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Investigating the effectiveness of cognitive emotion regulation training along with mindfulness-based on self-confidence in emotion regulation in adults with stuttering: Single-subject study

Fatemeh Tadayonghotbabadi[1]; Sara Abdi[2]; Negar Mivehvar[3]; Saeideh Shahrokhy[4]; *Yasaman Alipour[1]

[1]*Department of Psychology, Shiraz Branch, Islamic Azad University, Shiraz, Fars, Iran.*
[2]*Department of Psychology, Islamic Azad University, Electronics unit, Tehran, Iran.*
[3]*Department of Psychology, Alzahra University, Tehran, Iran.*
[4]*Department of Counseling, Al-Mahdi Mehr Institute of Higher Education, Isfahan, Iran.*

Abstract

Introduction: Stuttering can result in lower self-esteem, restricted social interactions, and adult workplace difficulties. This study examined how cognitive emotion regulation training and mindfulness-based self-confidence-enhancing training can improve emotional regulation in men and women who stutter.

Materials and Methods: The present study was a single-subject experimental design with three baselines, four intervention situations, and two follow-up situations. Participants in the study were adult males and females with stuttering who were seeking treatment at speech therapy clinics in Shiraz, Iran. Researchers utilized the Cognitive Emotion Regulation Questionnaire (CERQ). Various descriptive statistics, such as mean, median, range, stability envelope, range of stability envelope, relative level, and absolute level, were employed in the analysis. Moreover, the researchers used between-condition, within-condition, and graphical analysis methods to test the research hypotheses. All data analyses were conducted using SPSS version 27 and Excel software.

Results: According to the results, Percentage of Non-overlapping Data (PND) for the first and third individuals was 100%, while for the second individual, it was 83.33%. This indicates a significant increase in cognitive regulation of positive emotion for all three individuals. However, in terms of cognitive regulation of negative emotion, the PND rate was 100% for all three individuals, reflecting a significant decrease in cognitive regulation of negative emotion in all cases.

Conclusion: These findings indicate that the combination of cognitive emotion regulation training and mindfulness-based self-confidence training can significantly improve emotion regulation and self-regulation abilities in stutterers.

Keywords: Cognitive emotion regulation training, Emotion regulation, Mindfulness, Self-confidence, Stuttering

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***Corresponding Author:**
Department of Psychology, Shiraz Branch, Islamic Azad University, Shiraz, Fars, Iran.
yasamanalipour839@gmail.com
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Introduction

Developmental stuttering is a neurodevelopmental disorder where repetition, prolongation, or blocking of words disrupts speech fluency, often caused by neurological, genetic, or familial factors (1). It manifests as pauses, repetitions, prolongations, and physical symptoms like blinking or neck tension, leading to negative stereotypes such as shyness or anxiety (2). Affecting about 8% of adults, predominantly males (4:1), stuttering is linked to emotional and behavioral challenges impacting communication skills (3). Greater stuttering severity correlates with higher social anxiety levels (4), and it negatively affects job performance, satisfaction, and identity formation at work (5).

People who stutter often show higher anger and frustration during complex tasks but experience positive emotions during enjoyable activities, reflecting struggles in emotion regulation that, if unmanaged, can result in psychological issues (6). Emotion is regulation-critical for mental health and involves managing emotional responses effectively. Individuals who stutter face more difficulties in this area, leading to worsened stuttering under stress (7), higher emotional reactivity, and greater emotion regulation challenges than non-stutterers (8). Research also indicates higher experiential avoidance among them (7).

Stuttering reduces quality of life, increases mental health issues, impairs work performance, and fosters social isolation by promoting feelings like shyness, fear, and low self-esteem (9). Given its prevalence across cultures and social groups, effective treatments are essential. One promising approach combines cognitive emotion regulation training with mindfulness. Cognitive emotion regulation enhances emotional management and psychological health (10), while mindfulness fosters self-acceptance, reduces stress, and improves communication and self-confidence (11). Integrating both can synergistically improve emotion regulation and speech fluency (12). Studies affirm the effectiveness of mindfulness in boosting resilience and self-confidence (13) and of cognitive emotion regulation in enhancing emotional adjustment and positive emotions in educational contexts (14). Furthermore, Raugh et al. demonstrated the role of mindfulness in strengthening emotion regulation strategies (15). Stuttering significantly affects quality of life, mental health, and social interactions, highlighting the need for effective treatment strategies to improve these areas (9). Given its prevalence across various societies and the psychological and social challenges it imposes, comprehensive interventions are essential to better address this condition. Despite the widespread impact, no prior study has investigated the combined effectiveness of cognitive emotion regulation training and mindfulness-based self-confidence training in enhancing emotional regulation among adults who stutter. This gap underscores the necessity for further research, and the present study aims to fill this gap by examining the effects of integrating these two approaches on emotional regulation and stuttering reduction in adults who stutter.

Materials and Methods

The current study utilized a single-subject experimental design (A-B-C design) that included three baselines, four intervention phases, and two follow-up phases. The statistical population consisted of adult men and women who stutter and sought treatment at speech therapy clinics in Shiraz, Iran. The sample size comprised three individuals - one woman and two men with stuttering who had sought treatment in the study area between July and September 2023. These participants were randomly chosen to begin the baseline phase. The variables of interest were measured and recorded during the baseline phase (phase A) and then during the intervention phase (phase B). The variables were repeatedly assessed throughout the study, with additional evaluations conducted one month and two months post-intervention (phase C). Single-subject experimental designs do not incorporate a control group; each participant's baseline data acts as their control. In this study design, the participant acts as both the subject and the control, allowing researchers to analyze the effect of the independent variable (a combination of cognitive emotion regulation training and mindfulness-based confidence enhancement) by comparing the variable of interest before and after its introduction. This approach involves comparing responses before and after administering the independent variable for each participant (16).

The inclusion criteria included being a minimum of 25 years old, having the required physical and mental health for participating in

research training sessions, possessing an official clinical record related to stuttering, giving informed consent, and not having previously taken part in similar training programs. Exclusion criteria consisted of having any condition hindering regular attendance at training sessions, participating in other treatment programs simultaneously, and failing to attend training sessions (more than one session in-person), resulting in dropout from the study. The research process began with obtaining the necessary approval from the university and then collaborating with a speech therapy clinic in Shiraz, with the coordination of the university professors. After this, a post was shared on the social media accounts of clinic to invite potential participants. Candidates who met the initial criteria were selected based on the information submitted. The researcher ultimately chose seven participants, deciding on a larger sample size to address potential sample loss.

During the initial interview at a stuttering treatment center office, clients were briefed on research objectives and ethical principles while addressing any inquiries they may have had. Screening occurred during this phase to exclude individuals who did not meet study criteria, such as those unable to commit to training sessions. Some participants opted out of the study, leaving the researchers with three selected individuals. A pre-test was then conducted using a research tool to gather information from the chosen individuals. Afterward, the attendees were ready for the training program, consisting of six 90-minute sessions that took place two times a week at the center. The training focused on cognitive emotion regulation and mindfulness to enhance self-confidence, supplemented by at-home activities (17). A table overviewing the intervention sessions is included for reference—ethical considerations involved obtaining informed consent from participants and prioritizing the confidentiality of their information.

Research instruments

A) Cognitive Emotion Regulation Questionnaire (CERQ): Garnowski created a self-report questionnaire in 2002 to measure cognitive emotion regulation in individuals (18). The questionnaire consists of 36 items rated on a 5-point Likert scale. It includes nine main factors, with research in Iran identifying seven (19). These factors include self-blame (3 questions), other-blame (4 questions), rumination (5 questions), catastrophizing (4 questions), acceptance (4 questions) as negative factors, and positive refusing (8 questions) and positive reappraisal (4 questions) as positive factors. The questionnaire calculates two main factors: positive and negative cognitive emotion regulation. In Iran, the Cronbach's alpha coefficient for this scale was 0.89 (20). The researcher found Cronbach's alpha coefficients of 0.74 and 0.77 for positive and negative cognitive regulation factors, respectively.

Table 1. Summary of cognitive emotion regulation therapy protocol with mindfulness-based on increasing self-esteem

Session	Content
Overall goals:	- Improve cognitive emotion regulation in people who stutter - Enhance mindfulness to decrease stress and anxiety from stuttering - Boost self-confidence and self-acceptance in adults who stutter - Decrease negative emotions like shame and social anxiety in social situations
First	Recognizing emotional patterns and identifying negative thoughts Objective: Recognizing the automatic thoughts and feelings associated with stuttering Activity: - Presenting automatic negative thoughts and the emotions associated with them - Engaging in the identification of emotions and unhelpful thoughts during social interactions Exercise: Documenting challenging circumstances and the pessimistic thoughts that come with them
Second	Building familiarity and establishing a secure environment Objective: Getting acquainted and establishing a feeling of safety Presenting the idea of cognitive emotion regulation and mindfulness Welcome and introduce the therapist

	Explanation of stuttering and its impact on emotions Introducing the idea of cognitive emotion regulation, like cognitive restructuring Activity: Focusing on breathing Exercise: Record emotions and ideas connected to stuttering over the course of the week
Third	Cognitive restructuring Objective: Substituting pessimistic thoughts with optimistic and productive thoughts Activity: - Cognitive restructuring technique training - Examine irrational thoughts correlated to stuttering -Writing alternative thoughts Exercise: - Apply cognitive restructuring in actual circumstances
Fourth	Presenting the concept of mindfulness, self-acceptance, and effective communication skills Objective: Increase self-acceptance and decrease negative criticisms Enhance communication abilities to improve social relationships Activity: - Instruct on the idea of mindfulness and accepting without judgment - Engage in body scanning exercises to enhance awareness of the body - Educate on active listening and methods for expressing oneself - Participate in group activities to improve communication skills Exercise: Engage in daily body scanning exercises Enhance communication skills by practicing in actual situations
Fifth	Emotion regulation by using mindfulness and dealing with social obstacles Objective: Develop emotional regulation skills with mindfulness techniques Gradually face anxiety-provoking situations Activity: - Practice being mindful by focusing on your senses - Use mindfulness techniques to cope with social anxiety - Recognize social difficulties connected to stuttering - Design a gradual exposure plan Exercise: Practice being present in your daily life Implement the initial steps of gradual exposure
Sixth	Building self-confidence, practicing and improving skills, and setting goals for the future Objectives: Enhancing self-acceptance and confidence Reviewing and strengthening skills Ending treatment and making a plan for ongoing improvement Activity: Examining beliefs about self-confidence and stuttering Identifying strengths and successes Going over concepts and techniques Sharing group experiences Reviewing progress and achievements Creating a long-term plan for skill practice Exercises: Create a list of strengths and accomplishments Keep using the techniques you have learned Keep a daily journal to monitor your practice and progress

We utilized descriptive statistics such as mean, median, range, stability envelope, range of stability envelope, relative level, and absolute level. Additionally, between-condition, within-condition, and graphical analysis methods were employed. We analyzed data using SPSS version 27 and Excel software.

Results

The researchers gathered data from participants in three baselines, four sessions of intervention, and two follow-up sessions. Initially, the researchers analyzed the participants' demographic characteristics (Table 2).

This research centered on examining three individuals with a stuttering condition. Likewise, the scores of each individual were analyzed independently in Table 3. Figures 1 to 7 present the trend of changes in negative and positive emotions.

Table 2. Demographic characteristics

Participant	Age	Gender	Educational level	Mental health status	Type of stuttering
First	31	Male	Bachelor's degree	No psychiatric problems of any kind	Chronic stuttering: started from childhood and continued until adulthood.
Second	29	Female	Diploma	No psychiatric problems of any kind	Chronic stuttering: started from childhood and continued until adulthood.
Third	33	Male	Bachelor's degree	No psychiatric problems of any kind	Acquired stuttering: developed in adolescence and youth.

Table 3. The scores of the pre-test, intervention, and follow-up stages

	Participant	Baseline 1	Baseline 2	Baseline 3	Session 1	Session 2	Session 3	Session 4	Follow-up 1	Follow-up 2
The scores of positive emotions	1	49	49	51	52	54	55	57	59	60
	2	49	52	47	53	52	56	56	56	57
	3	50	51	51	54	57	55	57	59	60
The scores of negative emotion	1	65	64	61	60	59	55	54	51	50
	2	66	64	65	61	59	56	53	51	50
	3	64	65	65	59	58	59	54	53	51

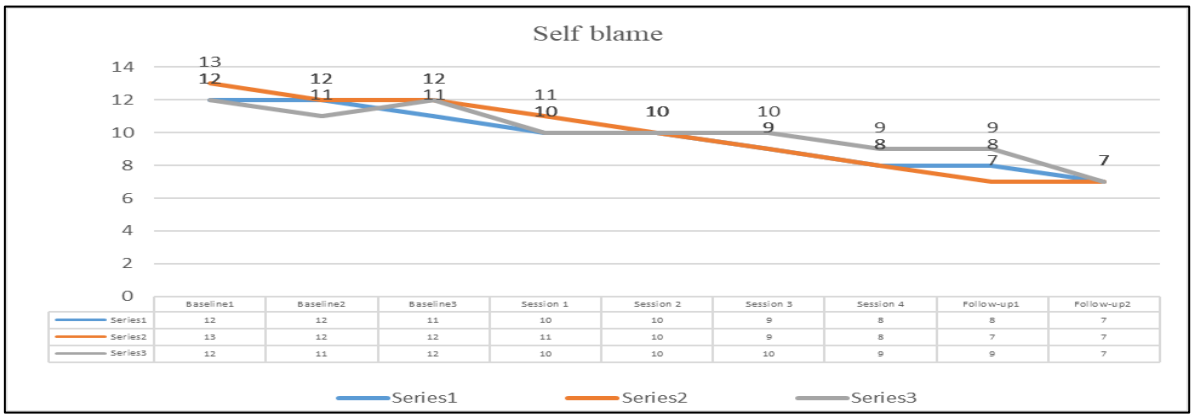

Figure 1. Examining the trend of changes in self-blame variable

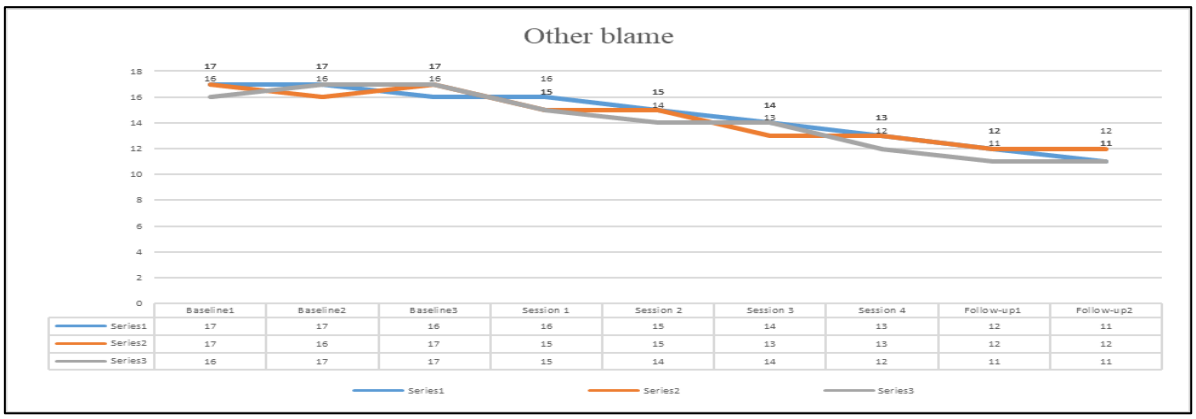

Figure 2. Examining the trend of changes in other-blame variable

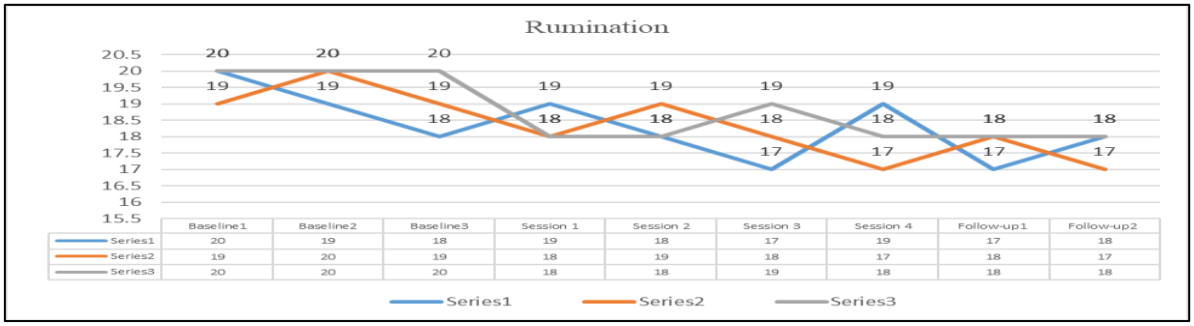

Figure 3. Examining the trend of changes in rumination variable

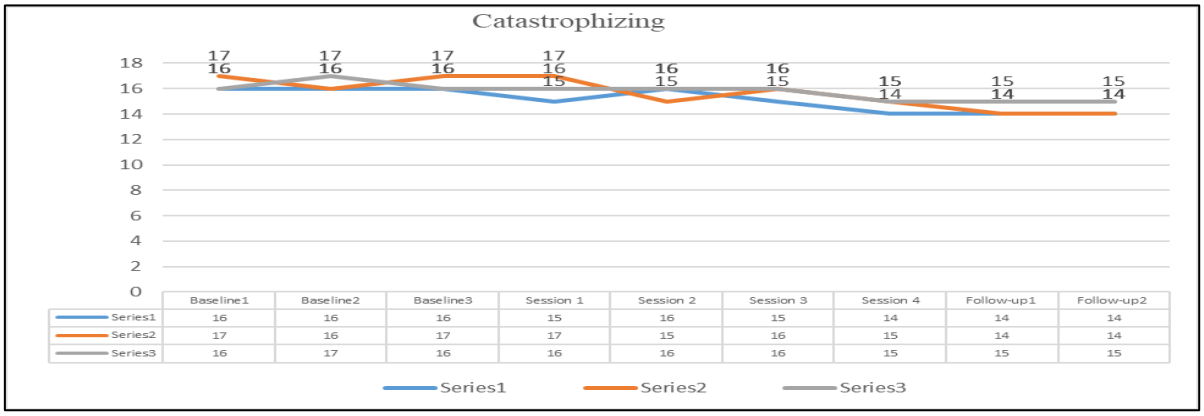

Figure 4. Examining the trend of changes in catastrophizing variable

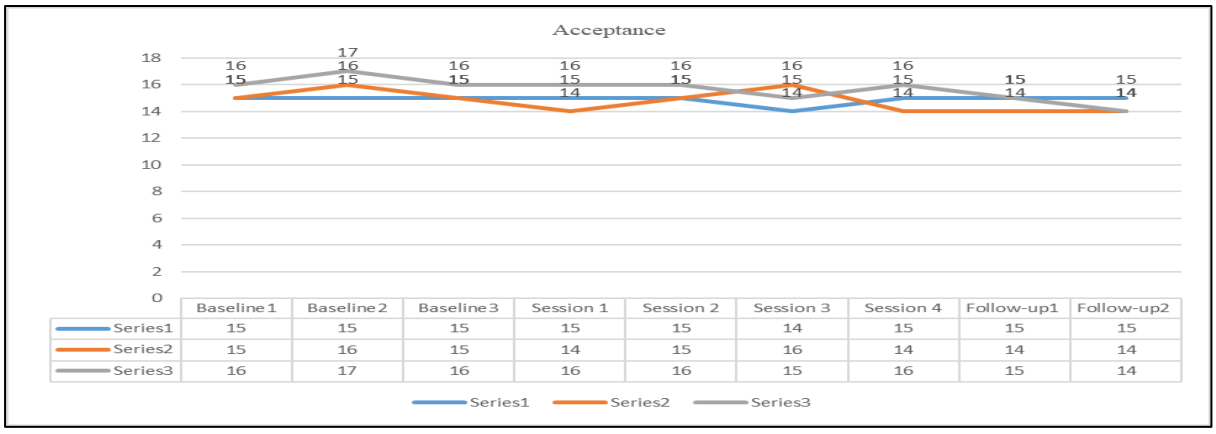

Figure 5. Examining the trend of changes in acceptance variable

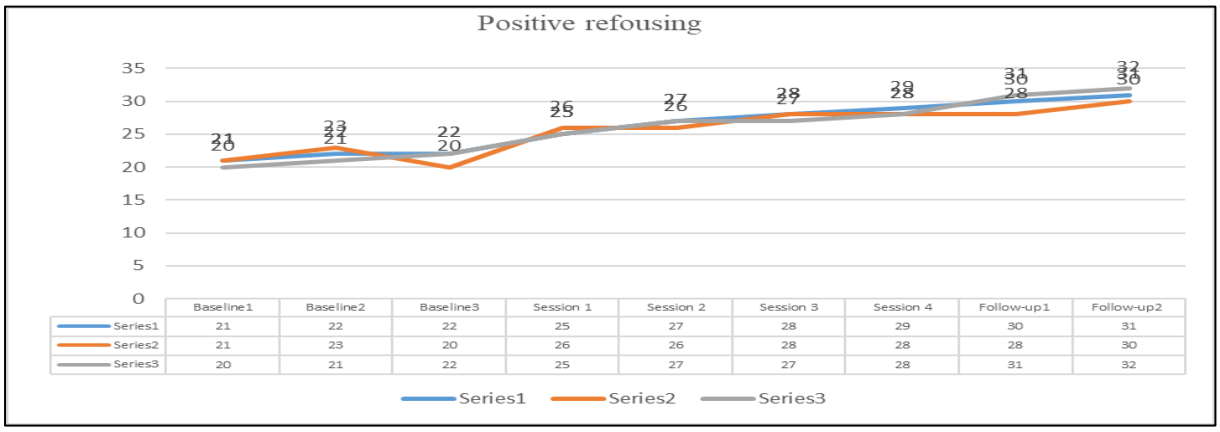

Figure 6. Examining the trend of changes in positive refocusing variable

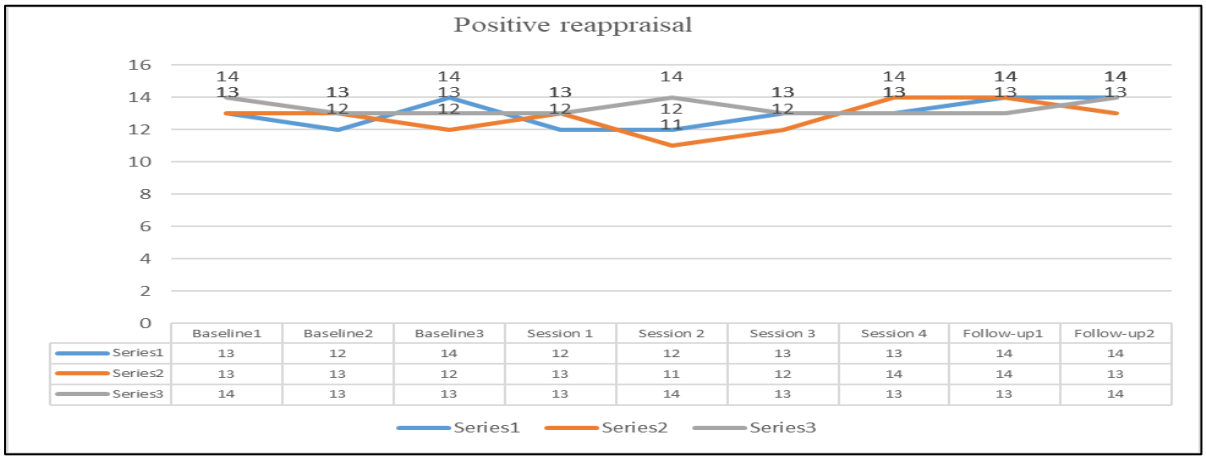

Figure 7. Examining the trend of changes in positive reappraisal variable

Likewise, Figure 8 shows that cognitive regulation of positive emotions increased in the follow-up stages compared to the pre-test stage. Concurrently, negative emotions decreased in the follow-up stages compared to the pre-test stage (Figure 9).

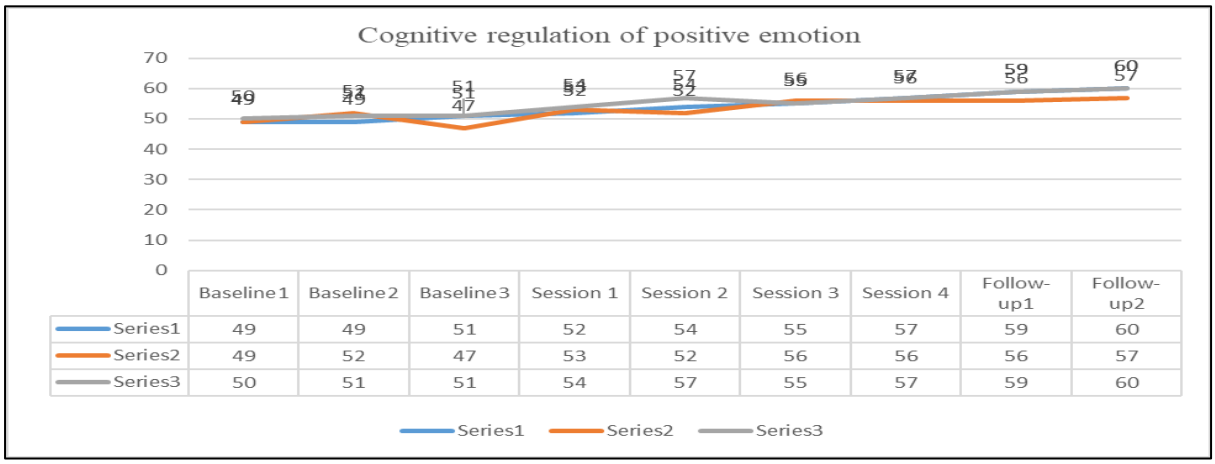

Figure 8. Examining the trend of changes cognitive regulation of positive emotion variable

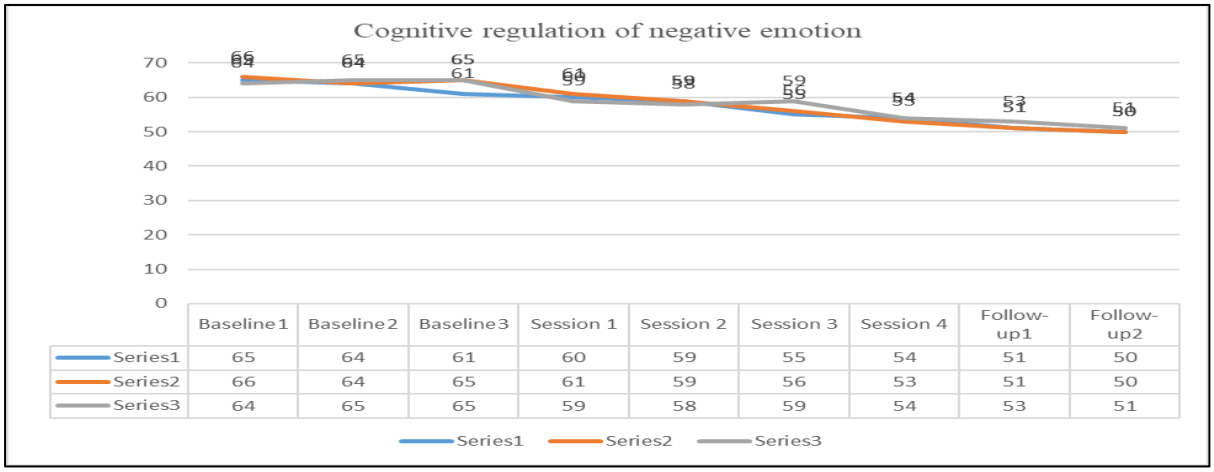

Figure 9. Examining the trend of changes in cognitive regulation of negative emotion variable

The researchers analyzed the within-condition analysis presented in Table 3. For each scenario, the researchers determined the mean, median, range of variability, and stability envelope.

Table 3. Results of within-condition analysis

		Baseline			Intervention			Follow-up		
	Participant	1	2	3	1	2	3	1	2	3
Cognitive regulation of positive emotion	Mean	49.6	49.3	50.6	54.5	54.2	55.7	59.5	56.5	59.5
	Median	49.0	49.0	51.0	54.5	54.5	56.0	59.5	56.5	59.5
	Range	2	5	1	5	4	3	1	1	1
	Stability envelope	9.8	9.8	10.2	10.9	10.9	11.2	11.9	11.3	11.9
	Range of stability envelope	39.2-58.8	39.2-58.8	40.8-61.2	43.6-65.4	43.6-65.4	44.8-67.2	47.6-71.4	45.2-67.8	47.6-71.4
	Relative level	1	-0.5	2	3	2	0.5	-	-	-
	Absolute level	2	-2	1	5	3	3	1	1	1
Cognitive regulation of negative emotion	Mean	63.3	65.0	64.6	57.0	57.2	57.5	50.5	50.5	52.0
	Median	64.0	65.0	65.0	57.0	57.5	58.5	50.5	50.5	52.0
	Range	4	2	1	6	8	5	1	1	2
	Stability envelope	12.8	13.0	13.0	11.4	11.5	11.7	10.1	10.1	10.4
	Range of stability envelope	51.2-76.8	52.0-78.0	52.0-78.0	45.6-68.4	46.0-69.0	46.8-70.2	40.4-60.6	40.4-60.6	41.6-62.4
	Relative level	-2	-2	-2.5	-5	-3	-2	-	-	-
	Absolute level	-4	-1	1	-6	-8	-5	-1	-1	-2

The mean is calculated by dividing the total data by the number of entries. Calculating the median involves arranging the data from lowest to highest, with the middle data point representing the median. The range of variation is the difference between the lowest and highest data points. The size of the stability compartment is typically 20 or 25 percent of the median. To determine the stability compartment above and below the median, one can calculate by adding and subtracting 20% of the median from the median itself. The relative change in the mean is determined by comparing the mean of the first and second halves of the data, while the absolute change is based on the difference between the first and last data points in each situation. In the intervention and follow-up conditions for cognitive regulation of positive emotion, the data shows an increasing trend, while for negative emotion, there is a decreasing trend. The data is considered stable based on the stability envelope. The researchers examined the between-condition analysis in Table 4.

Table 4. Results of between-condition analysis

		Participant 1	Participant 2	Participant 3
Cognitive regulation of positive emotion	Change of relative position between two positions	3	4	3
	Absolute style change between two positions	*6*	6	3
	Change the middle style between two positions	5.5	5.5	5
	Change in median between two positions relative to follow-up	5	2	3.5
	Mean change between two positions	4.8	4.9	5.08
	Mean change between two conditions relative to follow-up	5	2.25	3.75
	Percentage of non-overlapping data (PND)	6 (%100)	5 (%83.33)	6 (%100)
	Percentage of overlapping data (POD)	0 (%0)	1 (%16.66)	0 (%0)
Cognitive regulation of negative emotion	Change of relative position between two positions	-3	-5.5	-3.5
	Absolute style change between two positions	-7	-4	-6
	Change the middle style between two positions	-7	-7.5	-6.5
	Change in median between two positions relative to follow-up	-6.5	-7	-6.5
	Mean change between two positions	-6.33	-7.75	-7.16
	Mean change between two conditions relative to follow-up	-6.5	-6.75	-5.5
	Percentage of non-overlapping data (PND)	6 100)	6 (%100)	6 (%100)
	Percentage of overlapping data (POD)	0 (%0)	0 (%0)	0 (%0)

To determine the PND, the first step involved identifying the highest data point during the baseline period. Next, the number of data points exceeded this maximum value was recorded. The intervention focused on enhancing Cognitive regulation of positive emotion, hence the emphasis on higher data points. For calculating the POD, the initial step was to identify the highest data point during the baseline phase. Subsequently, the number of data points that fell below this maximum value was determined. In the context of the cognitive regulation of the positive emotion variable, the PND rate was 100% for the first and third individuals and 83.33% for the second individual. This indicated a significant improvement in cognitive regulation of positive emotion for all three cases. However, since the objective was to decrease cognitive regulation of negative emotion, the smallest data point during the baseline phase was identified. During the intervention phase, calculations were done for data points below the minimum threshold. In all three participants, there was a notable decrease in the variable of negative emotion, with an observed PND rate of 100%.

Discussion

The main goal of this research was to examine how effective cognitive emotion regulation training, when combined with mindfulness-based self-confidence enhancement, is in improving emotion regulation in adults who stutter. According to the findings, the therapeutic technique used in this research decreased negative self-regulation factors such as self-blame, other blame, rumination, and catastrophizing while also increasing positive self-regulation aspects like acceptance, positive refusing, and positive reappraisal.

The current findings showed that combining cognitive emotion regulation training with mindfulness-based self-confidence training enhances positive self-regulation and reduces negative self-regulation, which aligns with previous research (13-15,21-23). Oguntuase and Sun found that mindfulness training improved resilience, self-confidence, and emotion regulation in elite football players in China using self-report questionnaires and behavioral assessments (13). Abbasiaval et al. demonstrated that cognitive emotion regulation and social competence training enhanced emotional regulation in male students in Iran, assessed through emotional regulation scales (14). Raugh and Strauss integrated mindfulness with the emotion regulation model, showing improved outcomes with combined mindfulness practices in the United States, using self-report scales and behavioral observations (15). Najafi et al. reported that positive mindfulness therapy increased emotional capital and meta-emotions in Iranian women with generalized anxiety disorder, measured by self-report scales (21). Shokri et al. compared mindfulness-based cognitive therapy and cognitive emotion regulation training in Iranian mothers of aggressive students (22). Aghamohammadi et al. found that an adapted mindfulness-based stress management program reduced stress and improved emotion regulation in Iranian midwives (23).

These interventions help individuals improve their emotional regulation skills by enhancing cognitive emotion regulation and mindfulness. Cognitive emotion regulation techniques, such as positive reappraisal and focusing on long-term goals, help individuals develop new perspectives on stressful events, reducing negative emotions and promoting more positive experiences (10).

These techniques allow individuals to process emotions more effectively, reducing impulsive reactions that could otherwise exacerbate their emotional states (25). Mindfulness, in conjunction with cognitive emotion regulation, aids individuals in observing their emotions non-judgmentally and cultivating present-moment awareness. This process enables individuals to accept their experiences without impulsivity, leading to better emotional understanding and regulation. By fostering greater self-awareness, mindfulness helps individuals manage their emotions more effectively, enhancing their ability to cope with stress and preventing negative emotional reactions (24).

Together, these approaches are particularly beneficial for individuals with stuttering, who often face psychological pressure in social and communication settings. These interventions empower individuals to adopt healthier coping strategies, manage emotional responses, reduce anxiety, boost self-esteem, and improve overall well-being (26). Enhancing emotional self-regulation makes individuals more resilient in facing challenges, leading to greater satisfaction and mental health (27). This combined approach ultimately builds psychological resilience,

helping individuals face difficulties more effectively and improving their emotional regulation, which is crucial for managing social interactions and stressful situations (12). When analyzing the findings, it is crucial to consider the limitations of the present study. One limitation of this study was the difficulty in obtaining a representative sample, as recruiting adults who stutter proved challenging. Future studies could address this by collaborating with speech therapy clinics and utilizing social media platforms. The small sample size also limits generalizability, which could be improved by increasing the sample size or combining results with similar studies. The severity of stuttering may have influenced the outcomes, so grouping participants by severity could yield more precise results. Self-reported data might not fully capture participants' experiences, necessitating objective measures like independent assessments. Uncontrolled factors such as family support and environmental stress should be considered in future research. Participant motivation declined over time, which could be addressed with more engaging sessions and incentives. The results may not apply to all populations, so studies with more diverse groups are needed. Irregular attendance and cultural factors affecting mindfulness acceptance also posed challenges, suggesting the need for flexible scheduling and culturally tailored approaches. Additionally, demographic factors like marital status and employment, which could impact results, were not considered.

Conclusion

The results of the current research suggest that combining cognitive emotion regulation training and mindfulness is effective in enhancing self-confidence and improving emotion regulation and self-regulation in individuals with stuttering. This therapeutic approach can be valuable in helping individuals manage their emotions and boost their self-confidence, particularly those who struggle with communication in social settings. These findings could be beneficial in developing counseling programs and workshops for individuals dealing with communication disorders or self-confidence issues. The study findings also inform treatment plans for individuals with stuttering, as combining mindfulness and cognitive emotion regulation techniques can aid in improving emotion regulation and self-confidence in conjunction with speech therapy.

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Conflict of Interest

None declared.

Funding

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Ethical Considerations

The Ethics Review Board of Shiraz Branch, Iran, approved the present study. Also, written informed consent was obtained from the participants.

Code of Ethics

IR.IAU.SHIRAZ.REC.1403.231

Authors' Contributions

Data gathering: first author; concept and design: second and third authors; manuscript drafting: fourth author; research supervision and final writing: fifth author; statistical analysis and final editing: all authors.

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