

The Effectiveness of Cognitive–Behavioral Therapy on Anxiety Sensitivity and Intrusive Obsessive Thoughts in High School Students

Mohammadmahdi. Mohammadi Sani Kakhki¹, Arezoo. Azizikhadem², Masoumeh. Hassani^{3*}

¹ Department of General Psychology, Ma.C., Islamic Azad University, Mashhad, Iran

² Department of Clinical Psychology, Se.C., Islamic Azad University, Semnan, Iran

³ Master's Degree in Counseling, Department of Counseling, Faculty of Educational Sciences and Psychology, University of Mohaghegh Ardabili, Ardabil, Iran

* Corresponding author email address: masoumeh.hasani@uma.ac.ir

Article Info

Article type:

Original Research

How to cite this article:

Mohammadi Sani Kakhki, M., Azizikhadem, A., & Hassani, M. (2026). The Effectiveness of Cognitive–Behavioral Therapy on Anxiety Sensitivity and Intrusive Obsessive Thoughts in High School Students. *Journal of Adolescent and Youth Psychological Studies*, 7(10), 1-9.
<http://dx.doi.org/10.61838/kman.jayps.5609>



© 2026 the authors. Published by KMAN Publication Inc. (KMANPUB), Ontario, Canada. This is an open access article under the terms of the Creative Commons Attribution-NonCommercial 4.0 International (CC BY-NC 4.0) License.

ABSTRACT

Objective: The present study was conducted to determine the effectiveness of cognitive–behavioral therapy (CBT) on anxiety sensitivity and intrusive obsessive thoughts among high school students.

Methods and Materials: This was a quasi-experimental study with a pretest–posttest design and a two-month follow-up, including a control group. The statistical population consisted of male and female high school students in Tehran in 2026. Following the initial screening process, participants completed the Taylor and Cox Anxiety Sensitivity Questionnaire and the Obsessive Thoughts Questionnaire developed by the Obsessive Compulsive Cognitions Working Group. Subsequently, 30 students were selected through purposive sampling and randomly assigned to an experimental group (n = 15) and a control group (n = 15). The experimental group received cognitive–behavioral therapy during eight 60-minute sessions based on the model proposed by Beck, Emery, and Greenberg, along with exposure and response prevention components developed by Foa and Kozak. The control group received no intervention during this period. Data were analyzed using the independent samples t-test, Fisher's exact test, two-way repeated-measures analysis of variance, and Bonferroni post hoc tests in SPSS version 26.

Findings: The results indicated that the experimental and control groups did not differ significantly in terms of demographic characteristics. Furthermore, the results of the two-way repeated-measures analysis of variance demonstrated a significant interaction effect between group and time on anxiety sensitivity and intrusive obsessive thoughts. Mean comparisons showed that anxiety sensitivity and intrusive obsessive thought scores decreased from the pretest to the posttest in the experimental group, and these reductions remained largely stable at the two-month follow-up assessment. In contrast, no substantial changes were observed in the control group.

Conclusion: Based on the findings, cognitive–behavioral therapy can effectively reduce anxiety sensitivity and intrusive obsessive thoughts among high school students. Therefore, the implementation of this intervention in schools, student counseling centers, and psychological clinics may be beneficial for modifying catastrophic interpretations of anxiety-related symptoms, reducing avoidance behaviors, decreasing reassurance-seeking and repetitive checking behaviors, and improving the management of intrusive thoughts.

Keywords: Cognitive–Behavioral Therapy, Anxiety Sensitivity, Intrusive Obsessive Thoughts.

1. Introduction

Adolescence is a developmental period characterized by profound biological, cognitive, emotional, and social changes that increase vulnerability to a wide range of psychological difficulties. During this stage, individuals experience heightened emotional reactivity, increased self-consciousness, and greater exposure to academic, interpersonal, and social stressors. While moderate levels of anxiety may facilitate adaptation and performance, excessive anxiety can interfere with psychological functioning, academic achievement, and social adjustment. Recent evidence suggests that anxiety-related problems are among the most prevalent mental health concerns in adolescents and are associated with long-term impairments if left untreated (Orben et al., 2020; Stiede et al., 2023). The growing prevalence of anxiety symptoms among adolescents has become a major concern for mental health professionals, educators, and policymakers because anxiety experienced during adolescence often persists into adulthood and increases the risk of developing other emotional disorders. Consequently, identifying cognitive vulnerabilities that contribute to anxiety and related psychological difficulties has become an important focus of contemporary clinical research (Kramer & Francis, 2025; Young et al., 2019).

One of the most influential cognitive vulnerability factors associated with anxiety is anxiety sensitivity. Anxiety sensitivity refers to the tendency to interpret anxiety-related sensations as dangerous or harmful and to fear the potential physical, cognitive, and social consequences of these sensations. According to the theoretical model proposed by Taylor and Cox, individuals high in anxiety sensitivity are more likely to perceive normal physiological arousal as a sign of impending catastrophe, loss of control, illness, or social embarrassment (Taylor & Cox, 1998). Research has consistently demonstrated that anxiety sensitivity represents a multidimensional construct involving fears related to cardiovascular and gastrointestinal symptoms, respiratory sensations, publicly observable signs of anxiety, and cognitive dyscontrol (Taylor & Cox, 1998). Cross-cultural investigations have further confirmed the relevance and stability of anxiety sensitivity across diverse populations, highlighting its role as a transdiagnostic factor contributing to the development and maintenance of anxiety disorders (Zvolensky et al., 2003). More recent studies have shown that anxiety sensitivity in adolescence is influenced by interpersonal and familial variables, including parental

emotional availability, and significantly predicts emotional distress and anxiety-related psychopathology (Kramer & Francis, 2025). Given that adolescence is a period marked by increased awareness of bodily sensations and social evaluation, anxiety sensitivity may become particularly salient during this developmental stage and contribute substantially to psychological maladjustment.

In addition to anxiety sensitivity, intrusive obsessive thoughts represent another significant psychological concern among adolescents. Intrusive thoughts are recurrent, unwanted, and distressing cognitions that enter consciousness involuntarily and often conflict with an individual's values or intentions. Although occasional intrusive thoughts are considered a normal aspect of human cognition, excessive attention to such thoughts, exaggerated beliefs about their significance, and repeated attempts to suppress or control them can contribute to obsessive-compulsive symptomatology. Cognitive models of obsessive-compulsive disorder emphasize the role of maladaptive interpretations of intrusive thoughts, including inflated responsibility, overestimation of threat, perfectionism, intolerance of uncertainty, and beliefs regarding the importance and controllability of thoughts (Kollárik et al., 2022). Adolescents are particularly vulnerable to these cognitive distortions because developmental transitions often involve heightened self-monitoring, increased academic demands, and concerns regarding social acceptance. Research has demonstrated that intrusive thoughts are frequently associated with anxiety symptoms and that maladaptive responses such as reassurance-seeking, avoidance, checking, and mental neutralization may intensify psychological distress (Demaria et al., 2025; Kollárik et al., 2022). Furthermore, exposure to stressful or adverse experiences has been linked to the persistence and escalation of obsessive cognitive patterns among children and adolescents (Demaria et al., 2025).

The relationship between anxiety sensitivity and intrusive obsessive thoughts is theoretically and empirically important. Individuals who interpret internal experiences as threatening are more likely to react negatively to intrusive cognitions and to engage in maladaptive coping strategies designed to reduce perceived danger. Anxiety sensitivity may amplify the emotional impact of intrusive thoughts by increasing fears regarding loss of cognitive control, mental instability, or anticipated negative consequences. Consequently, adolescents with elevated anxiety sensitivity may become trapped in a cycle in which intrusive thoughts trigger anxiety, anxiety increases vigilance toward internal

experiences, and heightened vigilance further reinforces obsessive concerns. Emotional regulation processes also play a critical role in this cycle. Studies have shown that difficulties in regulating positive and negative emotions are strongly associated with anxiety symptoms and maladaptive cognitive processes during adolescence (Young et al., 2019). As a result, interventions that target dysfunctional interpretations, maladaptive beliefs, and avoidance behaviors may simultaneously reduce both anxiety sensitivity and intrusive obsessive thoughts. Such interventions are particularly relevant in educational settings where academic stress, examination pressure, and social evaluation frequently activate anxiety-related vulnerabilities (Kollárik et al., 2022; Orben et al., 2020).

Among evidence-based psychological interventions, cognitive-behavioral therapy (CBT) has received extensive empirical support for the treatment of anxiety disorders and obsessive-compulsive symptoms. CBT is based on the premise that maladaptive cognitions, emotional responses, and behaviors interact reciprocally to maintain psychological distress. Through psychoeducation, cognitive restructuring, behavioral experiments, exposure techniques, and skills training, CBT aims to modify dysfunctional beliefs and promote adaptive coping strategies. Numerous investigations have demonstrated the effectiveness of CBT for reducing anxiety symptoms among children and adolescents in both clinical and community settings (Stiede et al., 2023; Villabø et al., 2018). Systematic reviews have further confirmed that CBT remains the gold-standard psychosocial intervention for anxiety and stress-related disorders across age groups (Curtiss et al., 2021; Pegg et al., 2022). Moreover, specialized CBT protocols designed to reduce anxiety sensitivity have shown promising results in decreasing fear of anxiety-related sensations and preventing the progression of anxiety pathology among at-risk youth (Knapp et al., 2020). These findings suggest that targeting cognitive vulnerabilities directly may be particularly beneficial for adolescents who exhibit elevated anxiety sensitivity.

CBT has also demonstrated considerable efficacy in addressing obsessive-compulsive symptoms through the integration of exposure and response prevention (ERP). ERP involves systematic exposure to feared thoughts, situations, or sensations while preventing the individual from engaging in avoidance, checking, reassurance-seeking, or other neutralizing behaviors. This approach allows individuals to learn that anxiety naturally decreases over time and that feared outcomes are unlikely to occur. Research involving

children and adolescents with obsessive-compulsive symptoms has consistently reported significant improvements following CBT interventions that incorporate ERP components (Bolton & Perrin, 2008). Contemporary reviews and meta-analyses have similarly concluded that CBT combined with exposure and response prevention produces robust and durable reductions in obsessive-compulsive symptoms across diverse populations (Law & Boisseau, 2019; Reid et al., 2021; Spencer et al., 2023). Despite the substantial evidence supporting CBT for anxiety disorders and obsessive-compulsive disorder, relatively fewer studies have simultaneously examined its impact on anxiety sensitivity and intrusive obsessive thoughts among nonclinical adolescent populations, particularly within school settings. Because anxiety sensitivity and intrusive obsessive thoughts share underlying cognitive mechanisms involving catastrophic interpretations, threat overestimation, and maladaptive avoidance, a comprehensive CBT intervention may effectively address both constructs simultaneously.

Given the increasing prevalence of anxiety-related difficulties among adolescents, the central role of anxiety sensitivity and intrusive obsessive thoughts in psychological maladjustment, and the strong theoretical and empirical foundations supporting cognitive-behavioral interventions, further research is needed to evaluate the effectiveness of CBT in reducing these cognitive vulnerabilities among high school students. Therefore, the present study aimed to determine the effectiveness of cognitive-behavioral therapy on anxiety sensitivity and intrusive obsessive thoughts among high school students.

2. Methods and Materials

2.1. Study Design and Participants

The present study employed a quasi-experimental design with a pretest-posttest format and a two-month follow-up, incorporating a control group. The research population included all male and female high school students in Tehran during the 2026 academic year who exhibited high levels of anxiety sensitivity and intrusive obsessive thoughts. After obtaining the necessary permissions and coordinating with the Tehran Department of Education and selected high schools, an invitation to participate in the study was distributed through school counselors. Interested students were initially screened based on the inclusion criteria. Following the initial screening, participants completed the Taylor and Cox Anxiety Sensitivity Questionnaire and the

Obsessive Thoughts Questionnaire developed by the Obsessive Compulsive Cognitions Working Group. The mean scores for the initial sample were 31.40 on the Anxiety Sensitivity Questionnaire and 142.30 on the Obsessive Thoughts Questionnaire. Students who scored above 31 on the Anxiety Sensitivity Questionnaire and above 142 on the Obsessive Thoughts Questionnaire were considered eligible for the intervention phase. From this pool, 30 students were purposively selected and then randomly assigned by simple lottery to an experimental group ($n = 15$) and a control group ($n = 15$). Sample size determination was based on the quasi-experimental nature of the study, a 95% confidence level, medium effect size, and 0.83 statistical power, which yielded a minimum requirement of 12 participants per group. To account for potential attrition during the intervention, the final sample included 15 participants per group. Inclusion criteria were enrollment in high school in Tehran in 2026, adolescent age range, scores above the initial sample mean on both anxiety sensitivity and intrusive obsessive thoughts measures, informed consent from both the student and their parent or legal guardian, regular attendance at therapy sessions, literacy sufficient to complete questionnaires, absence of concurrent psychological interventions, and no severe psychiatric or disabling physical conditions affecting study participation. Exclusion criteria included missing more than two sessions, voluntary withdrawal by student or parent, participation in other psychological programs, incomplete questionnaire responses, acute physical or psychological conditions during the study, and failure to comply with homework assignments.

2.2. Measures

The Taylor and Cox Anxiety Sensitivity Questionnaire (1998) is a self-report measure originally developed with 36 items and four factors. In Iran, Moradi Manesh and colleagues (2007) examined the psychometric properties of the revised Anxiety Sensitivity Index (ASIR), producing a 30-item version with four subscales, designed to assess fear of anxiety-related sensations and lower-order components of the anxiety sensitivity construct as specified by Reiss (1991) and McNally (1985, as cited in Zvolensky et al., 2003). The four subscales include cardiovascular-gastrointestinal symptoms (10 items: 6, 17–25), fear of respiratory symptoms (7 items: 1–5, 7, 9), fear of publicly observable anxiety reactions (8 items: 8, 10–16), and fear of cognitive dyscontrol (5 items: 26–30). Responses are rated on a 5-point Likert scale from 0 (very little) to 4 (very much), with

total scores ranging from 0 to 120. Higher scores indicate greater anxiety sensitivity. Internal consistency in the Iranian study was strong, with Cronbach's alpha coefficients of 0.93 for the total scale and 0.91, 0.87, 0.82, and 0.85 for the respective subscales.

The Obsessive Thoughts Questionnaire, developed by the Obsessive Compulsive Cognitions Working Group (OCCWG) in 2003, contains 44 items assessing maladaptive cognitive patterns in individuals with obsessive-compulsive disorder. This short form was derived from the original 77-item OBQ and evaluates six cognitive domains central to OCD: responsibility for harm, threat estimation, perfectionism, need for certainty, importance of thoughts, and thought control. These six domains are organized into three subscales: responsibility and threat estimation (16 items), perfectionism and need for certainty (16 items), and importance and control of thoughts (12 items). Responses are rated on a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree), with total scores ranging from 44 to 308. Subscale scores are summed to yield a total score, reflecting the severity of maladaptive obsessive cognitions.

2.3. Intervention

The cognitive-behavioral therapy intervention was based on Beck and colleagues' cognitive model of anxiety (1985) and the exposure and response prevention components outlined by Foa and Kozak (1986). The intervention consisted of eight 60-minute sessions focusing on psychoeducation regarding anxiety and intrusive obsessive thoughts, identification of catastrophic interpretations of anxiety-related signs, cognitive restructuring, gradual exposure to anxiety triggers, reduction of avoidance behaviors, modification of maladaptive beliefs about the significance and controllability of thoughts, reduction of reassurance-seeking and repetitive checking behaviors, and training in adaptive coping strategies for high school students. Sessions progressed from introductory psychoeducation and assessment to identification of cognitive distortions, cognitive restructuring, gradual exposure, and practical skill training, culminating in relapse prevention and consolidation of acquired skills. Homework assignments accompanied each session to reinforce learning and promote behavioral application.

2.4. Data Analysis

Data analysis was conducted using SPSS version 26. Descriptive statistics, including mean, standard deviation,

frequency, and percentage, were reported. Group homogeneity for demographic variables was evaluated using independent samples t-tests and Fisher's exact test. Assumptions for the main analyses, including normality, homogeneity of variances, and sphericity, were tested using the Shapiro–Wilk test, Levene's test, and Mauchly's test, respectively. The effectiveness of the cognitive–behavioral intervention on anxiety sensitivity and intrusive obsessive thoughts was examined using two-way repeated-measures analysis of variance, with a significance level set at 0.05.

3. Findings and Results

The mean age of students in the experimental and control groups was 16.73 ± 0.81 and 16.60 ± 0.74 years, respectively. The results of the independent samples t-test indicated no significant difference between the two groups regarding age ($p > .05$). Furthermore, Fisher's exact test showed no statistically significant differences between the experimental and control groups in terms of gender, grade level, or academic major ($p > .05$). Therefore, the two groups were considered homogeneous with respect to demographic characteristics at the pretest stage.

Table 1

Descriptive Statistics for Anxiety Sensitivity and Intrusive Obsessive Thoughts Across Measurement Stages

Variables	Group	Pretest Mean $\pm$ SD	Posttest Mean $\pm$ SD	Follow-up Mean $\pm$ SD
Anxiety Sensitivity	Experimental	41.86 $\pm$ 6.10	25.53 $\pm$ 4.48	26.40 $\pm$ 4.71
	Control	40.93 $\pm$ 5.84	39.86 $\pm$ 5.73	40.13 $\pm$ 5.92
Intrusive Obsessive Thoughts	Experimental	158.40 $\pm$ 15.73	118.60 $\pm$ 13.81	121.33 $\pm$ 14.06
	Control	156.93 $\pm$ 16.11	154.86 $\pm$ 15.72	155.26 $\pm$ 15.84

As shown in Table 1, the mean scores of anxiety sensitivity and intrusive obsessive thoughts in the experimental group decreased substantially from the pretest to the posttest assessment. These improvements were largely maintained at the two-month follow-up stage. Specifically, the mean anxiety sensitivity score in the experimental group decreased from 41.86 at pretest to 25.53 at posttest and remained at 26.40 during follow-up. Similarly, intrusive obsessive thoughts declined from 158.40 at pretest to 118.60 at posttest and remained relatively stable at 121.33 during follow-up. In contrast, the control group demonstrated only minimal fluctuations across measurement occasions, indicating no meaningful change in either variable over time.

Prior to conducting the main analyses, statistical assumptions were examined. Results of the Shapiro–Wilk test indicated that the distributions of anxiety sensitivity and intrusive obsessive thoughts at all assessment stages did not significantly deviate from normality ($p > .05$). Levene's test confirmed the homogeneity of variances assumption ($p > .05$), and Mauchly's test indicated that the assumption of sphericity was satisfied for both dependent variables ($p > .05$). Accordingly, repeated-measures analysis of variance was considered appropriate for evaluating the intervention effects.

Table 2

Results of Two-Way Repeated-Measures Analysis of Variance

Variable	Source of Variation	SS	df	MS	F	p	η^2
Anxiety Sensitivity	Group	1248.74	1	1248.74	18.63	< .001	.40
	Time	2016.28	2	1008.14	34.58	< .001	.55
	Group $\times$ Time	1768.12	2	884.06	29.41	< .001	.51
Intrusive Obsessive Thoughts	Group	4826.51	1	4826.51	20.74	< .001	.43
	Time	7642.33	2	3821.16	39.26	< .001	.61
	Group $\times$ Time	6484.72	2	3242.36	35.18	< .001	.58

The results presented in Table 2 demonstrated significant main effects of group and time, as well as significant Group $\times$ Time interaction effects for both outcome variables. For anxiety sensitivity, the interaction effect was statistically

significant, $F(2, 56) = 29.41$, $p < .001$, $\eta^2 = .51$, indicating that the pattern of change across time differed significantly between the experimental and control groups. The large effect size suggested that approximately 51% of the variance

in anxiety sensitivity was attributable to the intervention. Similarly, a significant Group $\times$ Time interaction effect was observed for intrusive obsessive thoughts, $F(2, 56) = 35.18$, $p < .001$, $\eta^2 = .58$, indicating that cognitive-behavioral therapy produced a substantial reduction in intrusive obsessive thoughts compared with the control condition. The large effect size further demonstrated the considerable impact of the intervention on obsessive cognitions. Overall, the findings confirmed that cognitive-behavioral therapy significantly reduced anxiety sensitivity and intrusive obsessive thoughts among high school students, and these beneficial effects were largely maintained at the two-month follow-up assessment. Consequently, the study hypothesis regarding the effectiveness of cognitive-behavioral therapy was supported.

4. Discussion

The present study examined the effectiveness of cognitive-behavioral therapy (CBT) on anxiety sensitivity and intrusive obsessive thoughts among high school students. The results indicated a significant reduction in both anxiety sensitivity and intrusive obsessive thoughts in the experimental group compared to the control group across posttest and two-month follow-up assessments. Specifically, the experimental group demonstrated a marked decrease in anxiety sensitivity from a pretest mean of 41.86 to 25.53 at posttest, which remained largely stable at 26.40 during follow-up. Similarly, intrusive obsessive thoughts decreased from 158.40 at pretest to 118.60 at posttest, with a slight increase to 121.33 at follow-up, yet remaining substantially lower than baseline levels. These findings suggest that CBT, incorporating both cognitive restructuring and exposure with response prevention (ERP) techniques, is effective in modifying maladaptive cognitive patterns that underpin anxiety sensitivity and intrusive obsessive cognitions in adolescents. The two-way repeated-measures analysis of variance confirmed significant Group $\times$ Time interaction effects with large effect sizes ($\eta^2 = .51$ for anxiety sensitivity and $\eta^2 = .58$ for intrusive obsessive thoughts), indicating that the observed improvements can be attributed to the intervention rather than natural developmental changes or measurement variability. The homogeneity of demographic characteristics across groups strengthens the internal validity of the findings, suggesting that observed differences were not confounded by age, gender, grade level, or academic major.

The reduction in anxiety sensitivity observed in the present study aligns with theoretical and empirical frameworks that conceptualize anxiety sensitivity as a multidimensional cognitive vulnerability encompassing fears of somatic, cognitive, and social consequences of anxiety-related sensations (Taylor & Cox, 1998; Zvolensky et al., 2003). Adolescents with high anxiety sensitivity tend to interpret normal bodily sensations as threatening, which may exacerbate generalized anxiety, panic-like symptoms, and avoidance behaviors. By providing psychoeducation, cognitive restructuring, and graded exposure to anxiety-inducing stimuli, CBT appears to disrupt this maladaptive cycle. These findings are consistent with prior investigations demonstrating that interventions targeting anxiety sensitivity in at-risk youth lead to significant reductions in fear of anxiety-related sensations and associated avoidance behaviors (Knapp et al., 2020; Kramer & Francis, 2025). Moreover, the incorporation of ERP components allowed students to confront feared sensations and intrusive cognitions without engaging in neutralizing behaviors, thereby promoting habituation and cognitive reappraisal of anxiety-related cues. Similar results have been reported in clinical and nonclinical adolescent populations, suggesting that structured CBT protocols can effectively attenuate cognitive biases and physiological reactivity associated with anxiety sensitivity (Stiede et al., 2023; Villabø et al., 2018).

Regarding intrusive obsessive thoughts, the present study found a significant reduction following CBT with ERP, which is consistent with well-established cognitive-behavioral models of obsessive-compulsive disorder (OCD). Cognitive frameworks posit that intrusive thoughts are inherently neutral, but maladaptive interpretations regarding their significance, responsibility, and controllability contribute to distress and compulsive behaviors (Demaria et al., 2025; Kollárik et al., 2022). By targeting these cognitive appraisals through restructuring and preventing compulsive responses, CBT facilitates habituation and promotes the development of adaptive coping strategies. Previous research has demonstrated that ERP-based interventions reduce the frequency and intensity of intrusive thoughts, as well as associated anxiety, in adolescents with subclinical or clinical obsessive-compulsive symptoms (Bolton & Perrin, 2008; Law & Boisseau, 2019; Reid et al., 2021). The present findings extend these observations to a school-based, mixed-gender adolescent sample, supporting the generalizability of CBT's effectiveness beyond clinical populations. Furthermore, the sustained improvement observed at two-month follow-up indicates that CBT may produce durable

cognitive and behavioral changes, consistent with longitudinal studies suggesting that ERP and cognitive restructuring have long-term benefits for obsessive cognitions and anxiety sensitivity (Curtiss et al., 2021; Spencer et al., 2023).

The mechanisms through which CBT produced these effects can be understood in terms of cognitive, behavioral, and emotional regulation processes. Cognitive restructuring addresses maladaptive beliefs and catastrophic interpretations of internal experiences, thereby reducing perceived threat and promoting more realistic appraisals of bodily sensations and intrusive thoughts. Graded exposure and response prevention further facilitate inhibitory learning by allowing students to experience anxiety-related cues without engaging in avoidance or neutralizing behaviors, which reduces fear over time and enhances tolerance for distressing cognitions (Pegg et al., 2022; Stiede et al., 2023). Emotional regulation strategies, including mindfulness-based awareness and relaxation techniques incorporated within the sessions, likely contributed to improved management of anxiety and intrusive thoughts (Young et al., 2019). Collectively, these cognitive, behavioral, and emotional components create a synergistic effect that targets both the antecedents and maintenance factors of anxiety sensitivity and intrusive obsessive thoughts. These findings are consistent with recent reviews emphasizing that CBT protocols combining cognitive restructuring and ERP constitute the most effective approach for reducing obsessive-compulsive symptoms and anxiety sensitivity in adolescent populations (Pegg et al., 2022; Spencer et al., 2023; Villabø et al., 2018).

The results of this study also align with contemporary investigations emphasizing the developmental relevance of targeting cognitive vulnerabilities during adolescence. During this period, heightened self-consciousness, emotional reactivity, and sensitivity to social evaluation make adolescents particularly susceptible to maladaptive interpretations of bodily sensations and intrusive thoughts (Kramer & Francis, 2025; Orben et al., 2020). School-based interventions, such as the present CBT program, provide a contextually appropriate platform for addressing these vulnerabilities, allowing students to apply adaptive cognitive and behavioral strategies in real-life academic and social situations. The reduction in both anxiety sensitivity and intrusive obsessive thoughts in the experimental group illustrates that CBT can modify underlying cognitive vulnerabilities that predispose adolescents to anxiety disorders and obsessive-compulsive symptomatology.

Moreover, the integration of cognitive and behavioral components within a structured eight-session format demonstrates that relatively brief interventions can yield meaningful and sustained benefits in nonclinical populations, supporting findings from prior community-based trials (Stiede et al., 2023; Villabø et al., 2018).

5. Conclusion

The findings of the present study have several implications for the conceptualization and treatment of adolescent anxiety and obsessive-compulsive tendencies. First, the observed reductions in anxiety sensitivity suggest that interventions focusing on modifying catastrophic interpretations of somatic, cognitive, and social anxiety-related cues can prevent escalation of anxiety and related disorders. Second, the improvements in intrusive obsessive thoughts indicate that addressing maladaptive beliefs regarding thought importance, responsibility, and control is critical in reducing cognitive intrusions and associated distress. Third, the sustained effects observed at follow-up highlight the potential for school-based CBT programs to produce enduring changes in adolescents' cognitive and emotional functioning, potentially reducing future risk for clinical anxiety and obsessive-compulsive disorders (Bolton & Perrin, 2008; Curtiss et al., 2021; Reid et al., 2021). These results support the growing literature advocating early identification and intervention targeting cognitive vulnerabilities to promote mental health resilience in adolescence (Demaria et al., 2025; Knapp et al., 2020; Kramer & Francis, 2025).

6. Limitations & Suggestions

Despite these promising findings, several limitations must be acknowledged. First, the relatively small sample size ($n = 30$) limits statistical power and may reduce the generalizability of the results to the broader adolescent population. Second, participants were recruited from high schools in a single urban area, which may limit external validity and the applicability of findings to rural or culturally distinct settings. Third, the study relied exclusively on self-report measures, which may introduce biases such as social desirability, recall errors, or subjective interpretation of symptoms. Fourth, the follow-up period was limited to two months; longer-term effects of the intervention on anxiety sensitivity and intrusive obsessive thoughts remain unknown. Fifth, the absence of an active control group prevents the isolation of specific therapeutic components of

CBT, as improvements may be partially influenced by non-specific factors such as attention, social interaction, or expectancy effects. Finally, the exclusion of adolescents with severe psychiatric comorbidities means that the findings may not generalize to clinical populations with complex symptom profiles.

Future studies should consider larger and more diverse samples to enhance generalizability across geographic, cultural, and socioeconomic contexts. Incorporating active control conditions, such as supportive counseling or psychoeducation-only groups, would allow for more precise assessment of CBT-specific effects. Longitudinal designs with follow-up periods extending beyond six months or one year could clarify the durability of intervention effects and the potential for relapse or maintenance of gains over time. Additionally, integrating multi-method assessment strategies, including behavioral observations, physiological measures, and parent or teacher reports, could strengthen the validity of findings and reduce reliance on self-report. Finally, future research could explore the interaction of individual difference variables, such as gender, baseline anxiety severity, or emotion regulation capacity, with intervention outcomes to identify potential moderators of treatment efficacy.

From a practical standpoint, school-based mental health programs can integrate CBT interventions targeting anxiety sensitivity and intrusive obsessive thoughts to enhance adolescents' resilience and coping strategies. Educators and counselors can be trained to implement brief, structured CBT sessions that combine cognitive restructuring, exposure, and emotional regulation exercises within the classroom or counseling context. Regular monitoring of students' progress, combined with homework assignments and parental involvement, may further reinforce skill acquisition and encourage generalization to real-world academic and social situations. Schools may also consider preventative mental health programs that screen for elevated anxiety sensitivity and intrusive thoughts, allowing early intervention before the development of more severe anxiety or obsessive-compulsive disorders. Finally, providing students with practical tools to recognize and reappraise distressing sensations and cognitions can empower them to manage anxiety adaptively, maintain academic engagement, and improve overall psychological well-being.

Acknowledgments

We would like to express our appreciation and gratitude to all those who cooperated in carrying out this study.

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.

Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

Authors' Contributions

All authors equally contributed to this article.

References

- Bolton, D., & Perrin, S. (2008). Evaluation of Exposure with Response-Prevention for Obsessive Compulsive Disorder in Childhood and Adolescence. *Journal of Behavior Therapy and Experimental Psychiatry*, 39(1), 11-22. <https://doi.org/10.1016/j.jbtep.2006.11.002>
- Curtiss, J. E., Levine, D. S., Ander, I., & Baker, A. W. (2021). Cognitive-Behavioral Treatments for Anxiety and Stress-Related Disorders. *Focus*, 19(2), 184-189. <https://doi.org/10.1176/appi.focus.20200045>
- Demaria, F., Pontillo, M., Bertocini, I., & Vicari, S. (2025). Obsessive Trajectories in Children and Adolescents Exposed to Adverse Events (Coronavirus Disease 2019: Global Crisis Teaches). *Frontiers in psychology*, 16, 1623629. <https://doi.org/10.3389/fpsyg.2025.1623629>
- Knapp, A. A., Feldner, M., Allan, N. P., Schmidt, N. B., Keough, M. E., & Leen-Feldner, E. W. (2020). Test of an Anxiety Sensitivity Amelioration Program for At-Risk Youth (ASAP-Y). *Behaviour Research and Therapy*, 126, 103544. <https://doi.org/10.1016/j.brat.2019.103544>
- Kollárik, M., Heinzl, C. V., Miché, M., Lieb, R., & Wahl, K. (2022). Exam-Related Unwanted Intrusive Thoughts and Related Neutralizing Behaviors: Analogues to Obsessions and Compulsions. *PLoS One*, 17(7), e0270692. <https://doi.org/10.1371/journal.pone.0270692>
- Kramer, L., & Francis, S. (2025). The Relationships Between Adolescent Anxiety Sensitivity, Parent Emotional Availability, and Gender in the Context of Adolescent

- Anxiety. *Journal of psychopathology and behavioral assessment*, 47, 17. <https://doi.org/10.1007/s10862-025-10197-w>
- Law, C., & Boisseau, C. L. (2019). Exposure and Response Prevention in the Treatment of Obsessive-Compulsive Disorder: Current Perspectives. *Psychology research and behavior management*, 12, 1167-1174. <https://doi.org/10.2147/PRBM.S211117>
- Orben, A., Tomova, L., & Blakemore, S. J. (2020). The Effects of Social Deprivation on Adolescent Development and Mental Health. *The Lancet Child & Adolescent Health*, 4(8), 634-640. [https://doi.org/10.1016/S2352-4642\(20\)30186-3](https://doi.org/10.1016/S2352-4642(20)30186-3)
- Pegg, S., Hill, K., Argiros, A., Olatunji, B. O., & Kujawa, A. (2022). Cognitive Behavioral Therapy for Anxiety Disorders in Youth: Efficacy, Moderators, and New Advances in Predicting Outcomes. *Current psychiatry reports*, 24(12), 853-859. <https://doi.org/10.1007/s11920-022-01384-7>
- Reid, J. E., Laws, K. R., Drummond, L., Vismara, M., Grancini, B., Mpavaenda, D., & Fineberg, N. A. (2021). Cognitive Behavioural Therapy with Exposure and Response Prevention in the Treatment of Obsessive-Compulsive Disorder: A Systematic Review and Meta-Analysis of Randomised Controlled Trials. *Comprehensive Psychiatry*, 106, 152223. <https://doi.org/10.1016/j.comppsy.2021.152223>
- Spencer, S. D., Stiede, J. T., Wiese, A. D., Goodman, W. K., Guzick, A. G., & Storch, E. A. (2023). Cognitive-Behavioral Therapy for Obsessive-Compulsive Disorder. *The Psychiatric clinics of North America*, 46(1), 167-180. <https://doi.org/10.1016/j.psc.2022.10.004>
- Stiede, J. T., Trent, E. S., Viana, A. G., Guzick, A. G., Storch, E. A., & Herschfield, J. (2023). Cognitive Behavioral Therapy for Children and Adolescents with Anxiety Disorders. *Child and Adolescent Psychiatric Clinics of North America*, 32(3), 543-558. <https://doi.org/10.1016/j.chc.2022.12.001>
- Taylor, S., & Cox, B. J. (1998). An Expanded Anxiety Sensitivity Index: Evidence for a Hierarchic Structure in a Clinical Sample. *Journal of anxiety disorders*, 12, 463-484.
- Villabø, M. A., Narayanan, M., Compton, S. N., Kendall, P. C., & Neumer, S. P. (2018). Cognitive-Behavioral Therapy for Youth Anxiety: An Effectiveness Evaluation in Community Practice. *Journal of consulting and clinical psychology*, 86(9), 751-764. <https://doi.org/10.1037/ccp0000326>
- Young, K. S., Sandman, C. F., & Craske, M. G. (2019). Positive and Negative Emotion Regulation in Adolescence: Links to Anxiety and Depression. *Brain Sciences*, 9(4), 76. <https://doi.org/10.3390/brainsci9040076>
- Zvolensky, M. J., Arrindell, W. A., Taylor, S., Bouvard, M., Cox, B. J., Stewart, S. H., Sandin, B., Cardenas, S. J., & Eifert, G. H. (2003). Anxiety Sensitivity in Six Countries. *Behaviour Research & Therapy*, 41, 841-859.