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A Study on the Effectiveness of Positive Psychological Intervention Based on the PERMA Model in Postpartum Depression and Breastfeeding Self-Efficacy Among Primiparous Women

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Abstract

To examine the effects of a positive psychological intervention based on the PERMA model on postpartum depression and breastfeeding self-efficacy among primiparous women, providing evidence-based support for optimizing postpartum care interventions, a prospective randomized controlled trial was conducted in a tertiary hospital in southwest part of China. A total of 120 primiparous women who delivered at the Obstetrics Department between January and June 2025 were randomly assigned to either an intervention group (n=60) or a control group (n=60). The control group received routine postpartum care, while the observation group additionally underwent an 8-week PERMA-based positive psychological intervention (comprising 5 modules: positive emotion cultivation, engagement experiences, relationship building, meaning pursuit, and achievement documentation). Assessments were conducted using the Edinburgh Postnatal Depression Scale (EPDS) and the Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF) at 3 time points: pre-intervention (T0), 4 weeks post-intervention (T1), and 8 weeks post-intervention (T2). Results showed that at 8 weeks post-intervention, the observation group exhibited lower EPDS scores (7.32 ± 2.15) than the control group (10.68 ± 3.42), while the BSES-SF score (58.46 ± 6.83) was higher than that of the control group (48.72 ± 7.95). Both differences were statistically significant ($t = -6.384$, 7.216; $P < 0.001$). The exclusive breastfeeding rate at 8 weeks postpartum was higher in the observation group (68.3%) than in the control group (45.0%), with statistically significant differences ($\chi^2=6.736$, $P=0.009$). Repeated measures ANOVA revealed statistically significant time effects, between-group effects, and interaction effects for both EPDS and BSES-SF scores across groups ($P<0.05$). In conclusion, positive psychological intervention based on

the PERMA model could effectively alleviate postpartum depression in primiparous women, enhance breastfeeding self-efficacy, and increase exclusive breastfeeding rates. Its application in postpartum care is highly recommended in a larger scale in China and across the globe.

Keywords: PERMA model; positive psychological intervention; primiparous women; postpartum depression; breastfeeding self-efficacy

1. Introduction

Postpartum depression is one of the most common mental health issues following childbirth, with a global prevalence rate of approximately 10%-20% (Liu et al., 2019). Domestic epidemiological studies indicate that China's postpartum depression prevalence reaches 15%-20%. Among these, primiparous women constitute a vulnerable group with heightened risk due to factors such as lack of parenting experience and difficulties adapting to their new role (He et al., 2022). Postpartum depression not only severely impacts maternal physical and mental health but may also exert long-term negative effects on infants' cognitive, emotional, and behavioral development (Slomian et al., 2019; Yuan et al., 2023). Breastfeeding is crucial for maternal and infant health, yet postpartum depression often diminishes mothers' breastfeeding self-efficacy, thereby reducing exclusive breastfeeding rates and duration (C.-L. Dennis & McQueen, 2009). Consequently, exploring effective postpartum psychological interventions holds significant importance.

The PERMA model, proposed by positive psychology founder Seligman in 2011, is a theoretical framework for well-being comprising five core elements: Positive Emotions, Engagement, Relationships, Meaning, and Accomplishment (Seligman, 2011). This model emphasizes enhancing overall well-being and mental health by cultivating positive emotions, stimulating flow experiences, building supportive relationships, pursuing life meaning, and documenting personal accomplishments (I. Y. Lin et al., 2026). In recent years, the PERMA model has seen increasing application in mental health research (Bartholomaeus et al., 2020), yet studies applying it to postpartum depression interventions remain scarce.

This study aims to examine the effects of a PERMA-based positive psychology intervention on postpartum depression and breastfeeding self-efficacy among primiparous women, seeking to provide novel intervention strategies and evidence-based support for postpartum care.

2. Research Methodology

2.1 Study Design

This study is a prospective randomized controlled trial. Convenience sampling was used to select primiparous women who delivered at the Obstetrics Department of a tertiary hospital between January and June 2024. Inclusion criteria: 1 Age ≥ 20 years; 2 Single-fetus full-term delivery; 3 Primiparity; 4 Healthy newborn with Apgar score ≥ 8; 5 Willingness to breastfeed; 6 Voluntary participation. Exclusion criteria: 1 Severe pregnancy complications or comorbidities; 2History of mental illness or cognitive impairment; 3 Neonatal severe illness requiring mother-infant separation; 4 Participation in other psychological intervention studies.

Sample size calculation: Using the two-sample mean comparison formula with α=0.05 (two-tailed) and β=0.20, combined with pilot study results, 50 subjects per group were initially calculated. Accounting for a 20% dropout rate, the final sample size was set at 60 subjects per group, totaling 120 subjects. Subjects were randomly assigned to the observation group (n=60) and control group (n=60) using a random number table.

2.2 Intervention Methods

Control Group: Received routine obstetric postpartum care, including: 1 Postpartum health education (wound care, nutritional guidance, newborn care, etc.); 2 Breastfeeding guidance (feeding positions, milk expression techniques, breast care, etc.); 3 Psychological support (daily communication with nurses, discharge instructions, etc.); 4 Outpatient follow-up at 42 days postpartum.

Intervention Group: Received an 8-week positive psychology intervention based on the PERMA model (Çelik, 2024) in addition to routine care. The intervention protocol was designed by the research team based on the PERMA model and positive psychology theory, reviewed and revised by five experts (two psychology specialists, two obstetric nursing specialists, and one midwifery specialist). Specific details are presented in Table 1. The intervention format combined individual guidance with WeChat group support (Rodríguez-Gallego et al., 2024).

Table 1. Positive Psychological Intervention Protocol Based on the PERMA Model

Time	Module	Intervention Topic	Intervention Content	Format
Week 1	Positive Emotion (P)	Record Three Good Things Daily	Guide new mothers to record three small things each day that bring them joy or gratitude, cultivating positive emotional experiences.	WeChat group check-ins + individual feedback
Week 2	Positive Emotion (P)	Gratitude Practice	Encourage new mothers to write a thank-you letter to family members or healthcare providers, expressing their appreciation.	Individual guidance
Week 3	Engagement (E)	Mindful Feeding Experience	Teach new mothers to practice mindfulness during breastfeeding, focusing on the present-moment feeding experience.	Bedside guidance + audio practice
Week 4	Engagement (E)	Flow Activity Design	Help new mothers discover activities that allow them to become fully immersed (such as listening to music, reading, or simple crafts).	Individual guidance
Week 5	Interpersonal Relationships (R)	Peer Support Connection	Organize peer interactions within WeChat groups to share parenting experiences and offer mutual encouragement and support	WeChat Group Interaction
Week 6	Interpersonal Relationships (R)	Family Communication Skills	Guide new mothers in effectively communicating their needs with partners and family members to build a family support network (Karaçay Yıkar & Nazik, 2024)	Individual Guidance + Scenario Simulation
Week 7	Meaning (M)	Discovering the Meaning of Motherhood	Facilitate reflection on the personal growth and value of motherhood	Individual Interviews + Journaling
Week 8	Achievement (A)	Reflecting on Growth and Accomplishments	Assist new mothers in reviewing milestones from the past 8 weeks and documenting personal achievements	Personal Reflection + Certificate Awarding

2.3 Evaluation Indicators and Measurement Tools

Postpartum Depression: Assessed using the Edinburgh Postnatal Depression Scale (EPDS). Developed by Cox et al., the Chinese version demonstrates good reliability and validity. It comprises 10 items scored on a 4-point scale (0–3 points), yielding a total score ranging from 0 to 30. Higher scores indicate greater depression severity, with ≥10 points suggesting possible depression (Cox et al., 1987).

Breastfeeding Self-Efficacy: Assessed using the Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF). Developed by Dennis, the Chinese version demonstrates good reliability and validity. It comprises 14 items rated on a 5-point scale (1 = completely lacking confidence, 5 = always confident), yielding a total score ranging from 14 to 70. Higher scores indicate stronger breastfeeding self-efficacy (C. Dennis, 2003).

Breastfeeding Status: Breastfeeding methods (exclusive breastfeeding, mixed feeding, formula feeding) were recorded at 4 weeks and 8 weeks postpartum.

Intervention Satisfaction: A self-designed questionnaire assessed satisfaction with the intervention program among observation group mothers after completion, covering dimensions such as content design, guidance methods, and perceived effectiveness, using a 5-point Likert scale.

2.4 Data Collection

Uniformly trained nursing staff collected data via online questionnaires or outpatient follow-ups at three time points: pre-intervention (T0) (before postpartum discharge), 4 weeks post-intervention (T1), and 8 weeks post-intervention (T2).

2.5 Statistical Analysis

Data analysis was performed using SPSS 26.0 software. Quantitative data were expressed as mean ± standard deviation ($\bar{x} \pm s$). Comparisons between groups were conducted using independent samples t-tests, while comparisons within groups at different time points were analyzed using repeated measures ANOVA. Qualitative data were presented as frequency and percentage (%), with intergroup comparisons performed using χ^2 tests. $P < 0.05$ was considered statistically significant.

3. Research Findings

3.1 Comparison of Baseline Data Between Groups

During the study, 2 cases were lost to follow-up in the observation group (1 due to changed contact information, 1 due to personal reasons) and 3 cases in the control group (2 failed to complete the questionnaire, 1 withdrew due to illness). Ultimately, 58 cases in the observation group and 57 cases in the control group completed the entire study in respective. No statistically significant differences were observed between groups in baseline characteristics including maternal age, educational level, and mode of delivery ($P > 0.05$). Detailed data are presented in Table 2.

Table 2. Comparison of Baseline Characteristics Among Primiparous Women in Both Groups [n (%), $\bar{x} \pm s$]

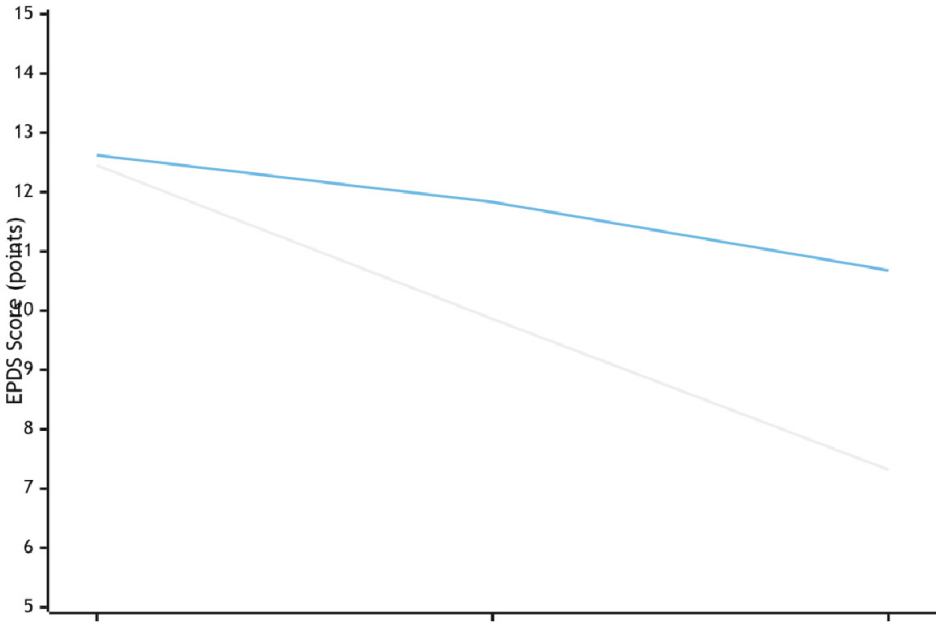
Project	Observation Group (n=58)	Control Group (n=57)	t/χ^2	P
Age (years)	28.54 ± 3.62	28.91 ± 3.85	-0.531	0.597
Educational Attainment			0.834	0.659
High school or below	12(20.7)	15(26.3)	12.940	
College/Undergraduate	38(65.5)	34(59.6)		
Master's degree or above	8(13.8)	8(14.0)		
Delivery Method			0.287	0.592
Natural birth	35(60.3)	32(56.1)		
Cesarean section	23(39.7)	25(43.9)		
Monthly Household Income (RMB)			1.026	0.599
<5000	8(13.8)	11(19.3)		
5000-10000	28(48.3)	26(45.6)		
>10000	22(37.9)	20(35.1)		

3.2 Comparison of Postpartum Depression Scores Between Groups

Repeated measures ANOVA revealed statistically significant time effects ($F=45.682$, $P<0.001$), between-group effects ($F=28.754$, $P<0.001$), and interaction effects ($F=16.893$, $P<0.001$) for EPDS scores across both groups. Further pairwise comparisons revealed no significant difference in EPDS scores between the two groups before intervention ($P>0.05$). At 4 weeks and 8 weeks post-intervention, the EPDS scores in the observation group were significantly lower than those in the control group ($P<0.05$), as shown in Table 3 and Figure 1.

Table 3. Comparison of EPDS Scores at Different Time Points Between the Two Groups ($\bar{x}\pm s$, points)

Time	Observation Group (n=58)	Control Group (n=57)	*t*	*P*
Before intervention (T0)	12.45 ± 3.28	12.62 ± 3.51	-0.268	0.789
4 weeks after intervention (T1)	9.86 ± 2.74	11.83 ± 3.26	-3.512	0.001
8 weeks after intervention (T2)	7.32 ± 2.15	10.68 ± 3.42	-6.384	<0.001



Pre-intervention(T0) 4 weeks post-intervention (T1) 8 weeks post-intervention(T2)

Figure 1. Trends in EPDS Scores Over Time Between Two Groups

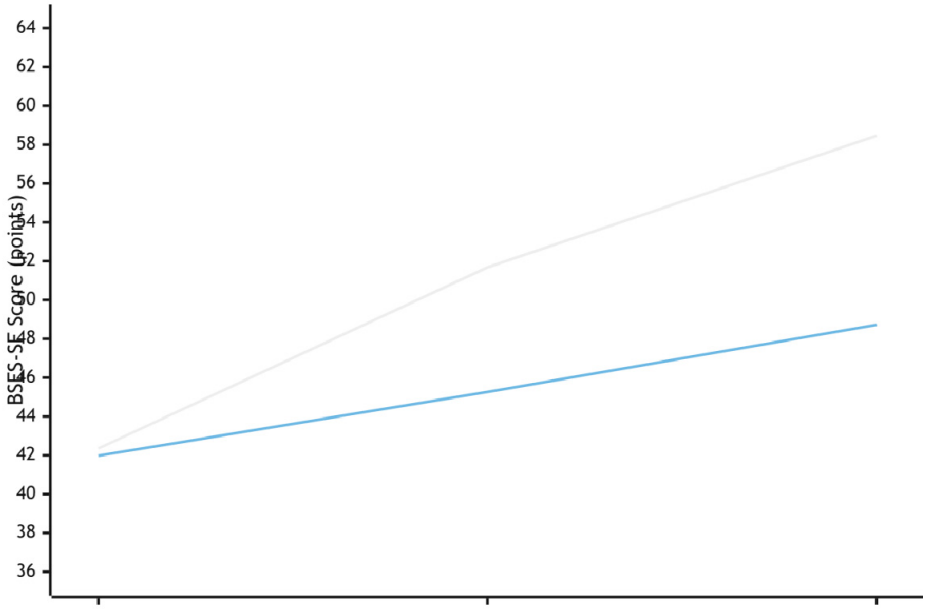
Note: The gray line represents the observation group, and the blue line represents the control group respectively. The observation group exhibited a significantly faster decline in EPDS scores compared to the control group. Repeated measures ANOVA revealed statistically significant time effects, between-group effects, and interaction effects ($P < 0.001$).

3.3 Comparison of Breastfeeding Self-Efficacy Between Groups

Repeated measures ANOVA revealed statistically significant time effects ($F=52.136$, $P<0.001$), between-group effects ($F=32.847$, $P<0.001$), and interaction effects ($F=19.265$, $P<0.001$) for BSES-SF scores across both groups. At 4 and 8 weeks post-intervention, the BSES-SF scores in the observation group were significantly higher than those in the control group ($P<0.001$), as shown in Table 4 and Figure 2.

Table 4. Comparison of BSES-SF Scores at Different Time Points Between Groups ($\bar{x}\pm s$, points)

Time	Observation Group (n=58)	Control Group (n=57)	*t*	*P*
Before intervention (T0)	42.35 ± 8.62	41.98 ± 8.95	0.225	0.822
4 weeks after intervention (T1)	51.68 ± 7.54	45.26 ± 8.13	4.387	<0.001
8 weeks after intervention (T2)	58.46 ± 6.83	48.72 ± 7.95	7.216	<0.001



Pre-intervention(T0) 4 weeks post-intervention(T1) 8 weeks post-intervention(T2)

Figure 2. Trends in BSES-SF Scores Over Time Between Two Groups

Note: The gray line represents the observation group, and the blue line represents the control group in respective. The observation group showed a significantly faster increase in BSES-SF scores compared to the control group. Repeated measures ANOVA revealed statistically significant time effects, between-group effects, and interaction effects (P<0.001).

3.4 Comparison of Exclusive Breastfeeding Rates Between Groups

At 8 weeks postpartum, the exclusive breastfeeding rate in the observation group was 68.3%, significantly higher than 45.0% in the control group (P=0.009), as shown in Table 5 and Figure 3.

Table 5. Comparison of Breastfeeding Patterns at 8 Weeks Postpartum Between Groups [n (%)]

Group	Exclusive Breastfeeding	Mixed Feeding	Formula Feeding	χ^2	*P*
Observation Group (n=58)	41(68.3)	14(24.1)	3(5.2)	6.736	0.009
Control Group (n=57)	27(45.0)	21(36.7)	9(15.0)		

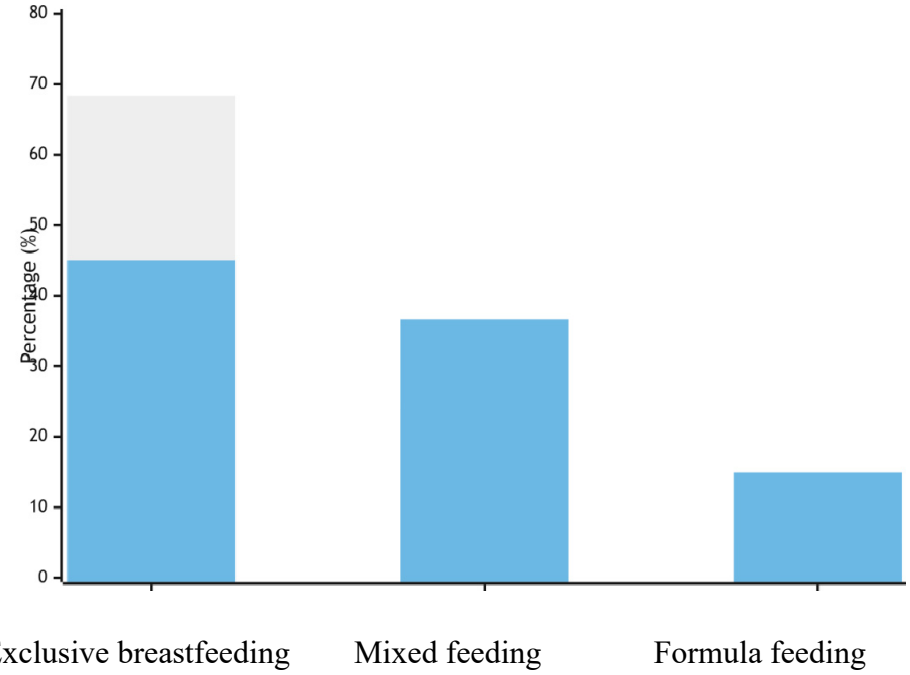


Figure 3. Comparison of Breastfeeding Methods at 8 Weeks Postpartum Between Two Groups

Note: Gray bars represent the observation group, blue bars represent the control group. The exclusive breastfeeding rate in the observation group was significantly higher than that in the control group (χ^2=6.736, P=0.009).

3.5 Intervention Satisfaction

Following the intervention, the overall satisfaction rate among mothers in the observation group was 93.1% (54/58). Specifically, satisfaction with "intervention content design" was 91.4% (53/58), satisfaction with "guidance methods" was 94.8% (55/58), and satisfaction with "perceived intervention effectiveness" was 89.7% (52/58) in respective. See Table 6 for details.

Table 6. Satisfaction Evaluation of the Intervention Program Among Mothers in the Observation Group (n=58)

Dimension	Observation Group Satisfied Individuals (n=58)	Satisfaction Rate (%)
Overall Satisfaction	54	93.1
Intervention Content Design	53	91.4
Guidance Approach	55	94.8
Perceived Intervention Effectiveness	52	89.7

Note: Satisfaction ratings use a 5-point Likert scale (1 = Very Dissatisfied, 2 = Dissatisfied, 3 = Neutral, 4 = Satisfied, 5 = Very Satisfied). The satisfaction rate is calculated as the percentage (%) of respondents selecting "Satisfied" or "Very Satisfied."

4. Discussion

4.1 Effects of PERMA Model Intervention on Postpartum Depression in Primiparous Women

The results of this study indicate that positive psychological intervention based on the PERMA model could significantly reduce postpartum depression levels in primiparous women. Eight weeks after the intervention, the EPDS scores in the intervention group were 3.36 points lower than those in the control group, a difference that is clinically significant. These findings are consistent with the results of other scholars who have applied the PERMA model (I. Y. Lin et al., 2026). The underlying mechanisms may include: the Positive Emotions module, through "three good things" and gratitude exercises, helps mothers focus on the positive aspects of life and break negative thought cycles; the Engagement module, through mindful feeding and flow activities, enhances the experience of present-moment focus and reduces rumination on parenting anxieties; the Interpersonal module builds effective social support networks through peer support and family communication guidance; the Meaning module guides mothers to re-evaluate the value of their maternal role, thereby enhancing self-identity (I. Y. Lin & Mattila, 2022); and the Achievement module strengthens self-efficacy by documenting personal growth. These five modules work synergistically to collectively enhance new mothers' psychological resilience (Seligman et al., 2005; Seligman & Csikszentmihalyi, 2000).

4.2 The Impact of the PERMA Model Intervention on Breastfeeding Self-Efficacy

This study found that post-intervention, the breastfeeding self-efficacy scores in the observation group were significantly higher than those in the control group, and the exclusive breastfeeding rate increased by 23.3 %. Breastfeeding self-efficacy is a core psychological factor influencing breastfeeding outcomes (Slomian et al., 2019). The PERMA-based intervention enhanced self-efficacy across multiple dimensions: the Positive Emotions module reduced anxiety's interference with breastfeeding; the Engagement module, through mindful feeding experiences (Sun, 2023), enabled mothers to focus more on positive feedback during the feeding process; peer support within the Relationships module provided vicarious experiences (Yu, 2021); the Achievement module, which involves documenting each successful feeding experience, directly reinforces a sense of mastery (Zheng et al., 2023). These mechanisms collectively explain the intervention's role in enhancing self-efficacy for breastfeeding (Kerimoglu Yildiz et al., 2025; Oggero et al., 2024).

4.3 Innovation and Clinical Significance of This Study

The innovation of this study lies in the systematic application of the PERMA model to the field of postpartum psychological care, the development of a structured intervention program (McGovern et al., 2024), and the validation of its effectiveness through a randomized controlled trial design. This model emphasizes the cultivation of positive psychology rather than merely focusing on symptom relief, aligning with the "health-centered" philosophy of modern nursing. The intervention program is flexible in format, combining online support with in-person guidance, making it suitable for clinical implementation.

4.4 Limitations

This study has the following potential limitations: First, the intervention duration was only 8 weeks, and long-term effects still require follow-up observation; second, the sample was drawn from a single center, so caution is needed when generalizing the findings; third, the study was not blinded, which may introduce measurement bias. Therefore, future research could extend the follow-up period, conduct multicenter studies, and explore the effectiveness of this model across different groups of postpartum women.

5. Conclusion

Positive psychological intervention based on the PERMA model could effectively reduce postpartum depression levels in primiparous women, improve breastfeeding self-efficacy, and increase exclusive breastfeeding rates, demonstrating good clinical value (Dukuzumuremyi et al., 2020) and was further validated through clinical experimental studies in the Department of Obstetrics of our city-based hospital. It is thus recommended that this intervention model be promoted in postpartum care, and that the intervention protocol be continuously optimized with the collaborative practices and applications of clinical practitioners and researchers across the world.

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Author contributions

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Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Macrothink Institute.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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