



Effectiveness of Schema Therapy on Emotion Regulation and Anxiety Sensitivity in Women with Borderline Personality Disorder

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ABSTRACT

Objective: The present study aimed to examine the effectiveness of schema therapy on emotion regulation and anxiety sensitivity in women with borderline personality disorder.

Methods and Materials: This study employed a quasi-experimental design with a pretest–posttest and a two-month follow-up with a control group. The statistical population consisted of women diagnosed with borderline personality disorder who attended a specialized psychology clinic in Tehran in 2025. A total of 30 participants were selected using convenience sampling and randomly assigned to experimental (n = 15) and control (n = 15) groups. The experimental group received schema therapy intervention over ten 90-minute sessions, while the control group received no intervention. Data were collected using the Difficulties in Emotion Regulation Scale and the Anxiety Sensitivity Questionnaire. Data analysis was conducted using two-way repeated measures analysis of variance in SPSS-26.

Findings: The results indicated that there were significant differences between the experimental and control groups in emotion regulation ($p = 0.024$) and anxiety sensitivity ($p = 0.008$). Additionally, within-group (time) effects were significant for both emotion regulation ($p < 0.001$) and anxiety sensitivity ($p < 0.001$). The interaction effect of group and time was also significant for emotion regulation ($p < 0.001$) and anxiety sensitivity ($p < 0.001$), indicating that schema therapy significantly improved emotion regulation and reduced anxiety sensitivity in the experimental group compared to the control group, with effects maintained at follow-up.

Conclusion: The findings suggest that schema therapy is an effective intervention for enhancing emotion regulation and reducing anxiety sensitivity in women with borderline personality disorder, and its effects are stable over time. Therefore, schema therapy can be recommended as a therapeutic approach for improving emotional and psychological functioning in this population.

Keywords: *Borderline Personality Disorder, Schema Therapy, Emotion Regulation, Anxiety Sensitivity*

1. Introduction

Borderline personality disorder (BPD) is a severe and complex psychological condition characterized by pervasive instability in affect regulation, impulse control, interpersonal relationships, and self-image. One of the most prominent features of this disorder is emotional dysregulation, which manifests as heightened emotional reactivity, difficulty in managing negative affect, and impaired capacity to return to emotional baseline following distressing experiences. In addition, individuals with BPD frequently exhibit elevated anxiety sensitivity, defined as the fear of anxiety-related sensations due to beliefs about their harmful physical, cognitive, or social consequences. These features significantly impair daily functioning and contribute to maladaptive coping strategies, including avoidance, impulsivity, and interpersonal conflicts (Sardaripour & Zare, 2023; Thimm, 2017).

From a theoretical perspective, early maladaptive schemas are considered fundamental cognitive-emotional structures underlying the development and maintenance of BPD symptoms. These schemas originate from adverse childhood experiences, such as neglect, abuse, or inconsistent caregiving, and are reinforced across the lifespan through dysfunctional cognitive and behavioral patterns. Schema theory posits that these deeply rooted schemas influence emotional processing, leading to maladaptive responses to stress and interpersonal challenges. Research has demonstrated that maladaptive schemas are strongly associated with emotional dysregulation, psychological distress, and impaired interpersonal functioning, particularly among individuals with personality disorders (Faustino et al., 2020; Thimm, 2017).

Schema therapy, developed by Young, integrates elements from cognitive-behavioral, attachment, psychodynamic, and experiential approaches, aiming to modify early maladaptive schemas and promote the development of healthier cognitive and emotional patterns. This therapeutic approach emphasizes the identification and restructuring of maladaptive schemas, the enhancement of adaptive coping styles, and the fulfillment of unmet emotional needs through corrective emotional experiences.

Evidence from systematic reviews and meta-analyses indicates that schema therapy is an effective intervention for a range of psychological disorders, particularly chronic and treatment-resistant conditions such as BPD and depression (Bakos et al., 2015; Körük & Özabacı, 2018).

A growing body of empirical research has supported the effectiveness of schema therapy in improving emotional regulation and reducing psychological distress across various clinical populations. For instance, schema therapy has been shown to significantly enhance emotion regulation and marital satisfaction while reducing maladaptive emotional expression among couples experiencing relational difficulties (Bibak et al., 2025). Similarly, integrated approaches combining schema therapy with acceptance and commitment therapy have demonstrated significant improvements in subjective well-being and reductions in body image concerns in clinical populations (Karami Mohajeri et al., 2026). These findings highlight the flexibility and efficacy of schema-based interventions in addressing complex emotional and cognitive dysfunctions.

In clinical populations with chronic health conditions, schema therapy has also been found to improve stress management, social adjustment, and psychological coherence, indicating its broader applicability beyond personality disorders (Isazadeh et al., 2021). Furthermore, comparative studies have shown that schema therapy may be more effective than mindfulness-based cognitive therapy in enhancing resilience and emotion regulation in patients with cardiovascular diseases, suggesting its superiority in targeting deep-rooted cognitive-emotional structures (Nikan et al., 2024).

The role of emotional schemas in shaping emotional experiences and regulatory processes has also been emphasized in recent research. Emotional schema therapy, an extension of schema-focused approaches, specifically targets maladaptive beliefs about emotions and their regulation. Studies have demonstrated that interventions focusing on emotional schemas can significantly reduce anxiety symptoms and improve emotion regulation in individuals with anxiety disorders and somatic conditions (Erfan et al., 2024; Razzaghi et al., 2025). In addition, group-based emotional schema therapy has been shown to decrease anxiety sensitivity and enhance emotional organization in

women with social anxiety, further supporting its efficacy in targeting emotional dysregulation (Morvaridi Farimani, 2017).

Research focusing specifically on individuals with BPD has provided further evidence for the effectiveness of schema therapy. For example, schema therapy has been found to reduce the severity and frequency of BPD symptoms and improve frustration tolerance and internalized shame among affected individuals (Taj Iliayifar et al., 2025). Moreover, recent randomized pilot studies have demonstrated that even brief schema therapy interventions can lead to significant reductions in BPD symptomatology, highlighting the efficiency and scalability of this therapeutic approach (Hilden et al., 2025). The feasibility of delivering schema therapy in online group formats has also been supported, suggesting its potential for wider dissemination and accessibility in clinical practice (van der Boom et al., 2025).

Despite these advances, emotional dysregulation and anxiety sensitivity remain critical targets for intervention in women with BPD. These individuals often experience intense emotional fluctuations, heightened sensitivity to perceived threats, and maladaptive coping strategies that perpetuate psychological distress. While other therapeutic approaches, such as compassion-focused therapy and acceptance and commitment therapy, have demonstrated effectiveness in improving emotion regulation and psychological flexibility, schema therapy offers a unique advantage by directly targeting the underlying cognitive-emotional structures that drive these difficulties (Jamali et al., 2021; Mamdouhi et al., 2024; Mansouri Kiani et al., 2023).

Given the central role of early maladaptive schemas in emotional dysregulation and anxiety sensitivity, and considering the empirical support for schema therapy in addressing these constructs, further investigation into its effectiveness in specific populations is warranted. In particular, women with BPD represent a vulnerable group with distinct clinical needs, necessitating targeted interventions that address both emotional and cognitive dimensions of the disorder.

Therefore, the aim of the present study was to examine the effectiveness of schema therapy on emotion regulation and anxiety sensitivity in women with borderline personality disorder.

2. Methods and Materials

2.1. Study design and Participant

This study employed a quasi-experimental design with a pretest–posttest and a two-month follow-up with a control group. The statistical population consisted of all women diagnosed with borderline personality disorder who referred to a specialized psychology clinic in Tehran in 2025. Using Cohen’s table at a 95% confidence level, an effect size of 0.30, and statistical power of 0.83, the required sample size for each group was calculated to be 12 participants; however, to account for potential attrition and to enhance generalizability, 15 participants were selected for each group (a total of 30 participants). Sampling was conducted in two stages: first, through convenience sampling, and second, through simple random assignment (lottery method), resulting in 15 participants in the experimental group and 15 in the control group.

Inclusion criteria included informed consent, at least a middle school level of education, no use of psychiatric medications in the past three months, and no concurrent participation in other psychotherapeutic interventions. Exclusion criteria included absence from more than two sessions, the emergence of severe psychological disorders, and withdrawal from the study. The intervention for the experimental group was conducted from March to May 2025, consisting of ten 90-minute sessions of schema therapy, while the control group received no intervention. The two-month follow-up continued until the end of September 2025, and no participants dropped out of the study. All ethical principles, including confidentiality of information and the right to withdraw from the study, were observed, and after the completion of the research, free psychotherapy services were provided to the control group.

2.2. Measures

Emotion Regulation: This questionnaire, developed by Kim L. Gratz and Lizabeth Roemer, is a 36-item self-report instrument based on a five-point Likert scale that assesses six key dimensions of difficulties in emotion regulation: (1) non-acceptance of emotional responses (6 items), (2) difficulties engaging in goal-directed behavior (5 items), (3) impulse control difficulties (6 items), (4) lack of emotional awareness (6 items), (5) limited access to emotion regulation strategies (8 items), and (6) lack of emotional clarity (5 items). Ten items (1, 2, 6, 7, 10, 17, 20, 22, 24, and 34) are reverse-scored, and total scores above 110 indicate greater

difficulties in emotion regulation. Gratz and Roemer reported a construct validity of 0.93 and a Cronbach's alpha of 0.80 for this questionnaire; in the present study, reliability coefficients for the subscales were 0.60, 0.62, 0.63, 0.65, and 0.67, respectively, and 0.79 for the total score.

Taylor and Cox Anxiety Sensitivity Questionnaire: The Anxiety Sensitivity Questionnaire was developed and validated by Steven Taylor and Brian J. Cox (1998). This instrument consists of 30 closed-ended items rated on a five-point Likert scale and measures four factors: fear of respiratory symptoms, fear of publicly observable anxiety reactions, fear of cardiovascular symptoms, and fear of cognitive dyscontrol. The questionnaire was validated by Dehghan (2013). The response scale ranges from very low (1) to very high (5). The reliability of the questionnaire in Dehghan's study (2013) was reported as 0.87 based on Cronbach's alpha.

2.3. Intervention

The schema therapy intervention protocol was implemented over ten structured sessions, each lasting approximately 90 minutes, based on the framework proposed by Young (2010). In the first session, after establishing rapport and a therapeutic alliance, the importance and objectives of schema therapy were explained, and participants' problems were conceptualized within the schema therapy framework; emphasis was placed on enhancing treatment motivation, reviewing the structure, rules, and regulations of group therapy, clarifying the overall goals and rationale of treatment, conducting initial assessment, establishing group norms such as confidentiality, respect, and active listening, identifying current problems, and evaluating participants' suitability for schema therapy with a focus on personal history. In the second session, objective evidence supporting or contradicting schemas was examined based on past and present life experiences, and discussions were conducted comparing maladaptive schemas with healthy schemas; this session included defining schema therapy, early maladaptive schemas, their characteristics, and their developmental origins. In the third session, cognitive techniques such as schema validity testing, redefinition of schema-consistent evidence, and evaluation of the advantages and disadvantages of coping styles were introduced, along with an overview of schema domains, a brief explanation of the biological underpinnings of early maladaptive schemas, and clarification of schema functions. In the fourth session, the

concept of the "healthy adult mode" was strengthened, unmet emotional needs were identified, and strategies for expressing blocked emotions were taught; additionally, maladaptive coping styles that perpetuate schemas were introduced with real-life examples, schema modes were defined, and participants were prepared for schema assessment and modification. In the fifth session, training focused on developing healthy communication patterns and implementing imagery-based dialogues; further objectives included increasing readiness for change, assessing schemas באמצעות standardized questionnaires, and providing individualized feedback to enhance schema awareness. In the sixth session, experiential techniques such as guided imagery of problematic situations and confrontation with the most distressing scenarios were practiced. In the seventh session, emphasis was placed on therapeutic relationships, interpersonal relationships with significant others, and role-playing exercises; participants were also trained to engage in dialogues between their healthy and schema-driven modes and to complete schema monitoring forms. In the eighth session, participants practiced adaptive behaviors through role-playing and completion of tasks related to new behavioral patterns; additional components included continued imagery dialogues, letter-writing assignments as homework, explanation of the therapeutic rationale for these techniques, and implementation of limited reparenting during imagery exercises. In the ninth session, the advantages and disadvantages of adaptive and maladaptive behaviors were reviewed, and strategies to overcome barriers to behavioral change were introduced; specific target behaviors were identified, prioritized for pattern-breaking, and participants were prepared to implement behavioral change. In the tenth session, the content of previous sessions was briefly reviewed, and learned strategies were practiced and consolidated; therapeutic goals included enhancing motivation for change, reinforcing adaptive behaviors through imagery and role-play, and equipping participants with skills to overcome barriers and implement meaningful life changes.

2.4. Data Analysis

Data were analyzed using SPSS version 26. The statistical method employed for data analysis was two-way repeated measures analysis of variance. Fisher's exact test was used to examine participants' demographic characteristics. The Kolmogorov-Smirnov test was applied to assess the normality assumption, Mauchly's test was used to examine

the sphericity assumption, and Levene's test was conducted to evaluate the homogeneity of variances. The level of statistical significance for all tests was set at 0.05.

3. Findings and Results

In this study, all participants were women. The mean age of the experimental group was 43.40 ± 3.92 years and that of

the control group was 44.07 ± 4.49 years. An independent samples t-test indicated no significant difference between the groups in terms of age ($p = 0.669$). Additionally, Fisher's exact test showed no significant differences between the groups regarding educational level and marital status ($p > 0.05$). Other demographic characteristics are presented in Table 1.

Table 1

Selected Demographic Characteristics of the Participants

Variable	Experimental Group (n = 15)	Control Group (n = 15)	p-value
Education Level	Diploma: 3 (20%) Bachelor's: 12 (80%)	Diploma: 2 (13%) Bachelor's: 13 (87%)	0.522
Marital Status	Single: 3 (20%) Married: 12 (80%)	Single: 1 (7%) Married: 14 (93%)	0.569

As shown in Table 2, descriptive indices for both groups at pretest, posttest, and follow-up stages are presented. As observed, the mean scores of the experimental group improved from pretest to follow-up. This improvement was reflected in emotion regulation and anxiety sensitivity, with

an increase in emotion regulation and a decrease in anxiety sensitivity scores, indicating the effectiveness of the schema therapy intervention. In contrast, the control group showed minimal changes.

Table 2

Descriptive Statistics for Women with Borderline Personality Disorder

Variables	Group	Pretest (M ± SD)	Posttest (M ± SD)	Follow-up (M ± SD)
Emotion Regulation	Experimental	67.30 ± 44.56	70.30 ± 75.40	70.30 ± 75.40
	Control	46.16 ± 45.80	46.38 ± 48.48	46.19 ± 46.12
Anxiety Sensitivity	Experimental	90.67 ± 56.30	80.70 ± 40.80	80.70 ± 40.80
	Control	80.16 ± 80.80	81.38 ± 48.81	81.19 ± 81.12

To analyze the data and test the hypotheses related to emotion regulation and anxiety sensitivity, a two-way repeated measures ANOVA was conducted. Prior to performing the analysis, its assumptions were examined. The Kolmogorov–Smirnov test indicated that the data were normally distributed at the 95% confidence level ($p > 0.05$). Levene's test results were greater than 0.05, confirming the assumption of homogeneity of variances. Mauchly's test of sphericity indicated that the assumption of sphericity was met for anxiety sensitivity ($\chi^2 = 3.56$, $p = 0.358$) and emotion regulation ($\chi^2 = 16.05$, $p = 0.055$); therefore, the sphericity-assumed test was used. Box's M test was employed to assess the equality of covariance matrices, and the results

confirmed this assumption for anxiety sensitivity (Box's $M = 3.051$, $F = 1.572$, $p = 0.514$) and emotion regulation (Box's $M = 4.179$, $F = 3.260$, $p = 0.508$). Between-group results indicated significant differences between the experimental and control groups in terms of mean anxiety sensitivity ($p = 0.008$) and emotion regulation ($p = 0.024$). Within-group (time) results also showed significant differences in mean anxiety sensitivity ($p < 0.001$) and emotion regulation ($p < 0.001$). In other words, the differences in mean scores of anxiety sensitivity and emotion regulation across the three stages (pretest, posttest, and follow-up) were statistically significant, accounting for approximately 67% and 78% of the variance, respectively.

Table 3

Results of Two-Way Repeated Measures ANOVA for Anxiety Sensitivity and Emotion Regulation

Variable	Source	SS	df	MS	F	p-value	Effect Size
Anxiety Sensitivity	Group	205.589	1	205.589	4.688	0.033	0.27

Emotion Regulation	Time	96.572	2	48.286	24.416	<0.001	0.67
	Group × Time	120.001	2	60.000	30.888	<0.001	0.71
	Group	98.822	1	98.822	15.703	0.024	0.204
	Time	92.822	2	46.411	36.997	<0.001	0.785
	Group × Time	132.022	2	66.011	18.206	<0.001	0.653

The results presented in Table 3 indicate that the interaction effect of group and time on anxiety sensitivity and emotion regulation was significant ($p < 0.001$), demonstrating the effectiveness of the intervention in reducing anxiety sensitivity and improving emotion regulation at posttest and follow-up in the experimental group compared to the control group.

The effect size for anxiety sensitivity indicated that approximately 77% of the variance in scores could be explained by between-group, within-group (time), and interaction effects. Similarly, the effect size for emotion regulation suggested that a substantial proportion of variance in scores was attributable to these sources of change, highlighting the strong impact of the schema therapy intervention.

4. Discussion

The present study aimed to examine the effectiveness of schema therapy on emotion regulation and anxiety sensitivity in women with borderline personality disorder. The findings demonstrated that schema therapy significantly improved emotion regulation and reduced anxiety sensitivity in the experimental group compared to the control group, both at posttest and follow-up stages. Moreover, the significant interaction effects of group and time indicated that the observed changes were not only statistically meaningful but also sustained over time, suggesting the stability of treatment effects. These results confirm the effectiveness of schema therapy as an intervention targeting core emotional and cognitive vulnerabilities associated with borderline personality disorder.

The observed improvement in emotion regulation among participants in the experimental group can be explained through the theoretical foundations of schema therapy, which emphasize the identification and modification of early maladaptive schemas and the development of adaptive emotional responses. Schema therapy directly addresses unmet emotional needs and maladaptive coping strategies, enabling individuals to reinterpret emotional experiences and respond more flexibly. This finding is consistent with previous research indicating that schema therapy enhances emotion regulation capacities across various populations. For example, studies have shown that schema-based

interventions significantly improve emotion regulation styles and emotional expression in clinical samples, including couples experiencing relational distress and individuals with chronic medical conditions (Bibak et al., 2025; Isazadeh et al., 2021). Similarly, comparative research has demonstrated that schema therapy is more effective than mindfulness-based cognitive therapy in improving emotion regulation and resilience among patients with cardiovascular disorders (Nikan et al., 2024).

The reduction in anxiety sensitivity observed in the experimental group also aligns with the mechanisms of schema therapy. Anxiety sensitivity is closely linked to maladaptive cognitive appraisals and exaggerated interpretations of internal sensations. Schema therapy, by restructuring dysfunctional beliefs and modifying maladaptive schemas, reduces the perceived threat associated with anxiety-related sensations. This interpretation is supported by prior findings indicating that emotional schema therapy significantly reduces anxiety symptoms and related cognitive distortions in individuals with anxiety disorders and psychosomatic conditions (Erfan et al., 2024; Razzaghi et al., 2025). Additionally, group-based schema interventions have been found to decrease anxiety sensitivity and improve emotional organization in socially anxious individuals, further supporting the present findings (Morvaridi Farimani, 2017).

Another important aspect of the findings is the durability of treatment effects at the follow-up stage. The maintenance of improvements in both emotion regulation and anxiety sensitivity suggests that schema therapy produces lasting cognitive and emotional changes. This can be attributed to the integrative and experiential nature of schema therapy, which not only modifies maladaptive beliefs but also promotes behavioral change and emotional processing through techniques such as imagery, role-play, and limited reparenting. Previous studies have similarly reported sustained treatment outcomes following schema therapy interventions, particularly in chronic and complex conditions such as depression and borderline personality disorder (Hilden et al., 2025; Renner et al., 2016).

The findings of the present study also highlight the relevance of schema-focused approaches in addressing the core features of borderline personality disorder. Emotional

dysregulation and heightened sensitivity to internal and external stressors are central characteristics of this disorder, and schema therapy directly targets these domains by addressing the underlying cognitive-emotional structures. Empirical evidence has demonstrated that schema therapy reduces the severity and frequency of borderline personality disorder symptoms, including emotional instability, impulsivity, and interpersonal difficulties (Sardaripour & Zare, 2023; Taj Iliayifar et al., 2025). The present results extend this body of research by specifically demonstrating improvements in emotion regulation and anxiety sensitivity, which are critical components of the disorder.

Furthermore, the effectiveness of schema therapy observed in this study may also be interpreted in light of the broader literature on emotional schemas and psychological functioning. Emotional schemas, defined as beliefs and attitudes about emotions, play a crucial role in shaping emotional experiences and regulatory processes. Maladaptive emotional schemas are associated with increased psychological distress, reduced self-compassion, and impaired emotional awareness. Schema therapy, by targeting these maladaptive beliefs, facilitates the development of more adaptive emotional schemas, thereby improving overall psychological functioning (Faustino et al., 2020; Thimm, 2017).

In addition, the results can be contextualized within the growing body of research supporting integrative therapeutic approaches. For instance, combining schema therapy with other evidence-based interventions, such as acceptance and commitment therapy, has been shown to enhance treatment outcomes by addressing both cognitive and experiential dimensions of psychological distress (Karami Mohajeri et al., 2026). Similarly, compassion-focused and acceptance-based therapies have demonstrated effectiveness in improving emotion regulation and psychological flexibility, suggesting that targeting emotional processes is a key mechanism of change across therapeutic modalities (Jamali et al., 2021; Mamdouhi et al., 2024; Mansouri Kiani et al., 2023). However, schema therapy offers a distinct advantage by directly addressing the developmental origins of maladaptive patterns, thereby producing more profound and enduring changes.

The findings also underscore the potential of schema therapy in group formats, as implemented in the present study. Group-based interventions provide opportunities for interpersonal learning, social support, and corrective emotional experiences, which are particularly beneficial for individuals with borderline personality disorder. Recent

studies have demonstrated the feasibility and effectiveness of group schema therapy, including online delivery formats, in reducing symptom severity and improving emotional functioning (van der Boom et al., 2025). These findings support the scalability and accessibility of schema therapy as a treatment option in diverse clinical settings.

5. Conclusion

Overall, the results of the present study are consistent with the existing literature and provide further evidence for the effectiveness of schema therapy in addressing key psychological constructs associated with borderline personality disorder. By improving emotion regulation and reducing anxiety sensitivity, schema therapy contributes to enhanced psychological well-being and functional outcomes in this population. The integration of cognitive, emotional, and behavioral techniques within a coherent therapeutic framework makes schema therapy a comprehensive and effective approach for treating complex psychological disorders.

6. Limitations and Suggestions

One limitation of the present study is the relatively small sample size, which may limit the generalizability of the findings to broader populations. Additionally, the use of a convenience sampling method may introduce selection bias, as participants who volunteer for such studies may differ systematically from those who do not. Another limitation is the reliance on self-report measures, which are subject to response biases such as social desirability and inaccurate self-assessment. Furthermore, the study focused exclusively on women with borderline personality disorder, which restricts the applicability of the findings to other populations, including men and individuals with different clinical conditions. Finally, although the follow-up period provided some evidence of the stability of treatment effects, longer follow-up durations are needed to fully assess the long-term stability of the intervention outcomes.

Future research should aim to replicate the findings of the present study using larger and more diverse samples to enhance the external validity of the results. It is also recommended that future studies employ randomized controlled trial designs to strengthen causal inferences regarding the effectiveness of schema therapy. Additionally, incorporating multimethod assessment approaches, including behavioral observations and physiological measures, may provide a more comprehensive

understanding of changes in emotion regulation and anxiety sensitivity. Further research could also explore the comparative effectiveness of schema therapy with other therapeutic approaches and examine potential mediators and moderators of treatment outcomes, such as individual differences in personality traits, attachment styles, and severity of symptoms.

In terms of practical implications, the findings of the present study suggest that schema therapy can be effectively implemented as a structured intervention for improving emotional functioning in individuals with borderline personality disorder. Clinicians are encouraged to incorporate schema-focused techniques, such as cognitive restructuring, experiential exercises, and limited reparenting, into their therapeutic practice. The use of group-based schema therapy may also enhance treatment accessibility and cost-effectiveness, making it a viable option for mental health service delivery. Moreover, training programs for mental health professionals should include schema therapy approaches to equip practitioners with the necessary skills to address complex emotional and cognitive patterns in clinical populations.

Authors' Contributions

Authors equally contributed to this article.

Declaration

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

Transparency Statement

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

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

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

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