The Effectiveness of Schema Therapy and Cognitive-Behavioral Intolerance of Uncertainty Interventions on Worry States, Thought-Action Fusion, and Cognitive Avoidance in Adolescents with Generalized Anxiety Disorder

Sanaz. Pourgoli[1] , Mohammad. Talaei kahjugh[2] , Elham. Sargolzaei[3] , Giti. Shahbazi[4] , Somaye. Nazari[5] , Zeinab. Baharestani[1*] , Kamran. Pourmohammad Ghouchani[4]

[1] Department of Clinical Psychology, kho.C., Islamic Azad University, Khomeinishahr, Iran
[2] Ma Clinical Psychology, Department of Clinical Psychology, Kharazmi University, Tehran, Iran
[3] Department of Clinical Psychology, Zah.C., Islamic Azad University ,Zahedan, Iran
[4] Department of Clinical Psychology, Ki.c., Islamic Azad University, Kish, Iran
[5] Department of Educational Psychology,Se.C., Islamic Azad University, Semnan, Iran

* Corresponding author email address: z.baharestani78@gmail.com

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Objective: The aim of this study was to investigate the effectiveness of schema therapy and cognitive-behavioral interventions focused on intolerance of uncertainty in reducing worry states, thought-action fusion, and cognitive avoidance among adolescents diagnosed with GAD.

Methods and Materials: This study employed a quasi-experimental, pretest-posttest control group design. The statistical population consisted of all adolescents diagnosed with GAD who referred to 30 psychological counseling centers in District 17 of Tehran in 2025. A total of 36 participants were selected through convenience sampling and were randomly assigned to one of three groups: schema therapy, cognitive-behavioral therapy (CBT) targeting intolerance of uncertainty, and a control group. Measurement tools included the 7-item Generalized Anxiety Disorder Scale (Spitzer et al., 2006), the Intolerance of Uncertainty Scale (Freeston et al., 1994), the Penn State Worry Questionnaire (Meyer et al., 1990), the Thought-Action Fusion Questionnaire (Shafran et al., 1996), and the Cognitive Avoidance Questionnaire (Sexton & Dugas, 2009). The schema therapy intervention (Young, 1990) was delivered in 8 sessions of 90 minutes each. The CBT intervention was based on the Dugas model (Dugas & Chavot, 2007; Chavot et al., 2019) and was delivered over 12 sessions of 90 minutes each. The control group was placed on a waitlist. Following the intervention, a posttest was administered to all groups. Data were analyzed using multivariate analysis of covariance (MANCOVA) in SPSS version 24, including both descriptive and inferential statistics.

Findings: The results indicated that, based on the posttest mean scores of the experimental groups, both schema therapy and cognitive-behavioral therapy focused on intolerance of uncertainty had a significant effect on reducing worry states, thought-action fusion, and cognitive avoidance in adolescents with GAD.

Conclusion: Based on the findings of this study, both cognitive-behavioral therapy focused on intolerance of uncertainty and schema therapy can be considered effective interventions and may be utilized in clinical and healthcare settings to improve worry states, thought-action fusion, and cognitive avoidance.
Keywords: Schema therapy, cognitive-behavioral therapy, intolerance of uncertainty, worry states, thought-action fusion, generalized anxiety disorder.

1. Introduction

Generalized Anxiety Disorder (GAD) is one of the most prevalent and debilitating anxiety disorders, characterized by excessive and uncontrollable worry that interferes with daily functioning and overall psychological well-being. Individuals with GAD often exhibit chronic worry states, pervasive cognitive avoidance, and distorted cognitive patterns such as thought-action fusion, which significantly compromise their capacity to regulate emotional responses and engage in adaptive decision-making processes (Behar & Borkovec, 2020; Jacoby, 2020). Adolescents, in particular, are highly vulnerable to the onset and intensification of GAD symptoms due to the dynamic interplay of cognitive, emotional, and social developmental processes during this life stage (Makhdoumi et al., 2024; Wahlund et al., 2020).

The persistence of worry in GAD is not merely a transient cognitive activity but an entrenched maladaptive strategy aimed at avoiding emotionally distressing imagery and uncertainty. Studies have shown that worry functions as a form of cognitive avoidance that maintains anxiety by preventing emotional processing and habituation (Berle & Starcevic, 2015; Günther et al., 2022; Scotta et al., 2022). Cognitive avoidance includes strategies such as thought suppression, distraction, and substitution of distressing thoughts with neutral or positive ones. These strategies, while seemingly adaptive in the short term, reinforce avoidance patterns and intensify long-term anxiety symptoms (Hosseinzadeh Firouzabad et al., 2017; Sagui-Henson, 2017). Adolescents who consistently engage in cognitive avoidance are more likely to develop chronic worry patterns, impaired problem-solving skills, and lower emotional resilience (Hayes-Skelton & Lee, 2020; Heffernan et al., 2021).

Another important construct in the pathology of GAD is thought-action fusion (TAF)—a cognitive distortion in which individuals believe that having a thought is morally equivalent to performing the corresponding action, or that the thought itself can cause real-world consequences (Berle & Starcevic, 2015; Rachman, 2016). This fusion between cognition and behavior leads to heightened anxiety, guilt, and compulsive behaviors aimed at neutralizing the perceived threat. TAF has been shown to be particularly problematic in adolescents, as their cognitive frameworks for abstract reasoning and probabilistic thinking are still maturing (Mikaili et al., 2015; Shah et al., 2023). Thus, treating TAF in youth with GAD is essential for reducing cognitive rigidity and enhancing psychological flexibility.

Intolerance of Uncertainty (IU) is another transdiagnostic factor strongly implicated in the etiology and maintenance of GAD. IU refers to the tendency to react negatively to uncertain situations, interpreting ambiguity as threatening and unacceptable (Bomyea et al., 2015; Jacoby, 2020). Individuals high in IU are prone to engage in excessive worry, over-preparation, and avoidance behaviors as attempts to mitigate the discomfort associated with uncertainty. Research shows that targeting IU in therapy results in significant reductions in worry and anxiety symptoms (Hebert & Dugas, 2019; Hosseini et al., 2021). In adolescents, where life is filled with developmental transitions and uncertainties regarding identity, academic performance, and social acceptance, the role of IU becomes even more critical (Ikic et al., 2017; Vafadar et al., 2021).

Cognitive Behavioral Therapy (CBT) remains a gold-standard intervention for GAD, with a solid evidence base supporting its efficacy in both adult and adolescent populations. CBT directly targets maladaptive cognitive distortions, worry patterns, and behavioral avoidance through techniques such as cognitive restructuring, exposure, and behavioral experiments (Bomyea et al., 2015; Borza, 2017). Specifically, cognitive-behavioral interventions that focus on IU have demonstrated effectiveness in reducing anxiety and worry in individuals with GAD (Hebert & Dugas, 2019; Wahlund et al., 2020). Such interventions aim to increase tolerance for ambiguity, reduce safety-seeking behaviors, and foster adaptive coping strategies.

In parallel with CBT, Schema Therapy (ST) has gained traction as an integrative therapeutic model that addresses deeper emotional needs and early maladaptive schemas formed in childhood, which are often implicated in the chronicity of GAD symptoms (Fassbinder et al., 2019; Thiel et al., 2016). ST is particularly valuable when traditional CBT fails to address the underlying personality-level vulnerabilities and relational patterns that contribute to

anxiety. Through techniques like experiential re-scripting and schema mode work, schema therapy helps clients reprocess unmet emotional needs and develop healthier cognitive-emotional patterns (Makhdoumi et al., 2024; Straarup et al., 2022). In adolescents, who are navigating identity formation and emotional regulation challenges, schema therapy can foster resilience and promote long-term change (Baniasadi et al., 2025; Dehghani Soltani & Rezaei Nasab, 2022).

A growing body of empirical literature has compared the efficacy of CBT and ST in treating adolescents with GAD. For instance, research by Izadi et al. (2022) found that both Acceptance and Commitment Therapy (ACT) and CBT were effective in improving decision-making and reducing anxiety symptoms in adolescents with GAD and comorbid conditions (Izadi et al., 2022). Similarly, a study by Makhdoumi et al. (2024) demonstrated that schema therapy significantly reduced worry states and indecision among adolescents with GAD, showing comparable results to traditional CBT approaches (Makhdoumi et al., 2024). These findings support the integration of both structured and deep-level therapeutic models in treating youth with complex anxiety profiles.

In terms of clinical manifestations, adolescents with GAD often report excessive preoccupation with future events, academic performance, peer approval, and family expectations. These worry domains are reinforced by high levels of IU and the presence of cognitive avoidance strategies, such as avoidance of anxiety-inducing situations or deliberate suppression of distressing thoughts (Günther et al., 2022; Ranney et al., 2021). Moreover, they may experience impairments in attentional control, emotional regulation, and decision-making, which are further exacerbated by the developmental tasks of adolescence (Marchetti et al., 2018; Morrison & Conner, 2019). Addressing these symptoms through evidence-based psychotherapeutic interventions becomes a pressing need.

Although CBT is more structured and focuses on skill acquisition and symptom reduction, schema therapy offers a complementary perspective that considers the developmental roots of maladaptive coping patterns. Studies show that schema therapy can also reduce TAF, cognitive avoidance, and other dysfunctional beliefs by altering core schemas and modes through experiential and relational techniques (Fassbinder et al., 2019; Thiel et al., 2016). The use of ST in adolescent populations is still emerging but shows promise for those with chronic, treatment-resistant

anxiety or complex personality structures (Shah et al., 2023; Straarup et al., 2022).

The intersection of worry, cognitive avoidance, TAF, and IU highlights the need for integrative intervention frameworks that target both the surface-level symptoms and the deeper personality-based structures of GAD. Such interventions must be developmentally sensitive, culturally adaptable, and theoretically grounded. Combining schema-based approaches with intolerance-of-uncertainty-focused CBT could enhance treatment outcomes, particularly in adolescents who exhibit rigidity in thinking and emotional inflexibility (Baniasadi et al., 2025; Behar & Borkovec, 2020).

Moreover, recent advances in neuropsychological research have begun to uncover the brain-based correlates of cognitive avoidance and vigilance in individuals with anxiety disorders. For example, Günther et al. (2022) identified structural brain differences associated with vigilance and avoidance behaviors in patients with anxiety, highlighting the potential for neuroscience-informed psychological interventions (Günther et al., 2022). Such findings underscore the complexity of GAD and the need for personalized treatment plans that integrate cognitive, emotional, behavioral, and neurobiological factors.

In sum, the high prevalence, early onset, and chronic nature of GAD in adolescents demand innovative and multimodal therapeutic approaches. Both CBT and schema therapy provide empirically supported frameworks for reducing key pathological features such as worry, TAF, and cognitive avoidance. Comparative studies and clinical trials are essential for determining the specific mechanisms of change and long-term efficacy of these interventions (Borza, 2017; Dehghani Soltani & Rezaei Nasab, 2022; Hebert & Dugas, 2019). By targeting both cognitive distortions and schema-level dysfunctions, these interventions have the potential to not only alleviate anxiety symptoms but also improve emotional resilience, metacognitive flexibility, and overall psychological functioning in adolescents with GAD (Hayes-Skelton & Lee, 2020; Knouse & Mitchell, 2015).

This study aims to contribute to this growing field of inquiry by empirically evaluating the comparative effectiveness of schema therapy and cognitive-behavioral interventions focused on intolerance of uncertainty in improving worry states, thought-action fusion, and cognitive avoidance among adolescents with generalized anxiety disorder.

2.   Methods and Materials

2.1. Study Design and Participants

The present study employed a quasi-experimental pretest-posttest design with a control group. The statistical population included all adolescents diagnosed with Generalized Anxiety Disorder (GAD) who had referred to 30 psychological counseling centers in District 17 of Tehran in the year 2025. From this population, 36 individuals were selected through convenience sampling. They were then randomly assigned to one of three groups: schema therapy, cognitive-behavioral therapy focused on intolerance of uncertainty, and a control group. Accordingly, each group—schema therapy (n = 12), cognitive-behavioral therapy (n = 12), and control (n = 12)—comprised 12 participants. The inclusion criteria were: a formal diagnosis of GAD, a score above 40 on the Generalized Anxiety Disorder Scale (GAD-7), informed consent to participate in the intervention sessions, no current medication use, no history of physical illness (based on psychiatric records), and no concurrent treatments or interventions (based on psychological records). Exclusion criteria included withdrawal from the study, absence from more than two sessions, and failure to complete therapeutic assignments.

2.2. Measures

Generalized Anxiety Disorder 7-Item Scale (GAD-7): Developed by Spitzer, Kroenke, Williams, and Löwe (2006), this 7-item scale assesses the psychological difficulties experienced by participants over the past two weeks. Items are rated on a 4-point Likert scale from 0 (not at all) to 3 (nearly every day), with total scores ranging from 0 to 21. An additional question (item 8) evaluates the extent to which the problems interfere with work, home responsibilities, or relationships. Response options are: not at all, somewhat, very much, and extremely. Cutoff scores are 5 (mild), 10 (moderate), and 15 (severe). Spitzer et al. (2006) extracted two factors from an initial 15-item scale: eight items related to depression (resulting in PHQ-8) and seven related to anxiety, forming the GAD-7. Cronbach's alpha and test-retest reliability for the GAD-7 were reported at .92 and .83, respectively. The GAD-7 also demonstrated good diagnostic validity. In a study by Naeinian et al. (2011) on Iranian university students and clinical samples, Cronbach's alpha was reported at .85. In the current study, Cronbach's alpha was .76.

Penn State Worry Questionnaire (PSWQ): Developed by Meyer, Miller, Metzger, and Borkovec (1990), this 16-item questionnaire assesses the tendency toward excessive and uncontrollable worry. Items are rated on a 5-point Likert scale ranging from 1 (not at all typical) to 5 (very typical), with total scores ranging from 16 to 80. The PSWQ has demonstrated high internal consistency, with Cronbach's alpha ranging from .86 to .95, indicating homogeneity among items. Test-retest reliability ranges from .74 to .93. The PSWQ also shows evidence of both convergent and divergent validity, correlating more strongly with other worry measures than with anxiety or depression measures. In a study by Dehshiri, Golzari, Barjali, and Sohrabi (2009), conducted on Iranian university students, Cronbach's alpha was .87, and test-retest reliability was .79, with significant correlations supporting convergent validity with trait anxiety and depression scores.

Thought-Action Fusion Questionnaire (TAFQ): Developed by Shafran, Thordarson, and Rachman (1996), this 19-item questionnaire uses a 5-point Likert scale with options ranging from "strongly agree" to "strongly disagree." Responses are scored from 0 to 4. The TAFQ measures three subscales: (1) likelihood TAF for self (3 items), (2) likelihood TAF for others (4 items), and (3) moral TAF (12 items). A revised version of the TAFQ added eight new subscales, resulting in a total of 27 items. Items 16 to 27 are split into two parts, each scored separately. In a study by Bakhshipour et al. (2011), Cronbach's alpha for the full scale was .81, and for subscales ranged from .79 to .95. Test-retest reliability was .61 for the full scale and ranged from .59 to .63 for subscales (Mikaeili, Eyni, & Taghavi, 2016).

Cognitive Avoidance Questionnaire (CAQ): Designed by Sexton and Dugas (2009), the CAQ is a 25-item instrument that assesses cognitive avoidance strategies on a 5-point Likert scale ranging from 1 (not at all) to 5 (very much), with total scores ranging from 25 to 125. The CAQ measures five cognitive avoidance strategies: (1) thought suppression, (2) replacing worrisome thoughts with positive ones, (3) distraction to interrupt the worry cycle, (4) avoidance of worry-inducing situations and activities, and (5) converting mental images into verbal thoughts. Sexton and Dugas (2009) reported high internal consistency (Cronbach's alpha = .95) and test-retest reliability over six weeks at .85. A study by Hoseinzadeh Firoozabad, Basaknejad, and Davoudi (2017) reported the questionnaire's reliability at .91.

2.3. Interventions

The schema therapy intervention in this study followed the protocol developed by Young (1990, as cited in Young, Klosko, & Weishaar, 2003), consisting of eight structured

sessions tailored for adolescents with Generalized Anxiety Disorder (GAD). The program began with establishing therapeutic rapport, introducing group rules, and defining treatment goals, followed by psychoeducation on early maladaptive schemas and coping styles. Cognitive techniques, such as schema validity testing, chair work, and redefinition of core beliefs, were employed to challenge schema-driven thoughts. Experiential methods, including guided imagery and empty chair dialogues, were used to connect current emotions with past schema activations and promote emotional processing. Behavioral pattern-breaking strategies were introduced to identify problematic behaviors and replace them with adaptive alternatives, reinforced through role-play and scenario planning. Throughout the sessions, participants engaged in homework assignments aimed at increasing awareness of schemas, enhancing emotional insight, and practicing new behaviors. The final session consolidated therapeutic gains, reviewed key insights, and prepared participants for post-treatment assessment and closure.

The cognitive-behavioral therapy (CBT) protocol utilized in this study was adapted from the Dugas and Ladouceur model (Dugas & Chavot, 2007; Chavot, Kolber-Ciru, & Bito, 2019), and consisted of twelve 90-minute sessions aimed at reducing GAD symptoms through intolerance of uncertainty (IU) reduction techniques. The initial sessions focused on psychoeducation about the nature of worry, differentiating between current and hypothetical problems, and monitoring worry episodes. The core therapeutic phase emphasized increasing the adolescent's awareness of their IU, recognizing how IU sustains chronic worry, and gradually exposing them to uncertainty-provoking situations. Socratic dialogue and behavioral experiments were used to reframe beliefs about the utility of worry and demonstrate the negative impact of avoidance. Subsequent sessions targeted positive beliefs about worry, teaching clients to critically evaluate and test the assumption that

worry is beneficial. The later phases introduced structured problem-solving for real-life concerns and imagery-based exposure to catastrophic thoughts regarding hypothetical situations. The protocol culminated in helping adolescents develop new cognitive and behavioral responses to uncertainty, thereby reducing worry intensity and enhancing emotional regulation.

2.4. Data Analysis

After obtaining the necessary permissions and completing the sampling process as previously described, 36 adolescents with a diagnosis of GAD were randomly assigned to three groups—two experimental groups and one control group. All three groups completed the assessment questionnaires. Participants were provided with information regarding the benefits, effects, and limitations of the therapeutic interventions. The research was conducted in two phases. In the first phase (library research), information was collected through books, journals, electronic publications, and dissertations. In the second phase (intervention), treatment was administered based on the specified protocols. Statistical analysis was conducted using both descriptive and inferential methods. In the descriptive section, frequency distribution tables, percentage distributions, measures of central tendency, and measures of dispersion were presented. For hypothesis testing, multivariate analysis of variance (MANOVA) was employed. Data analysis was performed using SPSS version 22.

3. Findings and Results

Table 1 presents the descriptive indices of the research variables, separated by group (experimental and control) and by stage (pretest and posttest), along with the assumptions of normality of data distribution.

Table 1

Descriptive Statistics of Research Variables by Group and Stage, Along with Normality and Homogeneity Test Assumptions

Variable	Group	Pretest Mean (SD)	Posttest Mean (SD)	K–S Test (Sig.)	Levene's F	Levene's Sig.
Worry States	Experimental	74.21 (8.94)	44.32 (6.54)	0.17	1.53	0.16
	Control	74.23 (9.19)	77.08 (10.23)	0.13		
Thought-Action Fusion	Experimental	49.85 (8.88)	32.15 (6.85)	0.19	0.46	0.49
	Control	50.30 (9.40)	52.45 (10.61)	0.05		
Cognitive Avoidance	Experimental	37.38 (9.78)	47.13 (10.54)	0.18	0.98	0.37
	Control	37.84 (9.67)	35.12 (9.34)	0.15		

Before presenting the results of the covariance analysis, the assumptions for parametric tests were examined. The results of Levene's test to assess the equality of variances across groups for the dependent variables—worry states, thought-action fusion, and cognitive avoidance—indicated that the significance levels were greater than 0.05. Therefore, with 95% confidence, it can be concluded that the experimental and control groups were homogeneous in terms of variance for the three variables in the pretest stage.

In addition, the Kolmogorov–Smirnov test confirmed the normal distribution of the dependent variable scores in the posttest stage (p > 0.05). Furthermore, the homogeneity of regression slopes assumption was tested and met (p > 0.05), supporting the appropriateness of ANCOVA for the data.

To compare the posttest means between experimental and control groups, Wilks' Lambda was used. The test yielded a Wilks' Lambda value of 0.41 and F = 6.75, indicating that—after controlling for the effect of covariates—there was a statistically significant difference in at least one of the dependent variables between groups (p < 0.01).

Table 2

Multivariate Analysis of Covariance (MANCOVA) to Examine the Effectiveness of Schema Therapy and Cognitive-Behavioral Therapy for Intolerance of Uncertainty on Worry States, Thought-Action Fusion, and Cognitive Avoidance in Adolescents with Generalized Anxiety Disorder

Variable	Stage	Sum of Squares	df	Mean Square	F	Sig.	Eta²	Power
Worry States	Pretest	81.33	1	81.33	92.89	0.001	0.23	0.45
	Group	4461.36	1	4461.46	334.21	0.049	0.51	0.88
	Error	4567.15	27	4567.15	—	—	—	—
Thought-Action Fusion	Pretest	1343.23	1	1343.23	96.06	0.021	0.27	0.49
	Group	1987.73	1	1987.73	169.93	0.006	0.55	0.94
	Error	5762.75	27	5762.75	—	—	—	—
Cognitive Avoidance	Pretest	5273.12	1	5273.12	95.10	0.001	0.21	0.51
	Group	2134.78	1	2134.78	287.14	0.007	0.57	0.95
	Error	6923.34	27	6923.34	—	—	—	—

According to the results of the multivariate analysis of covariance in Table 2, and after controlling for pretest scores, statistically significant differences were observed between the experimental and control groups in the posttest scores for all three dependent variables:

Worry states: F = 333.19, p < 0.049, η² = 0.51
Thought-action fusion: F = 169.93, p < 0.006, η² = 0.55
Cognitive avoidance: F = 287.14, p < 0.007, η² = 0.57

In other words, based on the posttest mean scores of the experimental groups, it can be concluded that schema therapy and cognitive-behavioral therapy interventions targeting intolerance of uncertainty significantly reduced worry states, thought-action fusion, and cognitive avoidance in adolescents with Generalized Anxiety Disorder.

4. Discussion and Conclusion

The findings of this study indicated that both schema therapy and cognitive-behavioral therapy (CBT) focusing on intolerance of uncertainty (IU) significantly improved worry states, reduced thought-action fusion (TAF), and decreased cognitive avoidance in adolescents diagnosed with Generalized Anxiety Disorder (GAD). After controlling for the effects of pre-test scores, the post-test results demonstrated significant differences between the experimental and control groups across all three variables. This suggests that both interventions effectively addressed the cognitive and emotional mechanisms underlying GAD symptoms in adolescents. These results are consistent with existing evidence highlighting the role of maladaptive cognitive patterns—such as IU, TAF, and cognitive avoidance—in the development and persistence of GAD, and they confirm the effectiveness of psychotherapeutic approaches in targeting these mechanisms.

The observed reduction in worry states following both schema therapy and IU-focused CBT aligns with previous studies emphasizing the centrality of worry in GAD pathology. Worry, defined as a repetitive and uncontrollable cognitive process concerning potential future threats, has been repeatedly shown to serve as a dysfunctional avoidance strategy (Behar & Borkovec, 2020; Jacoby, 2020). The CBT intervention employed in this study focused specifically on reducing worry by enhancing tolerance to uncertainty—a

strategy previously demonstrated to be effective in both adult and adolescent populations (Bomyea et al., 2015; Hebert & Dugas, 2019). The schema therapy intervention also showed comparable outcomes in reducing worry, which may be attributed to its focus on modifying deep-seated maladaptive schemas related to safety, mistrust, and vulnerability (Dehghani Soltani & Rezaei Nasab, 2022; Makhdoumi et al., 2024). These findings support the growing consensus that both symptom-focused and schema-focused approaches can effectively alleviate excessive worry in adolescents with GAD.

Regarding thought-action fusion, the results revealed that both interventions significantly reduced this maladaptive cognitive belief, which involves equating thoughts with moral wrongdoing or causal power. The reduction in TAF is particularly notable because this cognitive distortion is often associated with heightened anxiety, compulsive behaviors, and excessive guilt (Berle & Starcevic, 2015; Rachman, 2016). The CBT model achieved this reduction through cognitive restructuring and behavioral experiments that helped participants decouple intrusive thoughts from real-world consequences, consistent with findings from earlier cognitive therapy research (Borza, 2017; Hebert & Dugas, 2019). Schema therapy also reduced TAF by addressing the underlying belief systems that give rise to fusion-based thinking, such as schemas of defectiveness/shame or unrelenting standards (Fassbinder et al., 2019; Straarup et al., 2022). This dual effectiveness underscores the importance of both surface-level and deep cognitive change processes in modifying TAF among adolescents with GAD.

Cognitive avoidance was also significantly reduced in both treatment groups, further validating the theoretical linkage between avoidance behaviors and the maintenance of anxiety. Avoidance strategies—such as thought suppression, distraction, and emotional disengagement—are well-established features of GAD and are especially prevalent among adolescents who lack emotional regulation skills (Hayes-Skelton & Lee, 2020; Sagui-Henson, 2017). The CBT intervention directly addressed cognitive avoidance through exposure to uncertainty, mindfulness techniques, and problem-solving skills, in line with previous findings indicating its efficacy in reducing avoidant coping (Vafadar et al., 2021; Wahlund et al., 2020). Meanwhile, schema therapy targeted avoidance indirectly by encouraging emotional engagement and schema reactivation, which helped participants confront and process long-avoided experiences (Fassbinder et al., 2019; Thiel et al., 2016). Notably, these results confirm that both cognitive

and experiential techniques can effectively diminish avoidance tendencies in anxious youth.

These findings further affirm the transdiagnostic role of intolerance of uncertainty as a core mechanism in GAD and reinforce the importance of directly addressing IU in therapeutic interventions. Numerous studies have shown that IU exacerbates worry, fuels avoidance, and increases the likelihood of maladaptive cognitive appraisals (Bomyea et al., 2015; Jacoby, 2020). The present study demonstrated that interventions explicitly focusing on IU—not only reduced worry but also yielded broader cognitive benefits, including reductions in TAF and cognitive avoidance. These results echo previous findings indicating that IU is not merely a symptom but a maintaining mechanism of GAD and thus a highly appropriate target for intervention (Hebert & Dugas, 2019; Hosseini et al., 2021).

The efficacy of schema therapy in this study offers additional evidence for the adaptability and relevance of schema-based interventions in adolescent populations. While schema therapy is traditionally considered more appropriate for chronic or personality-based conditions, its application in anxiety disorders, especially in adolescents, has gained support in recent literature (Makhdoumi et al., 2024; Straarup et al., 2022). By targeting the underlying emotional needs and core beliefs that give rise to avoidance, worry, and TAF, schema therapy provides a developmentally attuned and emotionally integrative approach to treating GAD. These outcomes are consistent with prior findings that demonstrate the value of schema therapy in modifying rigid belief systems and reducing anxiety symptoms (Dehghani Soltani & Rezaei Nasab, 2022; Fassbinder et al., 2019).

Moreover, the results align with recent neuropsychological studies indicating that cognitive avoidance and vigilance are associated with structural and functional changes in the brain, particularly in areas linked to emotional regulation and cognitive control (Günther et al., 2022). The psychological improvements observed in this study may thus have underlying neurobiological correlates, suggesting that both CBT and schema therapy may contribute to long-term neural adaptation. This is particularly important in adolescence, a period marked by heightened neuroplasticity, which enhances the potential for durable therapeutic change (Hayes-Skelton & Lee, 2020; Ranney et al., 2021).

From a comparative perspective, although both interventions were effective across all variables, no significant superiority was found for either approach,

implying that both are viable options depending on the individual's needs and the clinical setting. CBT may be preferred in structured environments focused on short-term symptom relief, while schema therapy may be better suited for clients with entrenched patterns of avoidance and cognitive fusion. This flexibility supports the adoption of integrative or modular treatment models that can be adapted based on client characteristics and treatment goals (Baniasadi et al., 2025; Izadi et al., 2022).

In conclusion, the results of this study reinforce the efficacy of both CBT targeting IU and schema therapy in reducing the core cognitive and emotional components of GAD in adolescents. These findings contribute to the growing body of research advocating for individualized, developmentally appropriate, and mechanism-focused interventions in the treatment of adolescent anxiety disorders. The alignment with prior empirical studies provides strong support for the theoretical and clinical relevance of targeting worry, TAF, and cognitive avoidance in youth.

5. Limitations & Suggestions

Despite the promising findings, this study is subject to several limitations. First, the sample size was relatively small and limited to a specific geographic region in Tehran, which may restrict the generalizability of the results to other cultural or demographic contexts. Second, the study relied solely on self-report questionnaires, which are subject to biases such as social desirability or inaccurate introspection, particularly in adolescent populations. Third, although the study employed a randomized design, long-term follow-up data were not collected, and it remains unclear whether the observed therapeutic gains would be maintained over time. Fourth, the absence of therapist adherence measures or treatment fidelity checks limits the interpretability of intervention-specific effects. Lastly, the use of two different treatment durations (8 sessions for schema therapy and 12 for CBT) may have introduced variability in treatment intensity.

Future research should aim to replicate these findings in larger and more diverse samples, including adolescents from different cultural, socioeconomic, and clinical backgrounds. Longitudinal studies are essential to evaluate the durability of treatment effects and to assess whether early intervention during adolescence leads to reduced psychopathology in adulthood. Comparative studies using active control groups, mixed-method assessments (including behavioral or neurophysiological measures), and multi-informant reporting (e.g., parents, teachers) are recommended to triangulate findings. Additionally, future trials should examine the differential mechanisms of change in CBT versus schema therapy using mediation and moderation analyses. Exploring the feasibility of integrating these two models into a unified treatment protocol may also enhance therapeutic flexibility and outcomes.

Clinicians working with adolescents with GAD are encouraged to consider both CBT focused on intolerance of uncertainty and schema therapy as effective treatment options. Selection of the intervention should be based on client needs, developmental stage, and the severity of underlying schema-related vulnerabilities. Treatment plans should emphasize building emotional awareness, reducing cognitive distortions, and enhancing flexibility in the face of uncertainty. Incorporating parent psychoeducation and family involvement may further reinforce therapeutic outcomes. Finally, early identification and intervention strategies in school and community settings can prevent the chronicity of anxiety symptoms and promote resilience in at-risk youth.

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.

Authors' Contributions

All authors equally contributed to this article.

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