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Designing and validating a family based mental empowerment program for improvement of cognitive processes, psychological hardiness and academic performance of slow learners' students

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ABSTRACT

The study reported in this paper aimed at developing and validating a family-based mental empowerment program to enhance cognitive processes, psychological hardiness, and academic performance of slow learners. The present study was fundamental in nature. The statistical population included psychologists and exceptional children's education specialists, family education instructors, and parents of slow learners in Tehran. The sample population consisted of three professors in psychology and exceptional children's education from the University of Tehran, three family education instructors, and three mothers of slow learners, selected through purposive sampling. The validation process of the studied program was carried out in five steps (reviewing theoretical foundations, reviewing previous research and existing programs, developing program content, validating the content, and explaining the program validation). The Delphi method was used for program content development, triangulation and Lawshe's content validity index were employed for content validity determination, and the expert agreement percentage method was used for determining the program's reliability. The overall content validity coefficient of the sessions stood at 85%, and the program's reliability coefficient was 86%. The family-based mental empowerment program aimed at enhancing cognitive processes, psychological hardiness, and academic performance of slow learners demonstrated high validity and reliability. Therefore, this program can be used to improve the cognitive and academic status of slow learners.

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Introduction

Paying undivided attention to the education and development of children in any society is of paramount importance and can arguably be considered the most valuable investment for its future. A section of any population consists of students who, in broad terms, cannot succeed in learning and education at the same pace as their peers. These students are referred to as those with borderline intellectual functioning disorder or, from an educational perspective, slow learners (Afrooz, 2021). A slow learner is a student who has the potential to progress academically in public education schools but performs below the average level compared to their academic grade (Juleha, Sudirman, Arifuddin, & Gunadi, 2021). They have an IQ ranging from 70 to 85, learn slowly and forget quickly. Although they are often academically weak, they do not significantly differ from their peers in public education schools in terms of physical, sensory, motor, emotional, or social aspects. In adulthood, they can adapt to their environment and are capable of living independently (Afrooz, 2021). This group comprises approximately 13 to 14 percent of the population in every society (Hassiotis, Emerson, Wieland & Bertell, 2022). Slow learners face difficulties across all academic subjects. They are often neglected in schools and are deprived of a structured educational program tailored to their needs and abilities, requiring supportive education (Korikana, 2020). If their needs are unmet, they are likely to drop out of school (Vasudevan, 2017). Since school dropout is a strong risk factor for the loss of a society's efficient workforce, it can also lead to an increase in crime and insecurity in the country (Dragone, Migali & Zucchelli, 2021).

Slow learners (borderline intellectual students) have not yet been granted access to exceptional education services, and at the same time, they struggle to adapt easily to the educational systems of general education schools (Sayf Naraghi & Farighi, 2013). On the other hand, leaving slow learners in general education schools without considering their abilities and without providing adequate educational support leads to a significant waste of the annual education budget, grade repetition, and ultimately their frustration and disillusionment with education (Moravejnia & Safary-Nia, 2020). This situation highlights the increasing need for special services for these students to succeed, remain in school, and continue their education.

Slow learners are often labeled as lazy, inattentive to learning, and lacking concentration. In reality, they want to learn but due to weaknesses in cognitive processes, they require more time, practice, and repetition compared to their peers to grasp new concepts (Asio, Francisco, & Rodriguez, 2021). Cognitive processes refer to mental functions that enable us to receive, select, store, transform, and retrieve information. This term describes functions such as attention, memory, perception, problem-solving, reasoning, decision-making, and language. These processes affect all aspects of life, including school, work, and social relationships, and help us connect more effectively with the world (Zhang, 2019). Slow learners, due to their short attention span, cannot concentrate for long periods. Additionally, because of memory problems, they struggle to remember and recall what they've learned, leading to little interest in the learning process and disinterest in attending class (Ru'iya & Kistoro, 2021). Since the late 18th century, various programs have been developed to enhance mental processes, one of the most promising being mental empowerment for children, which repairs damaged functions through educational strategies, repetition, and practice (Gandomi, Arjmandnia, & Afrooz, 2021).

Furthermore, slow learners often feel incompetent due to past failures and disappointments, resulting in severely diminished self-esteem and low motivation to engage with classroom material (Hassan & Mahmud, 2018). Because of repeated classroom failures, a lack of future goals, and rejection by teachers and peers, slow learners often perform academically below their cognitive potential (Afrina Afzal, Manir, Khan, & Ali, 2021; Binu, 2021). These students

should not become discouraged by education, and methods that increase motivation should be used to assist their learning.

Encouraging parents to actively participate in their children's educational activities, especially in the early years of schooling, leads to better learning outcomes, a positive attitude toward school, and a greater likelihood of future success (Hamdin, Awang, Ahmad & Ahmad, 2019). There are two main methods to help slow learners improve academic performance: The first is to give them more time to complete academic tasks, and parents should practice and reinforce the lessons taught in school. The second, and better, approach is to motivate and encourage slow learners, as they often have low motivation. Families can collaborate with them in skill-based and practical assignments (Ghafourian & Ashoori, 2017). Slow learners usually struggle with classroom tasks, so parents need to be trained and guided on how to manage and support them in completing these tasks (Korikana, 2020).

Studies have shown that parental involvement can have a positive impact on children's cognitive, social, academic development, and overall well-being (Feldman, Anderson, Shapiro, et al., 2018). Positive and deep engagement from parents with slow learners reflects a form of attention and affection towards their children. These students feel loved and supported by their parents (Rofiah & Rofiana, 2017). They gain the motivation to learn and the confidence to express their feelings (Putry & Fakhruddiana, 2018). In family-based interventions, psychologists or counselors aim to make all influential family members aware of the structured program, so they can participate directly or indirectly in achieving its goals with a positive outlook, empathy, and cooperation, according to their roles in the family (Afrooz, Ghasemzadeh, & Ebrahimi, 2019). Teaching therapeutic techniques to families and empowering them to take consistent and effective actions for slow learners is a crucial and beneficial step in supporting these children. The family-based approach believes that when families engage in the care and education of their children without the influence of negative emotions and reactions, they provide an opportunity for their children to learn more and choose the appropriate therapeutic approaches (Skotko, Levine, Macklin & et al., 2016). In essence, the family-based approach is a set of values, attitudes, and practices for delivering services to children and their families, positioning parents as experts on their children's needs, and enhancing the relationship between parents and service providers.

Given the large number of students in general education classrooms, the lack of sufficient time for teaching and assessment, and the limited understanding that teachers have of the characteristics of slow learners, education tailored to their mental abilities and needs is not effectively provided. Effective education for slow learners requires knowledge, planning, and investment of time and resources. Therefore, family-based interventions can be extremely helpful. Moreover, there is, currently, no comprehensive rehabilitation approach or guidelines available for slow learners. One of the most important interventions in this regard is a multi-faceted approach that encompasses various aspects of development (Blasi, Zanette, Baglio, et al., 2020). Thus, the design and development of a family-based mental empowerment program is important because of the issues mentioned.

Method

This research was fundamental in nature. The researcher employed a qualitative research method based on the Delphi technique to explore and identify the phenomenon under study (the development of a family-based mental empowerment program). The rationale behind using the Delphi method was the expertise of the supervising professors in the field of slow learners, their prominent research in mental empowerment, and the relative knowledge of the researcher. The

study's population included experts in psychology and exceptional children's education, family education instructors, and parents of slow learners.

Sampling Procedures

The sample consisted of three professors from the psychology and exceptional children's education department at the University of Tehran, three family education instructors holding doctoral degrees in psychology, and three mothers of slow learners with a high school diploma or higher, selected through purposive sampling. The research was conducted by visiting the Faculty of Psychology and Educational Sciences at the University of Tehran and public education schools in District 10 of Tehran.

Study Procedure

1. Step One: Theoretical Review: Numerous studies have examined the cognitive and academic difficulties of slow learners, often identifying fundamental deficiencies in their cognitive processes. For example, Hasibuan, Santosa, and Syamsuri (2022) found that slow learners' poor academic performance is linked to cognitive weaknesses such as memory and low concentration. Träff and Östergren (2021), in a three-year longitudinal study, explored the mental abilities and academic skills of slow learners, concluding that they suffer from neurocognitive deficits and have lower cognitive capacities than their peers. However, they found that empowerment interventions could bring slow learners' mental abilities up to the average level of their peers. Mental empowerment is defined by the American Congress of Rehabilitation Medicine as a set of systematic and purposeful therapeutic activities aimed at achieving functional changes through: 1) the re-establishment or enhancement of previously learned behavioral patterns, or 2) the development of new mental activity patterns or compensatory mechanisms for nervous system deficits (Armstrong, Giacino, Katz, et al., 2019). This therapeutic approach includes a range of brain exercises that enhance cognitive processes, leading to personal success in areas such as education, employment, and social relationships (Wood, 2018). These programs are delivered through computers, pen and paper, or hybrid methods. The Committee on Children with Disabilities regards the family as a key player in ensuring the health and well-being of children. As a result, the focus on health services and developmental care has shifted from a child-centered model to a family-based one (Committee on Children with Disabilities, 2001). While parents' primary role in the family is to provide the conditions for their children's holistic development, their knowledge of their child's personality traits, abilities, interests, and weaknesses allows them to act as educators and contribute to better learning outcomes (Ceka & Murati, 2016). It was in the late 1970s that families became involved in the care of their children, exchanging information with therapists, gaining a more comprehensive view of their children, and enhancing the understanding of family-based services (Wilfahrt, Matthews, Lenz & et al., 2017). Studies have demonstrated that parental involvement in intervention programs can impact cognitive processes and improve children's academic performance (Guralnick, 2017).

2. Step Two: Literature review and investigating existing programs: This step involved reviewing available sources, books, and articles to gather effective components of existing programs and assess the strengths and weaknesses of current family-based mental empowerment programs. The review showed that interventions for slow learners can be categorized into three groups: computer-based, non-computer-based, and hybrid. Research supports the idea that cognitive processes and psychological hardiness can be enhanced through intervention programs and that these skills can be transferred to other domains, such as academic performance (Bharadwaj, Yeatts & Headley, 2021; Jones, Katz, Buschkuehl, Jaeggi & Shah, 2020). Research also indicates the positive effects of family-based approaches on

improving the mental, emotional, and academic abilities of slow learners (Zakiah, Supena, Wulandari, 2022; Kaptich, Kiplangat & Munyua, 2019; Nugrahavati & Mustadi, 2019; Lutfiatin & Hamdan, 2019).

3. Step Three: Designing the family-based mental empowerment program: At this stage, the theoretical foundations were meticulously examined to ensure the program's construct validity based on strong theoretical background. The researcher's knowledge, along with the input of specialists involved in the development of the intervention program, indicated the program's face validity. To confirm content validity, the Delphi approach was employed. This approach is a systematic method in research used to gather expert opinions on a subject, typically through questionnaires while maintaining the anonymity of respondents and sharing feedback within the group. The design and development of this intervention program involved gathering initial expert opinions from three professors in psychology and exceptional children's education, three family education instructors, and three parents of slow learners with a high school diploma or higher. Over three additional rounds, their views and suggestions were collected to finalize the program. The tools and programs used in this research included: a family-based mental empowerment program based on a combination of the memory enhancement rehabilitation guidelines (Arjmandnia & Ghasemi, 2019), the Maghzineh attention and concentration package, the N-back software (2008), and sessions for increasing awareness, correcting negative parental attitudes, stress management strategies for parents, and boosting self-efficacy and psychological hardiness among slow learners. Therefore, the present program is a hybrid approach, combining various effective therapeutic packages proven in different studies, with an emphasis on family involvement, designed by a research team and refined with the help of experts in the subject.

4. Step Four: preliminary implementation and finalization of the educational program: This step aimed to conduct an initial evaluation of the program, enhance the researcher's ability to implement it, assess the measurement tools, identify obstacles to achieving the educational goals, and uncover content-related issues from the participants' perspectives, as well as any potential challenges in program execution. To achieve these objectives, a preliminary study was conducted on three students and their parents at Za'im Primary School for boys. Following this stage, the finalized program was developed. The program was structured into 18 sessions, each lasting 90 minutes, over a period of three months. The first five sessions were conducted in a workshop format, consisting of oral explanations, discussions, practicing skills with the parents, and providing feedback. From the sixth to the eighteenth session, parents learned how to implement the exercises from the family-based mental empowerment program at home. During the group sessions, the exercises were demonstrated by the therapist on one student while other parents observed, and their questions were answered.

Results

The family-based mental empowerment program was validated through five stages. The final program, as outlined in Table 1, includes 18 sessions, each lasting 90 minutes.

Table 1: Family-based mental empowerment program sessions

Goal	No.	Instructional Objective	Content
Mental empower	1	Raising Awareness and Amending Parents' Negative Attitudes	Welcoming the participants Explaining group rules, introducing the program as well as the structure of the sessions Familiarization with the characteristics of slow learners Introducing effective therapeutic and educational methods

	2		Awareness of slow learning, the necessity of mental empowerment, and the role of families Changing attitudes through awareness and social communication	
	3	Strategies for Coping with Parental Psychological Stress	Providing practical strategies to enhance stress-coping skills Facilitating acceptance of the child's slow learning and setting Realistic expectations Explaining the effective role of each family member in relation to the slow-learning student	
	4	Enhancing Self-Efficacy and Confidence	Teaching the principles of mother-child relationships Improving positive attention skills and teaching problem-solving methods Teaching metacognitive strategies including: organizing, elaborating, and mental rehearsal	
	5			
	6	Increasing Psychological Hardiness	Providing practical strategies to increase resilience and psychological hardiness	
Goal	No.	Instructional Objective	Non-computer-based Exercises	Computer-based Exercises
Mental empowerment	7	Improving visual working memory Improving auditory working memory Visual attention and inhibition	Memorizing flash cards Memorizing words Exercises from the Beta rehabilitation training package	Rainy clouds exercise N-Back level 1
	8	Improving visual working memory Improving auditory working memory Visual attention and inhibition	Memorizing geometric shapes and wood-blocks Retrieval (retention) of words in reverse Exercises from the Beta rehabilitation training package	Highway exercise N-Back level 1
	9	Improving visual working memory Improving auditory working memory Visual attention and inhibition	Memorizing numbers with cubes Memorizing words and letters Exercises from the Beta rehabilitation training package	Honey memory exercise N-Back level 1
	10	Improving visual working memory Improving auditory working memory Visual attention and inhibition	Memorizing order of colored cars Retrieval (retention) of words and letters in reverse order Exercises from the Beta rehabilitation training package	Picture gallery memory exercise N-Back level 1
	11	Improving visual working memory Improving auditory working memory Visual attention and inhibition	Memorizing colored cups Memorizing order of directions Exercises from the Beta rehabilitation training package	Pictures memory exercise N-Back level 1
	12	Improving visual working memory Improving auditory working memory Visual attention and inhibition	Memorizing letter and word blocks (cubes) Finding rhyming words Exercises from the Beta rehabilitation training package	Puzzle exercise N-Back level 1
	13	Improving visual working memory Improving auditory working memory Visual attention and inhibition	Memorizing color cards and images Finding words with the same beginning and ending sounds Exercises from the Beta rehabilitation training package	Moo-Nazane exercise N-Back level 2
	14	Improving visual working memory Improving auditory working	Traffic light and traffic signs exercise Odd-one-out word exercise	Chorus group exercise N-Back level 2

	memory Visual attention and inhibition	Exercises from the Beta rehabilitation training package	
15	Improving visual working memory Improving auditory working memory Visual attention and inhibition	Game of maze memorizing specified (important) words in a story Exercises from the Beta rehabilitation training package	Yummy-Finder exercise N-Back level 2
16	Improving visual working memory Improving auditory working memory Visual attention and inhibition	Dressing room game Storytelling cards Exercises from the Beta rehabilitation training package	Word memory exercise N-Back level 2
17	Improving visual working memory Improving auditory working memory Visual attention and inhibition	Memorizing individuals' color of clothing and names Retrieval (retention) of the last word of sentences Exercises from the Beta rehabilitation training package	Controller (Organizer) exercise N-Back level 2
18	Improving visual working memory Improving auditory working memory Visual attention and inhibition	Signpost exercise, counting numbers forward and backward Memorizing words and numbers	Lost in the sea exercise N-Back level 2

5. Step Five: validation of the family-based mental empowerment program: In this study, the family-based mental empowerment program was validated using the triangulation method and the triple interaction approach. The reviewers included three psychology professors, three family education instructors, and three mothers of slow-learning students. For program validation, the researcher provided the content of the sessions along with a complete explanation, and a four-question questionnaire was prepared for validation. This questionnaire was then individually submitted to the reviewers (psychology professors, family education instructors, and mothers). To calculate the Content Validity Ratio (CVR) of the intervention program, the Lawshe's method was used. In the Lawshe's method, specialists evaluate the goal and content of each session in three categories: essential, useful, and non-essential. Scores of 1, 0, and -1 are assigned respectively to these categories. The results of the specialists' ratings for content validity using the Lawshe method are presented in Table 2, where the content validity of each session and the overall program is reported.

Formula for Content Validity Ratio (CVR): $$CVR = \frac{n_E - \frac{N}{2}}{\frac{N}{2}}$$

- **CVR** is the Content Validity Ratio
- **nE** is the number of specialists who rated the sessions and educational content as essential
- **N** is the total number of specialists

Based on the specialists' evaluations, some session content might be eliminated or confirmed. If two out of the three specialists, or two-thirds of them, rate the goals and content of a session as non-essential, that session will be removed. The overall content validity ratio of the sessions was calculated to be 85%. Since a CVR closer to 1 indicates higher validity, it can be concluded that the family-based mental empowerment program possesses a high content validity. Additionally, the overall average of the specialists' agreement score regarding the overall session content was 8.64 out of 10. In other words, the percentage of specialist

agreement on the final session content was 86%, indicating high reliability of the intervention program.

Table 1: Results of the specialists' ratings for content validity of the program

Groups	NO	Session Number 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		Scoring: 1 = Essential; 0 = Useful; -1 = Non-essential																	
Psychologists	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	0	1
	3	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	0
Family education instructors	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1
	2	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	3	1	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1
Mothers	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1
	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total	9	9	8	9	8	8	8	8	8	9	8	8	9	8	8	9	8	9	8
Mean	-	8.34																	
Validity ratio		1	0.78	1	0.78	0.78	0.78	1	0.78	1	0.78	0.78	0.78	0.78	0.78	1	0.78	0.78	0.78
Validity		1	0.89	1	0.89	0.89	0.89	1	0.89	1	0.89	0.89	0.89	0.89	0.89	1	0.89	1	0.89
Overall validity		0.85																	

Table 2: Results of the expert agreement percentage for determining the sessions' reliability

Groups	NO	Session Number 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		Session Score (1-10)																	
Psychologists	1	10	10	9	10	8	10	9	10	10	10	10	9	10	10	9	8	10	10
	2	9	8	8	9	8	9	8	9	8	9	9	8	8	9	8	8	9	9
	3	9	9	8	9	10	9	9	10	9	9	10	9	9	8	8	10	8	9
Family education instructors	1	10	8	9	9	10	10	8	9	8	9	9	8	9	9	8	9	8	8
	2	9	8	7	9	8	9	8	6	9	10	9	8	8	9	9	8	8	8
	3	7	9	8	7	8	8	9	8	8	7	10	9	9	10	9	8	10	9
Mothers	1	9	6	8	9	7	8	8	9	10	8	9	8	9	8	8	9	9	8
	2	8	9	9	8	8	7	9	9	9	9	9	9	9	9	9	9	9	9
	3	9	7	9	8	6	9	7	9	8	9	8	9	9	9	8	8	8	9
Mean	-	8.88	8.22	8.33	8.66	8.11	8.77	8.77	8.77	8.77	8.88	9.22	8.55	8.88	9	8.44	8.55	8.77	9
Final Coefficient	-	0.89	0.82	0.83	0.87	0.81	0.88	0.83	0.87	0.87	0.88	0.92	0.85	0.88	0.90	0.84	0.85	0.87	0.90
Overall Mean		8.64																	
Overall Coefficient		0.86																	

Discussion and Conclusion

The present study aimed to design a family-based mental empowerment program to improve cognitive processes, psychological hardiness, and academic performance of slow learner students. The validation of the educational program was carried out using the triangulation method or the triple interaction approach. To do so, the researcher presented the content of the sessions, along with detailed explanations and a questionnaire, to selected experts (three psychology professors, three family education instructors, and three mothers of slow-learning students). Afterward, Lawshe's method was used to assess content validity. In this method, the specialists evaluated the objective and content of each session in three categories: essential, useful, and non-essential. Scores of 1, 0, and -1 were respectively assigned to these categories. If two-thirds of the specialists deemed the session content non-essential, that session was omitted. According to the findings, the overall content validity ratio of the sessions was 85%. Since a validity ratio closer to 1 indicates higher validity, it can be said that the family-based mental empowerment program has high validity. Moreover, the overall average score of experts' agreement on the final session content was 8.64 out of 10. In other words, the

percentage of agreement among experts regarding the final session content was 86%, which indicates the high reliability of the intervention program.

One of the compensatory intervention methods is the family-based approach, according to which if families engage in the care and education of their children without emotional biases and negative reactions, more opportunities present themselves regarding learning and selecting appropriate therapeutic methods. Additionally, considering the fact that there is no systematic mental empowerment program in elementary schools and educational programs are limited to teachers and textbooks, it is logical to assume that in the absence of systematic empowerment programs, implementing intervention programs designed within the family setting can gain high satisfaction. Therefore, teaching therapeutic techniques to families and empowering them to continuously and effectively support slow learner students is considered an important and effective step in helping this section of the student population. On the other hand, families spend the most time with the child and can carry out the most comprehensive interventions at the lowest cost.

To elaborate on the findings, it can be said that slow learner students, under an educational program tailored to their needs, weaknesses, and strengths, can maximize their abilities. As the literature review and empirical findings in the second chapter showed, this educational program was designed using tasks and programs based on empirical evidence. In other words, the use of exercises whose effectiveness has been previously reported can explain the validity of the present program.

Involving parents and taking into account their opinions in designing the intervention program boosted their confidence in the program and relieved their concerns about their children's future. Since parents accompany their children most of the time and through all their experiences, they can be the best advisors in identifying their children’s special needs. A further explanation is that, first, since the family-based mental empowerment program considers the psychological needs of slow learners and is flexible enough to adapt its content to their individual characteristics, can effectively motivate the students based on their individual differences. Second, because this program is family-based, it can be easily implemented at home by family members. Third, the educational sessions were designed so that parents could provide a comprehensive report on their children's status, helping to identify and nurture their strengths. Therefore, the use of the family-based mental empowerment approach not only has positive effects on various cognitive and academic aspects but can also significantly reduce the costs imposed on families and the educational system.

Undoubtedly, every research project faces limitations that may hinder the researcher's success in achieving the desired level or goal. One such limitation is the lack of validated empowerment programs for slow learners to review the theoretical background, as well as the limitation in selecting specialists (professors, family education instructors, and parents of slow learners) across different provinces, which may pose challenges in generalizing the results. It is suggested that, to improve the quality of the family-based mental empowerment program, experimental studies be designed and implemented to determine its effectiveness, and that it be considered as part of elementary school educational programs. Additionally, a student-based mental empowerment program should be developed, and its effectiveness compared to the family-based approach.

Declarations

Author Contributions

Conceptualization, SA. & GAA. Methodology, BGB. Software, SA; validation, GAA, BGB. & AAA; formal analysis, SA; investigation, SA; resources, SA; data curation, SA; writing—original draft preparation, SA; writing—review and editing, SA; visualization, GAA; supervision, GAA, AAA & BGB; project administration, SA. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

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Ethical considerations

This study was conducted in full compliance with ethical guidelines and principles. All participants provided informed consent, and their confidentiality and anonymity were strictly maintained. The research protocol was reviewed and approved by the relevant ethical committee, ensuring adherence to ethical standards throughout the study.

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Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this research.

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