods characterized by rapid biological, emotional, cognitive, and social transformations. During this developmental stage, high school students experience substantial academic demands, interpersonal challenges, identity-related concerns, and future-oriented pressures that can significantly influence their psychological well-being. Contemporary educational environments, particularly in the aftermath of global crises and sociocultural changes, have intensified emotional vulnerability among adolescents and increased the prevalence of psychological distress, anxiety, uncertainty-related concerns, and maladaptive stress responses (McIntosh & Stone, 2022; Waters, 2023). Researchers have increasingly emphasized that the psychological adjustment of adolescents depends not only on the absence of psychopathology but also on the presence of protective psychological resources that enable students to cope effectively with adversity, ambiguity, and stressful experiences (Ellis et al., 2023; Santilli et al., 2020). Among these protective resources, resilience has emerged as one of the most influential constructs in educational and developmental psychology.

Resilience refers to the dynamic process through which individuals adapt positively despite exposure to stressful circumstances, uncertainty, trauma, or environmental adversity. Rather than conceptualizing resilience solely as a stable personality trait, contemporary perspectives define it as a multidimensional and developable capacity involving emotional regulation, adaptive cognition, social competence, coping flexibility, and future-directed motivation (Ben-Asher & Huss, 2023; Mastrothanas, 2025). In school settings, resilience has been associated with improved emotional adjustment, academic engagement, life satisfaction, and psychological well-being among adolescents (Santilli et al., 2020; Sulistiobudi & Kadiyono, 2023). Resilience-based interventions have therefore gained increasing attention as preventive and promotive psychological programs aimed at strengthening students' adaptive capacities and enhancing their ability to manage stressful and uncertain conditions effectively.

One of the most prominent psychological difficulties experienced by adolescents is intolerance of uncertainty. Intolerance of uncertainty refers to an individual's dispositional inability to endure ambiguous, unpredictable, or uncertain situations due to the perception that such

conditions are threatening or unacceptable. Adolescents with high levels of intolerance of uncertainty tend to experience heightened anxiety, excessive worry, cognitive rigidity, emotional dysregulation, and maladaptive coping responses when confronted with uncertain circumstances (Bozkurt, 2023; Sagone & Indiana, 2023). Recent educational and psychological studies have demonstrated that intolerance of uncertainty is significantly associated with emotional distress, academic dissatisfaction, social anxiety, decisional procrastination, and mental health problems among adolescents and young adults (Odacı et al., 2022; Qiang et al., 2024; Yao et al., 2023). The increasing unpredictability of educational systems, social relationships, economic conditions, and future career opportunities has further intensified uncertainty-related concerns among students.

Several recent investigations have confirmed the detrimental psychological effects of intolerance of uncertainty in adolescent populations. For example, Fu et al. reported that intolerance of uncertainty significantly predicted negative emotional experiences among high school students during periods of social instability and crisis (Fu et al., 2024). Similarly, Wu et al. demonstrated that intolerance of uncertainty mediated the relationship between neuroticism and psychosomatic symptoms in female middle school students, suggesting that students who struggle to tolerate ambiguity are more vulnerable to emotional and physical distress (Wu et al., 2024). Morillo-Sarto et al. also found that intolerance of uncertainty played a mediating role between environmental dysfunction and psychological distress among adolescents, highlighting the central role of uncertainty-related cognitions in adolescent mental health outcomes (Morillo-Sarto et al., 2025). Likewise, Du and Lyu demonstrated that intolerance of uncertainty mediated the association between future expectations and problematic internet use among adolescents, emphasizing the importance of adaptive cognitive-emotional processing in youth adjustment (Du & Lyu, 2021).

The educational consequences of intolerance of uncertainty have also become increasingly evident. Sagone and Indiana reported that higher levels of intolerance of uncertainty were associated with greater decisional procrastination and lower academic self-efficacy among university students (Sagone & Indiana, 2023). Similarly, Odacı et al. showed that educational stress mediated the relationship between intolerance of uncertainty and academic life satisfaction in teenagers, indicating that uncertainty-related cognitions may impair students' emotional and academic functioning (Odacı et al., 2022).

Qiang et al. further observed that intolerance of uncertainty contributed to academic burnout through self-regulatory fatigue among university students (Qiang et al., 2024). These findings collectively suggest that intolerance of uncertainty represents a substantial risk factor affecting adolescents' emotional adjustment, educational engagement, and overall psychological functioning.

In addition to uncertainty intolerance, future orientation represents another important psychological construct closely associated with adolescent development and well-being. Future orientation refers to individuals' cognitive, motivational, and emotional tendencies toward planning, anticipating, and valuing future goals and outcomes. Adolescents who possess strong future orientation generally demonstrate higher levels of academic motivation, psychological optimism, self-regulation, persistence, and adaptive coping behaviors (Santilli et al., 2020; Sulistiobudi & Kadiyono, 2023). Conversely, weak future orientation has been associated with hopelessness, emotional disengagement, anxiety, low academic achievement, and risky behaviors. During adolescence, the ability to construct meaningful future goals is particularly critical because students are actively developing their personal identity, educational aspirations, and vocational expectations.

The psychological disruptions caused by social crises and educational instability have negatively influenced students' future orientation in recent years. Studies conducted during and after the COVID-19 pandemic demonstrated that uncertainty and stress significantly undermined adolescents' confidence regarding their future goals and opportunities (McIntosh & Stone, 2022; Waters, 2023). Cao found that uncertainty and stress negatively affected students' perceived academic performance and psychological adjustment in online learning contexts (Cao, 2021). Likewise, Cogorno et al. reported that students exposed to unstable social conditions and conflict-related stress experienced significant concerns regarding their educational continuity and future development (Cogorno et al., 2023). Such findings underscore the necessity of psychological interventions that enhance adolescents' sense of hope, adaptability, and future-directed thinking.

Resilience-based interventions may play an essential role in strengthening future orientation among students. Research has shown that resilience is positively associated with optimism, self-efficacy, personal growth initiative, and adaptive goal-setting behaviors (Cole et al., 2024; Finch et al., 2023). Finch et al. demonstrated that psychological capital interventions improved hope, resilience, optimism,

and well-being among female students during periods of educational disruption (Finch et al., 2023). Similarly, Sulistiobudi and Kadiyono found that psychological capital significantly predicted employability and adaptive career development among vocational students (Sulistiobudi & Kadiyono, 2023). These findings suggest that resilience-oriented training programs can facilitate more constructive future planning and increase adolescents' confidence in managing future challenges.

Another critical variable affecting adolescent psychological adjustment is stress appraisal. Stress appraisal refers to individuals' cognitive interpretation and evaluation of stressful situations, including perceptions of threat, controllability, coping capacity, and emotional significance. According to cognitive appraisal theories, the way individuals interpret stressful experiences significantly determines their emotional and behavioral responses. Adolescents who perceive stressful situations as overwhelming or uncontrollable are more likely to experience anxiety, emotional dysregulation, and maladaptive coping patterns (Kareem et al., 2022; Wang et al., 2022). Conversely, students who interpret stressors as manageable challenges often demonstrate greater resilience, emotional balance, and adaptive functioning.

Recent evidence indicates that adolescent stress appraisal has become increasingly maladaptive due to educational competition, social instability, and rapid technological changes. Wang et al. reported that emotion regulation capacities significantly influenced affective states among Chinese high school students during the post-pandemic period (Wang et al., 2022). Kareem et al. further observed that intolerance of uncertainty and diminished classroom engagement negatively affected well-being among school students during periods of crisis (Kareem et al., 2022). Similarly, Dupuis et al. found that participation in school-based anxiety prevention programs contributed to reductions in anxiety symptoms among adolescents during the pandemic, highlighting the effectiveness of preventive psychological interventions within educational contexts (Dupuis et al., 2024). These findings emphasize the importance of equipping students with adaptive coping skills that can alter maladaptive stress appraisals and improve emotional functioning.

Theoretical frameworks in developmental psychology also support the role of resilience training in promoting adaptive stress appraisal and psychological flexibility. The Hidden Talents Framework proposed by Ellis et al. suggests that adolescents exposed to adversity may develop adaptive

competencies when provided with supportive environmental and psychological resources (Ellis et al., 2023). Likewise, participatory and psychoeducational interventions have demonstrated positive effects on emotional regulation, coping skills, and psychosocial functioning among adolescents exposed to challenging environments (Capurso et al., 2022; Mastrothanasis, 2025). School-based interventions designed to foster resilience and emotional competence therefore represent promising approaches for strengthening students' psychological adjustment and coping capacities.

Research has further demonstrated that resilience-related capacities are closely connected with emotional intelligence, ambiguity tolerance, classroom connectedness, and psychological capital. Yang found that emotional intelligence and ambiguity tolerance significantly predicted work engagement and adaptive functioning among educational professionals (Yang, 2022). AtiLa also highlighted the role of psychological capital and classroom connectedness in reducing school alienation among students (AtiLa, 2023). Similarly, Oral and Karakurt demonstrated that psychological hardiness negatively predicted intolerance of uncertainty among university students during stressful conditions (Oral & Karakurt, 2022). These findings collectively support the assumption that resilience-related interventions can reduce maladaptive emotional reactions and enhance adaptive psychological resources in educational settings.

Furthermore, psychosocial protective factors such as social support, emotional well-being strategies, kindness, and supportive educational climates have been shown to strengthen adolescent resilience and psychological adjustment. Iovino et al. emphasized the importance of teaching emotional well-being strategies in schools to foster adaptive emotional functioning among students (Iovino et al., 2021). Buenconsejo et al. similarly highlighted the significance of school kindness and supportive peer environments in promoting psychological well-being among adolescents (Buenconsejo et al., 2022). Ben-Asher and Huss also demonstrated that creative and expressive interventions could strengthen resilience among vulnerable youth populations by promoting emotional expression and empowerment (Ben-Asher & Huss, 2023). Such evidence indicates that resilience is not solely an internal characteristic but is also influenced by supportive educational and interpersonal contexts.

The increasing integration of digital technologies and artificial intelligence into educational environments has

additionally raised concerns regarding students' mental health and emotional well-being. Nigam et al. argued that educational systems must prioritize psychological well-being alongside technological advancement to prevent emotional burnout and psychological instability among students (Nigam et al., 2024). Simultaneously, social media exposure, community dysfunction, and environmental stressors have intensified psychological distress and uncertainty among adolescents (Morillo-Sarto et al., 2025). Zhang et al. further demonstrated that positive childhood experiences and supportive family relationships can buffer the negative effects of uncertainty stress on depressive symptoms among youth (Zhang et al., 2021). These findings reinforce the necessity of preventive and resilience-enhancing interventions within school systems.

Although previous studies have examined the associations between resilience, uncertainty intolerance, stress, and psychological well-being, limited research has specifically investigated the effectiveness of resilience-based group training simultaneously on intolerance of uncertainty, future orientation, and stress appraisal among high school students. Moreover, many existing studies have focused primarily on university populations or crisis-related contexts, while fewer investigations have addressed school-based resilience interventions among adolescents within ordinary educational environments. Given the developmental sensitivity of adolescence and the increasing prevalence of uncertainty-related psychological difficulties among students, there is a substantial need for evidence-based interventions capable of strengthening adolescents' adaptive capacities and psychological resilience.

Therefore, the present study aimed to investigate the effectiveness of resilience-based group training on intolerance of uncertainty, future orientation, and stress appraisal among high school students.

2. Methods and Materials

2.1. Study Design and Participants

This study was conducted using a quasi-experimental design with a pretest-posttest structure and a control group. The statistical population consisted of all high school students in Ahwaz during the 2025–2026 academic year. Participants were selected through multistage cluster sampling from several public high schools in different educational districts of Ahwaz. After the initial screening process and assessment of inclusion criteria, 40 students who demonstrated elevated levels of uncertainty intolerance and

maladaptive stress appraisal were selected and randomly assigned into an experimental group and a control group, with 20 participants in each group. Inclusion criteria included being enrolled in high school, willingness to participate in the study, obtaining parental consent, absence of severe psychiatric disorders based on school counseling records, and regular attendance in training sessions. Exclusion criteria included absence from more than two intervention sessions and simultaneous participation in other psychological intervention programs during the study period. The experimental group participated in resilience-based group training sessions, while the control group received no intervention during the study period. Ethical considerations such as confidentiality of information, voluntary participation, and the right to withdraw from the study at any stage were fully observed.

2.2. Measures

The Intolerance of Uncertainty Scale developed by Freeston et al. (1994) was used to assess participants' levels of uncertainty intolerance. This questionnaire is one of the most widely used instruments for measuring emotional, cognitive, and behavioral reactions to uncertain situations. The scale consists of 27 items rated on a five-point Likert scale ranging from 1 (not at all characteristic of me) to 5 (entirely characteristic of me). Higher scores indicate greater intolerance of uncertainty. The questionnaire evaluates several dimensions including uncertainty-related anxiety, avoidance behaviors, and cognitive concerns associated with ambiguous situations. Previous psychometric studies have demonstrated satisfactory construct validity and high internal consistency for the scale, with Cronbach's alpha coefficients generally reported above 0.85 in adolescent and adult populations. The Persian version of the instrument has also shown appropriate reliability and validity in Iranian samples.

Future orientation was assessed using the Future Orientation Questionnaire developed by Seginer (2009). This instrument measures individuals' attitudes, expectations, motivations, and planning related to their future lives. The questionnaire contains 31 items scored on a five-point Likert continuum ranging from strongly disagree to strongly agree. The scale evaluates dimensions such as motivational future orientation, cognitive planning, and emotional attitudes toward future goals. Higher scores reflect a more positive and adaptive orientation toward the future. Previous studies have confirmed the scale's

convergent validity and acceptable factor structure across adolescent populations. Internal consistency coefficients reported for the total scale and its subscales have been satisfactory, generally ranging from 0.78 to 0.91. Research conducted on Iranian adolescents has also supported the reliability and cultural applicability of the questionnaire.

Stress appraisal was measured using the Stress Appraisal Measure developed by Peacock and Wong (1990). This self-report instrument evaluates individuals' cognitive appraisal of stressful situations and their perceived coping resources. The questionnaire consists of 28 items scored on a five-point Likert scale ranging from 1 (not at all) to 5 (extremely). The scale measures several dimensions including threat appraisal, challenge appraisal, controllability by self, controllability by others, centrality, and stressfulness. Higher scores in maladaptive appraisal dimensions indicate more negative evaluations of stressful experiences. Previous research has demonstrated strong psychometric properties for the instrument, including satisfactory internal consistency, test-retest reliability, and construct validity across diverse populations. The Persian adaptation of the measure has also shown acceptable reliability coefficients and validity indicators in studies involving Iranian students and adolescents.

2.3. Intervention

The resilience-based group training program was implemented in eight weekly sessions, each lasting approximately 90 minutes. The intervention protocol was designed based on resilience theory and cognitive-behavioral principles aimed at strengthening adaptive coping mechanisms, emotional regulation, cognitive flexibility, optimism, and problem-solving skills. Initial sessions focused on establishing group cohesion, introducing the concept of resilience, and increasing awareness of stress and emotional responses. Middle sessions emphasized identifying maladaptive thoughts, developing positive cognitive restructuring skills, enhancing emotional self-regulation, improving interpersonal communication, and teaching effective coping strategies for uncertain situations. Participants were also trained in goal setting, future planning, self-efficacy enhancement, and adaptive appraisal of stressful experiences. Final sessions focused on consolidating learned skills, promoting maintenance strategies, and encouraging the application of resilience skills in everyday academic and personal challenges. Group discussions, role-playing exercises,

relaxation techniques, homework assignments, and experiential activities were used throughout the intervention process to maximize participant engagement and skill acquisition.

2.4. Data Analysis

Data analysis was conducted using IBM SPSS Statistics version 27. Descriptive statistics including means and standard deviations were calculated for all study variables. Before conducting inferential analyses, assumptions of normality, homogeneity of variances, and equality of covariance matrices were examined using the Shapiro–Wilk test, Levene’s test, and Box’s M test, respectively. To evaluate the effectiveness of the resilience-based group training program on intolerance of uncertainty, future orientation, and stress appraisal, multivariate analysis of covariance (MANCOVA) was employed while controlling for pretest scores. Effect sizes were calculated using partial eta squared, and the significance level for all statistical analyses was set at $p < .05$.

3. Findings and Results

The demographic characteristics of the participants indicated that the mean age of students in the experimental group was 16.21 years ($SD = 0.84$), while the mean age in the control group was 16.08 years ($SD = 0.79$). In the experimental group, 11 participants (55%) were female and 9 participants (45%) were male, whereas in the control group, 10 participants (50%) were female and 10 participants (50%) were male. Regarding educational grade level, 42.5% of the participants were studying in the tenth grade, 35% in the eleventh grade, and 22.5% in the twelfth grade. Examination of baseline demographic variables revealed no statistically significant differences between the experimental and control groups in terms of age, gender distribution, or educational level ($p > .05$), indicating that the two groups were relatively homogeneous before the intervention.

Table 1

Descriptive Statistics of Intolerance of Uncertainty, Future Orientation, and Stress Appraisal Scores in Experimental and Control Groups at Pretest and Posttest Stages

Variable	Group	Pretest Mean	Pretest SD	Posttest Mean	Posttest SD
Intolerance of Uncertainty	Experimental	79.46	8.37	58.12	7.05
Intolerance of Uncertainty	Control	78.91	7.94	76.83	8.16
Future Orientation	Experimental	71.28	9.11	92.47	8.24
Future Orientation	Control	70.84	8.76	72.15	8.53
Stress Appraisal	Experimental	83.57	7.88	60.39	6.91
Stress Appraisal	Control	82.95	8.04	81.74	7.68

The descriptive findings presented in Table 1 demonstrate substantial changes in the mean scores of the experimental group following participation in the resilience-based group training program. Specifically, the mean score of intolerance of uncertainty in the experimental group decreased from 79.46 ($SD = 8.37$) at pretest to 58.12 ($SD = 7.05$) at posttest, indicating a considerable reduction in students’ maladaptive responses toward uncertain situations. In contrast, the control group showed only a slight decrease from 78.91 ($SD = 7.94$) to 76.83 ($SD = 8.16$). Regarding future orientation, the experimental group demonstrated a marked increase in mean scores from 71.28 ($SD = 9.11$) at pretest to 92.47 ($SD = 8.24$) at posttest, suggesting substantial improvement in positive expectations, planning, and motivation toward future goals. Meanwhile, the control group exhibited only

minimal change between the two assessment stages. Similarly, stress appraisal scores in the experimental group decreased notably from 83.57 ($SD = 7.88$) to 60.39 ($SD = 6.91$), reflecting a reduction in negative cognitive appraisal of stressful situations after the intervention. The control group displayed relatively stable scores across both stages. Overall, the descriptive statistics suggest that resilience-based group training was associated with meaningful improvements in psychological functioning among high school students.

Before conducting multivariate analysis of covariance, the statistical assumptions underlying the analysis were examined. Results of the Shapiro–Wilk test indicated that the distribution of scores for all dependent variables was normal in both groups ($p > .05$). Levene’s test also

demonstrated equality of variances across groups for intolerance of uncertainty, future orientation, and stress appraisal variables ($p > .05$). Furthermore, Box’s M test confirmed the homogeneity of covariance matrices between

groups (Box’s $M = 11.84$, $F = 1.09$, $p = .287$). Therefore, the assumptions required for conducting MANCOVA were satisfied.

Table 2

Results of Multivariate Analysis of Covariance for the Effects of Resilience-Based Group Training on Study Variables

Test	Value	F	Hypothesis df	Error df	p	Partial Eta Squared
Pillai’s Trace	0.71	28.94	3	33	0.001	0.71
Wilks’ Lambda	0.29	28.94	3	33	0.001	0.71
Hotelling’s Trace	2.46	28.94	3	33	0.001	0.71
Roy’s Largest Root	2.46	28.94	3	33	0.001	0.71

The multivariate analysis of covariance results presented in Table 2 revealed a statistically significant overall effect of resilience-based group training on the combined dependent variables of intolerance of uncertainty, future orientation, and stress appraisal. Based on Wilks’ Lambda, there was a significant difference between the experimental and control groups in the posttest stage after controlling for pretest scores (Wilks’ Lambda = 0.29, $F = 28.94$, $p = 0.001$). The obtained partial eta squared value of 0.71 indicated that approximately 71% of the variance in the combined

dependent variables could be attributed to participation in the resilience-based intervention program, reflecting a large effect size. Similar significance levels were observed across Pillai’s Trace, Hotelling’s Trace, and Roy’s Largest Root statistics, further confirming the robustness of the intervention effect. These findings suggest that resilience-based group training had a significant and substantial impact on improving students’ psychological responses and coping-related variables.

Table 3

Results of Univariate Analysis of Covariance for Intolerance of Uncertainty, Future Orientation, and Stress Appraisal

Variable	Source	SS	df	MS	F	p	Partial Eta Squared
Intolerance of Uncertainty	Group	3248.51	1	3248.51	41.28	0.001	0.53
Intolerance of Uncertainty	Error	2755.73	35	78.73			
Future Orientation	Group	3894.67	1	3894.67	46.91	0.001	0.57
Future Orientation	Error	2906.84	35	83.05			
Stress Appraisal	Group	3517.29	1	3517.29	44.36	0.001	0.56
Stress Appraisal	Error	2775.64	35	79.30			

The univariate analysis of covariance results reported in Table 3 indicated that resilience-based group training significantly affected all three dependent variables after controlling for pretest scores. For intolerance of uncertainty, a statistically significant difference was observed between the experimental and control groups at posttest ($F = 41.28$, $p = 0.001$), with a partial eta squared of 0.53, indicating that 53% of the variance in posttest scores was attributable to the intervention. This finding demonstrates that the training program substantially reduced students’ intolerance toward uncertain situations. In relation to future orientation, the intervention produced a highly significant effect ($F = 46.91$, $p = 0.001$), with an effect size of 0.57, suggesting that resilience-based training effectively enhanced students’ positive attitudes, planning abilities, and motivational

perspectives toward the future. Likewise, a significant reduction in maladaptive stress appraisal was observed in the experimental group compared with the control group ($F = 44.36$, $p = 0.001$), with a partial eta squared value of 0.56, indicating a strong intervention effect. Collectively, these findings provide empirical evidence that resilience-based group training significantly improved adaptive psychological functioning and coping-related capacities among high school students.

4. Discussion

The present study aimed to investigate the effectiveness of resilience-based group training on intolerance of uncertainty, future orientation, and stress appraisal among

high school students. The findings demonstrated that participation in the resilience-based intervention significantly reduced intolerance of uncertainty and maladaptive stress appraisal while simultaneously increasing future orientation among students in the experimental group compared with the control group. The obtained effect sizes further indicated that the intervention exerted a substantial influence on students' psychological functioning and adaptive coping capacities. These findings highlight the importance of resilience-oriented educational and psychological interventions in promoting emotional adjustment and strengthening protective psychological resources during adolescence.

One of the major findings of the present study was the significant reduction in intolerance of uncertainty among students who participated in resilience-based group training. This result is consistent with previous research demonstrating the close association between resilience-related capacities and improved tolerance of ambiguous or stressful situations (Oral & Karakurt, 2022; Sagone & Indiana, 2023). Resilience-based interventions typically emphasize cognitive flexibility, adaptive emotional regulation, problem-solving skills, and positive coping strategies, all of which can reduce individuals' tendency to perceive uncertain situations as threatening or uncontrollable. Adolescents with high intolerance of uncertainty often engage in catastrophic thinking, excessive worry, emotional avoidance, and rigid cognitive processing patterns. Through resilience-oriented training, students may gradually learn to reinterpret uncertainty as a manageable aspect of life rather than a source of overwhelming distress.

The present findings align with studies indicating that intolerance of uncertainty is strongly associated with psychological distress, anxiety symptoms, emotional dysregulation, and maladaptive educational outcomes among adolescents and young adults (Fu et al., 2024; Morillo-Sarto et al., 2025). For example, Fu et al. demonstrated that intolerance of uncertainty significantly predicted negative emotions among high school students during stressful conditions (Fu et al., 2024). Similarly, Wu et al. found that intolerance of uncertainty mediated the relationship between neuroticism and psychosomatic symptoms among female middle school students (Wu et al., 2024). These studies support the idea that uncertainty-related cognitions play a central role in adolescents' emotional functioning. By improving coping flexibility and emotional regulation, resilience-based training likely weakened

maladaptive cognitive interpretations associated with ambiguity and unpredictability.

The findings are also compatible with the results reported by Qiang et al., who observed that intolerance of uncertainty contributed to academic burnout through self-regulatory fatigue among university students (Qiang et al., 2024). Students who lack resilience often experience cognitive exhaustion when confronted with unpredictable academic or social challenges because they interpret uncertainty as threatening and emotionally destabilizing. Resilience training may reduce this vulnerability by strengthening emotional endurance, psychological hardiness, and self-regulatory capacities. In the present study, group discussions, cognitive restructuring exercises, emotional awareness training, and adaptive coping techniques may have enabled students to develop more balanced and flexible responses toward uncertain situations.

The current findings also correspond with the work of Odacı et al., who found that educational stress mediated the relationship between intolerance of uncertainty and academic life satisfaction among teenagers (Odacı et al., 2022). Adolescents who demonstrate greater resilience may experience lower emotional reactivity in stressful educational contexts because they possess stronger coping resources and more adaptive appraisal patterns. Likewise, Kareem et al. showed that classroom engagement and psychological well-being were negatively affected by intolerance of uncertainty during periods of educational instability (Kareem et al., 2022). The resilience-based intervention implemented in the present study may therefore have contributed to healthier educational adjustment by reducing maladaptive cognitive-emotional reactions toward uncertainty.

Another important finding of this study was the significant increase in future orientation among students who participated in the resilience-based group training program. This result suggests that resilience-oriented interventions may strengthen adolescents' hopefulness, planning abilities, motivational resources, and confidence regarding future goals. Future orientation is considered one of the most critical developmental tasks during adolescence because students at this stage actively construct educational aspirations, occupational identities, and long-term personal goals. Adolescents who possess stronger future orientation are generally more capable of maintaining motivation, persisting during adversity, and regulating their behaviors in accordance with long-term objectives.

The increase in future orientation observed in this study is consistent with previous findings linking resilience and psychological capital to positive developmental outcomes (Finch et al., 2023; Sulistiobudi & Kadiyono, 2023). Finch et al. demonstrated that interventions targeting psychological capital improved hope, resilience, and optimism among female students during educational disruptions (Finch et al., 2023). Similarly, Sulistiobudi and Kadiyono found that psychological capital significantly enhanced vocational students' employability and adaptive career development (Sulistiobudi & Kadiyono, 2023). Since resilience-based training emphasizes goal setting, optimism, adaptive thinking, and problem-solving skills, it is reasonable that participation in the intervention increased students' confidence in their ability to manage future challenges successfully.

The present findings may also be interpreted in light of the results reported by Santilli et al., who found positive relationships between resilience, life satisfaction, and career adaptability among middle school students (Santilli et al., 2020). Adolescents who perceive themselves as capable of coping effectively with adversity are more likely to maintain positive expectations regarding future opportunities and outcomes. Resilience may therefore function as a psychological resource that enhances adolescents' sense of agency and strengthens their ability to envision constructive future pathways. Likewise, Cogorno et al. reported that students exposed to unstable social conditions often experienced uncertainty and fear regarding their educational continuity and future prospects (Cogorno et al., 2023). Interventions that strengthen resilience may help reduce these concerns by increasing students' emotional stability and adaptive confidence.

The enhancement of future orientation may additionally be explained through the psychological mechanisms proposed within the Hidden Talents Framework (Ellis et al., 2023). According to this perspective, adolescents can develop adaptive competencies when provided with supportive psychological resources and environments that promote emotional regulation, cognitive flexibility, and constructive coping. The resilience-based group intervention likely provided participants with opportunities to reinterpret challenges as manageable experiences rather than insurmountable obstacles. As students became more capable of regulating stress and uncertainty, they may also have become more willing to engage in future planning and optimistic goal-directed thinking.

Another significant finding of the present study was the reduction in maladaptive stress appraisal among students in the experimental group. This result indicates that resilience-based training improved students' cognitive evaluation of stressful situations and reduced perceptions of helplessness, uncontrollability, and emotional threat. Stress appraisal plays a critical role in determining emotional and behavioral responses because individuals' interpretations of stressful experiences often shape their coping behaviors and psychological outcomes. Adolescents who appraise stressors as threatening and uncontrollable are more vulnerable to anxiety, emotional exhaustion, and maladaptive coping strategies.

The reduction in maladaptive stress appraisal observed in this study is consistent with findings reported by Wang et al., who emphasized the role of emotional regulation capacities in improving affective functioning among high school students (Wang et al., 2022). Resilience-based interventions frequently include emotional awareness training, relaxation strategies, cognitive reframing, and coping skill enhancement, all of which may contribute to healthier stress appraisal patterns. Similarly, Iovino et al. highlighted the importance of teaching emotional well-being strategies within school environments to strengthen students' adaptive emotional functioning (Iovino et al., 2021). Through repeated practice of coping and emotional regulation techniques, participants in the present study may have learned to perceive stressful situations as manageable rather than overwhelming.

The findings are also supported by the work of Dupuis et al., who demonstrated that school-based anxiety prevention programs contributed to significant reductions in anxiety symptoms among adolescents (Dupuis et al., 2024). School-based resilience interventions may provide adolescents with a safe environment for discussing emotional experiences, practicing adaptive coping strategies, and receiving peer support. This supportive group atmosphere may strengthen students' psychological security and reduce maladaptive emotional reactions toward stressful situations. Likewise, Capurso et al. emphasized the effectiveness of psychoeducational interventions in promoting emotional adjustment and psychosocial functioning among students exposed to crisis-related stressors (Capurso et al., 2022).

The present results also align with studies emphasizing the importance of social support, emotional connectedness, and psychological capital in promoting resilience and psychological well-being among adolescents (AtiLa, 2023; Buenconsejo et al., 2022). Group-based resilience training

may strengthen students' interpersonal support systems and reduce feelings of isolation or helplessness during stressful experiences. Furthermore, Ben-Asher and Huss demonstrated that participatory and expressive interventions could strengthen resilience and emotional empowerment among vulnerable youth populations (Ben-Asher & Huss, 2023). The collaborative and interactive nature of the present intervention may therefore have contributed to improved stress appraisal by increasing emotional expression, peer support, and adaptive social engagement.

The findings of this study may additionally be interpreted in relation to the broader psychological consequences of social instability, educational pressure, and post-pandemic emotional challenges among adolescents. Previous research has shown that students continue to experience elevated levels of emotional vulnerability, uncertainty-related stress, and psychological distress following periods of global disruption (McIntosh & Stone, 2022; Waters, 2023). Yao et al. found that intolerance of uncertainty mediated the relationship between social anxiety and self-injurious behaviors among junior high school students (Yao et al., 2023). Similarly, Zhang et al. reported that uncertainty stress contributed to depressive symptoms among youth, while supportive relationships functioned as protective factors (Zhang et al., 2021). These findings reinforce the importance of preventive resilience-based interventions capable of strengthening emotional coping and psychological flexibility during adolescence.

Furthermore, contemporary educational systems increasingly require students to adapt to rapidly changing technological, academic, and social conditions. Nigam et al. argued that educational institutions must prioritize mental well-being alongside technological advancement to prevent psychological deterioration among students (Nigam et al., 2024). Similarly, Yang highlighted the importance of ambiguity tolerance and emotional intelligence in adaptive educational functioning (Yang, 2022). Resilience-based interventions may therefore serve as valuable psychological resources that prepare adolescents to cope more effectively with future educational and social uncertainties.

5. Conclusion

Overall, the findings of the present study suggest that resilience-based group training represents an effective psychological intervention for improving adolescents' emotional adjustment and adaptive coping capacities. By reducing intolerance of uncertainty, strengthening future

orientation, and improving stress appraisal, resilience-oriented interventions may contribute substantially to students' psychological well-being, educational engagement, and long-term developmental adjustment. The results underscore the importance of implementing preventive and promotive psychological programs within school environments to support adolescents during periods of developmental transition and psychosocial stress.

6. Limitations & Suggestions

One of the limitations of the present study was the relatively small sample size and the restriction of participants to high school students from Ahwaz, which may limit the generalizability of the findings to adolescents from different cultural, educational, or socioeconomic backgrounds. Another limitation involved the use of self-report questionnaires, which may have been influenced by response bias, social desirability, or participants' subjective perceptions. Additionally, the absence of a long-term follow-up assessment made it difficult to determine the durability and stability of the intervention effects over time. The study also did not control for certain potentially influential variables such as family functioning, personality traits, academic achievement, or previous psychological experiences that could have affected students' responses to the intervention.

Future studies are encouraged to examine the long-term effectiveness of resilience-based interventions using follow-up assessments across several months or years. Researchers may also compare the effectiveness of resilience-based training with other psychological interventions such as mindfulness-based therapy, cognitive-behavioral therapy, or acceptance and commitment therapy among adolescent populations. Conducting studies with larger and more diverse samples from different cities, educational levels, and cultural contexts would improve the external validity of the findings. Future investigations may additionally explore the mediating and moderating roles of variables such as emotional intelligence, social support, family resilience, self-efficacy, and academic motivation in the relationship between resilience training and psychological adjustment.

The findings of the present study have several practical implications for educational and mental health professionals working with adolescents. School counselors, psychologists, and educators may incorporate resilience-based training programs into school mental health services to strengthen students' coping abilities, emotional regulation, and

adaptive functioning. Educational policymakers may also develop preventive psychological interventions aimed at reducing uncertainty-related stress and promoting positive future orientation among students. Parents and teachers can contribute to strengthening adolescent resilience by fostering supportive interpersonal relationships, encouraging adaptive problem-solving, and promoting emotional expression within educational and family environments. Additionally, implementing structured resilience programs in schools may help reduce psychological vulnerability and improve adolescents' overall well-being, academic engagement, and readiness to cope with future challenges.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contributed to this article.

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