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# Comparing the Effectiveness of Forgiveness Training and Mindfulness Training on Cognitive Flexibility and Communication Skills in Individuals with Substance Use Disorders

Alireza Nakhaee[1], Ali Arab[2]*, Masoud Rostami[3]

1. PhD student, Department of Psychology, Zahedan Branch, Islamic Azad University, Zahedan, Iran.
2. Associate Professor, Department of Psychology, University of Sistan and Baluchestan, Zahedan, Iran (Corresponding Author).
3. Assistant Professor, Department of Psychology, University of Sistan and Baluchestan, Zahedan, Iran.

*** Corresponding author email address**: Aliarab@edpsy.usb.ac.ir

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A B S T R A C T

**Purpose:** The primary objective of this study was to compare the effectiveness of forgiveness training and mindfulness training on cognitive flexibility and communication skills in individuals with substance use disorders (SUDs).

**Methodology:** A quasi-experimental design with pre-test, post-test, and follow-up measurements was employed. The study involved 45 participants with SUDs, randomly assigned to three groups: a forgiveness training group, a mindfulness training group, and a control group, with 15 participants in each group. Both interventions were delivered over 12 weeks, with cognitive flexibility and communication skills assessed at three time points using validated questionnaires. Data were analyzed using repeated measures ANOVA, with Bonferroni post-hoc tests to identify significant differences between groups and over time.

**Findings:** The repeated measures ANOVA indicated significant effects of group membership on cognitive flexibility ($F(2, 42) = 17.140$, $p < .001$, $\eta^2 = .449$) and communication skills ($F(2, 42) = 37.301$, $p < .001$, $\eta^2 = .640$). Post-hoc analysis revealed that both the forgiveness and mindfulness groups showed significant improvements in cognitive flexibility from pre-test to post-test (mean difference = -7.200, $p < .001$) and from pre-test to follow-up (mean difference = -7.244, $p < .001$), with no significant decline from post-test to follow-up (mean difference = -0.044, $p = 1.00$). For communication skills, significant improvements were also observed in both intervention groups from pre-test to post-test (mean difference = -17.311, $p < .001$) and pre-test to follow-up (mean difference = -17.533, $p < .001$), with no significant change from post-test to follow-up (mean difference = -0.222, $p = 1.00$). Mindfulness training demonstrated slightly higher effectiveness in improving communication skills compared to forgiveness training.

**Conclusion:** Both forgiveness and mindfulness training significantly improved cognitive flexibility and communication skills in individuals with SUDs, with mindfulness training showing slightly greater effectiveness, particularly in communication skills. These findings suggest that integrating these interventions into treatment programs for SUDs can enhance critical cognitive and interpersonal functions, contributing to successful recovery and long-term well-being.

***Keywords:*** *Substance Use Disorders, Mindfulness Training, Forgiveness Training, Cognitive Flexibility, Communication Skills, Recovery Interventions*

## 1. Introduction

Substance use disorders (SUDs) present a significant challenge to both individuals and society due to the profound impact they have on mental, emotional, and physical health. Individuals with SUDs often experience deficits in cognitive flexibility, which is the ability to adapt thinking and behavior in response to changing environments and demands. Cognitive flexibility is crucial for effective problem-solving and coping strategies, particularly in high-stress situations (Villalba et al., 2019). Moreover, communication skills are frequently impaired in this population, further complicating their social interactions and ability to seek and maintain supportive relationships (Banerjee et al., 2017; Enayati Shabkolai et al., 2023; Goshayeshi et al., 2024).

Mindfulness-based interventions (MBIs) have gained widespread recognition as effective tools for improving various psychological outcomes, including cognitive flexibility and communication skills. Mindfulness, defined as the non-judgmental awareness of the present moment, has been shown to enhance psychological resilience and reduce stress (Galla et al., 2015; Shoghi et al., 2023). MBIs are particularly relevant for individuals with SUDs, as these individuals often struggle with impulsivity and emotional dysregulation—areas that mindfulness training directly targets (Chin et al., 2019). The practice of mindfulness has been found to increase cognitive flexibility by promoting a more adaptive mental framework, which is essential for navigating the challenges of recovery from substance use (Hassed, 2021).

A growing body of research supports the integration of mindfulness into therapeutic practices for SUDs. For example, a study by Baer et al. (2012) demonstrated that participation in an eight-week mindfulness-based stress reduction (MBSR) program led to significant reductions in perceived stress and improvements in mindfulness, which were associated with better coping strategies in individuals with substance use issues (Baer et al., 2012). Similarly, Carmo et al. (2022) found that a mindfulness-based intervention significantly improved cognitive flexibility and emotional regulation in male prisoners, a population with high rates of substance abuse (Carmo et al., 2022). These findings suggest that mindfulness training can be an effective component of treatment programs for SUDs, contributing to improved cognitive and emotional outcomes.

In addition to cognitive benefits, mindfulness training has been shown to enhance communication skills. Effective communication is critical for maintaining social support networks, which are vital for recovery from SUDs. Research by Kou et al. (2022) indicated that mindfulness training improved supportive communication and emotional intelligence among nursing students, highlighting the broader applicability of mindfulness beyond clinical populations (Kou et al., 2022). Furthermore, Chen et al. (2021) reported that mindfulness practices, including loving-kindness meditation, enhanced doctors' empathy and communication skills, which are essential for patient care but also relevant in peer and support group settings for individuals with SUDs (Chen et al., 2021).

Forgiveness training, though less commonly studied than mindfulness, also holds potential for enhancing cognitive flexibility and communication skills in individuals with SUDs. Forgiveness is a process that involves releasing resentment and negative emotions toward oneself or others, which can be particularly challenging for individuals struggling with addiction. The capacity to forgive has been linked to better mental health outcomes, including reduced stress, improved emotional regulation, and enhanced interpersonal relationships (Aggs & Bambling, 2010). These benefits are crucial for individuals with SUDs, who often carry significant emotional burdens related to their addiction and its consequences.

The therapeutic potential of forgiveness training is supported by research that highlights its role in improving psychological well-being. For instance, a study by Haro et al. (2017) found that participants who engaged in forgiveness training reported significant reductions in anxiety and depressive symptoms, along with improvements in cognitive flexibility (Haro et al., 2017). These findings align with the theoretical underpinnings of forgiveness, which suggest that letting go of negative emotions can free up cognitive resources, allowing for more adaptive and flexible thinking (Barnhill et al., 2020).

In the context of communication skills, forgiveness can play a pivotal role in repairing and strengthening relationships, which are often damaged by substance use. Effective communication is not only about conveying information but also about managing emotions and maintaining positive interpersonal interactions. Forgiveness training can help individuals with SUDs develop the emotional resilience and empathy needed to communicate more effectively, thereby improving their ability to build and sustain supportive relationships (Baby et al., 2018).

The current study aims to build on this existing body of research by comparing the effectiveness of forgiveness


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training and mindfulness training on cognitive flexibility and communication skills in individuals with SUDs. The study is grounded in the theoretical frameworks of mindfulness and forgiveness, which emphasize the importance of present-moment awareness and emotional regulation in achieving psychological well-being. By targeting these areas, the interventions are expected to produce significant improvements in cognitive flexibility and communication skills, which are critical for successful recovery from substance use. Therefore, this study aimed to compare the effectiveness of forgiveness training and mindfulness training on cognitive flexibility and communication skills in individuals with substance use disorders (SUDs).

## 2. Methods and Materials

### *2.1. Study Design and Participants*

The present study was designed to compare the effectiveness of forgiveness training and mindfulness training on cognitive flexibility and communication skills among individuals with substance use disorders. To accomplish this objective, a quasi-experimental design was utilized, which included a pre-test, post-test, and follow-up phase with an unequal control group.

The research population comprised all individuals with substance use disorders residing at the Niatek Rehabilitation Center in Zabol in 2020, totaling 100 individuals. From this population, 45 volunteers were selected as the sample based on their willingness to participate and their scores on initial screening questionnaires, which were below the community average. These 45 participants were then randomly assigned to three groups: two experimental groups and one control group, each consisting of 15 members. The sample was selected using convenience sampling, adhering to established inclusion and exclusion criteria.

The inclusion criteria required participants to obtain informed consent from both themselves and their families, not to be undergoing any other form of treatment or educational intervention during the study, and to attend all sessions without any absences. Additionally, participants were required to score at least 1.5 standard deviations above the mean on the research questionnaires. The exclusion criteria were defined as receiving any psychological intervention or counseling during the study period and missing two or more sessions.

For the intervention, one experimental group received forgiveness training over 12 sessions, each lasting 60 minutes and conducted weekly. The other experimental group underwent mindfulness training, which was delivered over 8 weekly sessions, each also lasting 60 minutes. The control group did not receive any intervention during this period. To assess the effectiveness of the interventions, pre-tests and post-tests were conducted using specific questionnaires designed to measure cognitive flexibility and communication skills. A follow-up assessment was also conducted one month after the interventions to evaluate the long-term effects.

### *2.2. Measures*

#### *2.2.1. Cognitive Flexibility*

The Cognitive Flexibility Inventory (CFI) is a psychological assessment tool developed by Dennis and Vander Wal in 2010 to measure an individual's cognitive flexibility, which is the ability to switch between thinking about two different concepts and to think about multiple concepts simultaneously. This inventory is particularly valuable in both clinical and non-clinical settings for assessing progress in cognitive-behavioral therapy (CBT) and other psychological interventions. The CFI consists of 20 items, each rated on a seven-point Likert scale ranging from 1 (completely disagree) to 7 (completely agree). This scale evaluates the respondent's cognitive adaptability and their ability to consider alternative solutions, control their thoughts and behaviors, and adjust their cognitive strategies to manage challenges effectively. The CFI is divided into three subscales: Alternative Thinking, Control, and Human Behavior Alternatives. The Alternative Thinking subscale measures the ability to generate multiple alternative solutions to problems. The Control subscale assesses the perceived control over one’s thoughts and emotions. The Human Behavior Alternatives subscale focuses on recognizing different behaviors that can be applied in various situations. Some items on the CFI are reverse-scored to ensure accurate measurement of cognitive flexibility. The total score is derived by summing the scores from all 20 items, with higher scores indicating greater cognitive flexibility. The maximum possible score is 140, and the minimum is 20 (Enayati Shabkolai et al., 2023; Pourjaberi et al., 2023). In this study, the reliability of the CFI was confirmed with a Cronbach’s alpha of 0.77, demonstrating acceptable internal consistency.


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### 2.2.2. *Communication Skills*

The Queendom Communication Skills Questionnaire, developed by Queendom in 2004, is a comprehensive tool used to assess communication skills in adults. Effective communication is essential for maintaining interpersonal relationships, and this questionnaire is designed to measure how well individuals express themselves, listen, and respond in various social contexts. The questionnaire consists of 34 items, each rated on a five-point Likert scale ranging from 1 (never) to 5 (always). These items capture a wide range of communication behaviors, including verbal and non-verbal communication, listening skills, emotional regulation during conversations, and the ability to resolve conflicts constructively. The items in the Queendom Communication Skills Questionnaire cover several dimensions of communication. Expressiveness is assessed through items that evaluate how clearly and effectively an individual can express their thoughts and feelings. Listening skills are evaluated by items that measure the ability to actively listen and understand others' perspectives. Conflict resolution is measured by items that assess the ability to manage and resolve interpersonal conflicts constructively. The total score is calculated by summing the responses across all items, with higher scores indicating better communication skills. The questionnaire has been validated in various studies, with Cronbach's alpha for the full scale reported at 0.69, indicating acceptable internal consistency (Radpour et al., 2024). In this study, the reliability was further confirmed with a Cronbach's alpha of 0.73.

## 2.3. *Interventions*

### 2.3.1. *Mindfulness Training*

The mindfulness training intervention was designed to enhance cognitive flexibility and communication skills by teaching participants mindfulness techniques that promote present-moment awareness and emotional regulation. The intervention consisted of 8 weekly sessions, each lasting 60 minutes. The mindfulness training aimed to help participants develop a non-judgmental awareness of their thoughts, emotions, and bodily sensations, which is particularly beneficial for individuals with substance use disorders. By cultivating mindfulness, participants were expected to improve their ability to respond to stress, reduce impulsive behaviors, and enhance their communication with others (Carmo et al., 2022; Jones et al., 2020; Lindsay et al., 2018).

The first session introduced the concept of mindfulness, explaining its origins, principles, and benefits. Participants learned about the importance of staying present and fully engaged in the moment, as well as the impact of mindfulness on mental and physical health. The session included a simple breathing exercise to help participants begin to practice mindfulness.

In the second session, participants were guided through a body scan meditation, a foundational mindfulness practice that involves paying close attention to bodily sensations from head to toe. This exercise was intended to help participants develop a greater awareness of their physical state and learn to recognize the connection between their body and mind.

The third session focused on mindful breathing techniques. Participants were taught how to use their breath as an anchor to stay grounded in the present moment, especially during times of stress or emotional turmoil. The session included guided practices that participants could use in their daily lives to enhance their emotional regulation.

In the fourth session, participants explored the practice of mindful observation. This involved paying close attention to everyday objects or experiences, such as sounds or sights, with a fresh perspective and without judgment. The goal was to help participants cultivate a sense of curiosity and openness, which could enhance their cognitive flexibility.

The fifth session introduced the concept of mindfulness in daily activities. Participants were encouraged to integrate mindfulness into routine tasks, such as eating, walking, or washing dishes. The session emphasized the importance of bringing full attention and presence to even the most mundane activities as a way to practice mindfulness throughout the day.

In the sixth session, participants learned about mindfulness of emotions. The facilitator guided them in recognizing and observing their emotions without becoming overwhelmed by them. This session included techniques for acknowledging difficult emotions and responding to them with compassion rather than reacting impulsively.

The seventh session focused on mindful communication. Participants practiced being fully present during conversations, listening deeply, and responding thoughtfully rather than reacting automatically. The session aimed to improve communication skills by fostering a more mindful and empathetic approach to interactions with others.

The final session was dedicated to integrating all the mindfulness practices learned throughout the course. Participants reflected on their progress, discussed how


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mindfulness had impacted their lives, and shared strategies for maintaining their practice after the intervention ended. The session concluded with a final guided meditation, reinforcing the skills developed over the eight weeks.

### *2.3.2. Forgiveness Training*

The forgiveness training intervention was designed to help individuals with substance use disorders develop the capacity to forgive, both themselves and others, as a way to promote psychological healing and improve cognitive flexibility. The intervention consisted of 12 weekly sessions, each lasting 60 minutes. The training was structured to gradually guide participants through the process of understanding forgiveness, recognizing its importance, and applying forgiveness in their own lives. The sessions were based on therapeutic models of forgiveness and aimed to reduce feelings of resentment, anger, and guilt, which are common in individuals with substance use disorders. By cultivating forgiveness, participants were expected to experience improvements in their cognitive flexibility and communication skills (Besharat Garamaleki et al., 2022).

The first session focused on introducing the concept of forgiveness, differentiating it from condoning or excusing harmful behavior. Participants discussed their initial thoughts and feelings about forgiveness, and the facilitator provided an overview of the benefits of forgiveness, particularly in relation to emotional health and relationships. This session aimed to build a foundational understanding and set the stage for the subsequent sessions.

In the second session, participants were encouraged to reflect on their personal experiences with hurt and resentment. They were guided through exercises that helped them identify specific incidents in their lives where forgiveness might be applicable. The session emphasized the importance of acknowledging and expressing the pain associated with these experiences as a necessary step toward forgiveness.

The third session introduced the concept of self-forgiveness. Participants explored how their own actions and decisions, particularly those related to their substance use, had impacted their lives. The session provided tools for recognizing self-blame and offered strategies to begin the process of self-forgiveness, which is often a critical step in recovery.

In the fourth session, participants were introduced to the emotional components of forgiveness, such as empathy and compassion. The facilitator guided them through exercises designed to foster empathy toward those who had wronged them, helping participants understand the perspective of others and the possible reasons behind their actions.

The fifth session focused on the cognitive aspects of forgiveness, particularly on reframing negative thoughts and beliefs related to the offending party or incident. Participants were taught cognitive-behavioral techniques to challenge and change unhelpful thought patterns, which can hinder the forgiveness process.

The sixth session emphasized the importance of making a conscious decision to forgive. Participants were guided through exercises that helped them articulate their decision to forgive, whether it was forgiving someone else or themselves. This session aimed to solidify their commitment to the process of forgiveness.

In the seventh session, participants explored the impact of forgiveness on their personal well-being and relationships. The facilitator highlighted the positive changes that can occur when one forgives, such as reduced stress, improved mental health, and better communication with others.

The eighth session was dedicated to addressing any obstacles or setbacks participants might face in their journey toward forgiveness. The facilitator provided strategies for overcoming common barriers, such as recurring negative emotions or doubts about the forgiveness process.

The ninth session introduced the concept of forgiveness as an ongoing process rather than a one-time event. Participants were encouraged to view forgiveness as a practice that they could continue to cultivate in their daily lives, especially in challenging situations.

In the tenth session, participants discussed how forgiveness could be integrated into their broader life goals, including their recovery from substance use disorders. The session emphasized the role of forgiveness in achieving long-term emotional and psychological well-being.

The eleventh session focused on the social aspects of forgiveness, including how to communicate forgiveness to others and how to seek forgiveness from those they might have wronged. Role-playing exercises were used to practice these skills in a supportive environment.

The final session reviewed the entire forgiveness process and reinforced the key concepts learned throughout the intervention. Participants reflected on their personal growth and shared their experiences with the group. The session concluded with a discussion on how to maintain the practice of forgiveness in their everyday lives after the program ended.


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### 2.4. *Data Analysis*

Data analysis in this study was conducted using both descriptive and inferential statistical methods. Descriptive statistics were used to organize and summarize the data, including the calculation of means, standard deviations, and frequency distributions to describe the sample characteristics and the main variables of interest. For inferential statistics, repeated measures analysis of variance (ANOVA) with a simple mixed design was employed. This statistical method was chosen to assess the effects of the interventions (forgiveness training and mindfulness training) across three measurement points: pre-test, post-test, and follow-up. The repeated measures ANOVA allowed for the evaluation of within-group changes over time as well as between-group differences in outcomes. To further explore significant findings from the ANOVA, the Bonferroni post hoc test was applied, helping to identify specific pairs of groups or time points where significant differences occurred, thus providing a clearer understanding of the effects of the interventions. All statistical analyses were conducted using SPSS software, version 26. This software was selected for its robustness and wide acceptance in psychological research, allowing for comprehensive data analysis and interpretation.

## 3. Findings and Results

The demographic characteristics of the participants in this study showed that out of the 45 individuals with substance use disorders, the majority (53.3%) were aged between 26 and 36 years, followed by 28.8% aged between 37 and 47 years, 15.5% aged between 15 and 25 years, and 2.2% aged between 48 and 58 years. Regarding educational background, 51% of the participants had completed high school, 28.8% had a middle school education, 13.3% had only elementary education, 4.4% had an associate degree, and 2.2% had a bachelor's degree.

Table 1 provides the mean (M) and standard deviation (SD) values for all groups across the different stages of measurement for distress tolerance, absorption, appraisal, and regulation components.

**Table 1**

*Descriptive Statistics*

| Variable | Group | Pre-test Mean (SD) | Post-test Mean (SD) | Follow-up Mean (SD) |
|---|---|---|---|---|
| Cognitive Flexibility | Forgiveness | 65.80 (3.12) | 79.33 (3.58) | 78.67 (7.27) |
| | Mindfulness | 68.07 (3.24) | 76.20 (6.86) | 75.93 (5.32) |
| | Control | 68.07 (2.28) | 68.00 (3.34) | 69.07 (3.54) |
| Communication Skills | Forgiveness | 102.67 (9.29) | 128.73 (6.13) | 128.47 (5.58) |
| | Mindfulness | 109.53 (8.17) | 135.67 (5.15) | 135.93 (5.88) |
| | Control | 108.13 (7.85) | 107.87 (6.92) | 108.53 (6.76) |

Table 1 represents the mean and standard deviation (SD) values for cognitive flexibility and communication skills across the three groups (Forgiveness, Mindfulness, and Control) at the pre-test, post-test, and follow-up stages. For cognitive flexibility, both the Forgiveness and Mindfulness groups showed substantial increases from pre-test to post-test, which were maintained at follow-up. In contrast, the Control group showed little to no improvement. Similarly, for communication skills, the Forgiveness and Mindfulness groups demonstrated marked improvements from pre-test to post-test, with these gains largely sustained at follow-up. The Control group, however, showed no significant change over time.

In the analysis, assumptions of normality, homogeneity of variances, and independence of observations were checked and met for all variables with the sample size of 45 participants. However, the assumption of sphericity was not met, and therefore the Greenhouse-Geisser correction was applied where necessary.

**Table 2**

*ANOVA Results*

| Source of Variation | SS | df | MS | F | p | $\eta^2$ | Power |
|---|---|---|---|---|---|---|---|
| Cognitive Flexibility Between-Groups | 326.894 | 2 | 163.447 | 17.140 | .001 | .449 | 1.00 |



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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Error (Within-Groups) | 400.504 | 42 | 9.536 | | | | |
| Within-Groups (Time) | 1564.859 | 1.968 | 160.795 | 45.274 | .001 | .519 | 1.00 |
| Time × Group Interaction | 832.119 | 1.936 | 414.211 | 12.037 | .001 | .364 | |
| Error (Within-Subjects) | 1451.689 | 82.655 | 17.563 | | | | |
| Communication Skills | | | | | | | |
| Between-Groups | 2724.598 | 2 | 1362.299 | 37.301 | .001 | .640 | 1.00 |
| Error (Within-Groups) | 1534.911 | 42 | 36.522 | | | | |
| Within-Groups (Time) | 9107.126 | 1.176 | 7754.995 | 145.799 | .001 | .776 | 1.00 |
| Time × Group Interaction | 4522.074 | 2.351 | 1923.107 | 36.198 | .001 | .633 | 1.00 |
| Error (Within-Subjects) | 2623.467 | 49.380 | 53.128 | | | | |

The ANOVA results (Table 2) indicated that there was a significant effect of group membership on cognitive flexibility ($F(2, 42) = 17.140$, $p < .001$, $\eta^2 = .449$), suggesting that the interventions had a statistically significant impact on cognitive flexibility. Similarly, the stages of measurement (pre-test, post-test, follow-up) showed a significant effect ($F(1.968, 42) = 45.274$, $p < .001$, $\eta^2 = .519$), as did the interaction between stages and group membership ($F(1.936, 42) = 12.037$, $p < .001$, $\eta^2 = .364$). For communication skills, the ANOVA also showed a significant effect of group membership ($F(2, 42) = 37.301$, $p < .001$, $\eta^2 = .640$), significant stages effect ($F(1.176, 42) = 145.799$, $p < .001$, $\eta^2 = .776$), and a significant interaction effect between stages and group membership ($F(2.351, 42) = 36.198$, $p < .001$, $\eta^2 = .633$).

**Table 3**

*Bonferroni Post-Hoc Test for Time Effects*

| Variable | Comparison | Mean Difference | Standard Error | p-value |
|---|---|---|---|---|
| Cognitive Flexibility | Pre-test vs. Post-test | -7.200 | 0.745 | .001 |
| | Pre-test vs. Follow-up | -7.244 | 0.998 | .001 |
| | Post-test vs. Follow-up | -0.044 | 0.868 | 1.00 |
| Communication Skills | Pre-test vs. Post-test | -17.311 | 1.410 | .001 |
| | Pre-test vs. Follow-up | -17.533 | 1.424 | .001 |
| | Post-test vs. Follow-up | -0.222 | 0.386 | 1.00 |

Table 3 revealed significant improvements from pre-test to post-test and from pre-test to follow-up in both variables ($p < .001$). For cognitive flexibility, the mean difference between pre-test and post-test was -7.200, and between pre-test and follow-up was -7.244, indicating substantial improvements due to the interventions. Similarly, communication skills showed a mean difference of -17.311 between pre-test and post-test, and -17.533 between pre-test and follow-up, demonstrating significant enhancement. There was no significant difference between post-test and follow-up scores in either cognitive flexibility or communication skills ($p = 1.00$), suggesting that the improvements achieved were maintained over time without significant decline.

**Table 4**

*Bonferroni Post-Hoc Test for Group Effects*

| Variable | Comparison | Mean Difference | Standard Error | p-value |
|---|---|---|---|---|
| Cognitive Flexibility | Forgiveness vs. Mindfulness | 1.200 | 1.127 | .572 |
| | Forgiveness vs. Control | 6.222 | 1.127 | .001 |
| | Mindfulness vs. Control | 5.022 | 1.127 | .001 |
| Communication Skills | Forgiveness vs. Mindfulness | -7.889 | 2.067 | .001 |
| | Forgiveness vs. Control | 11.778 | 2.067 | .001 |
| | Mindfulness vs. Control | 18.667 | 2.067 | .001 |

## *4. Reporting Combined Second Post-Hoc Tables*



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Table 4 showed different patterns of significance across the interventions. For cognitive flexibility, there was no significant difference between the Forgiveness and Mindfulness groups ($p = .572$), indicating that both interventions were equally effective in improving cognitive flexibility. However, both the Forgiveness and Mindfulness groups significantly outperformed the Control group ($p < .001$), highlighting the effectiveness of the interventions compared to no treatment.

In contrast, for communication skills, the Mindfulness group showed significantly greater improvements compared to the Forgiveness group ($p < .001$), with a mean difference of -7.889. Both the Forgiveness and Mindfulness groups had significantly higher communication skills scores than the Control group ($p < .001$), with mean differences of 11.778 and 18.667, respectively. This suggests that while both interventions were beneficial, mindfulness training had a more pronounced impact on improving communication skills among participants.

## 5. Discussion and Conclusion

The present study aimed to compare the effectiveness of forgiveness training and mindfulness training on cognitive flexibility and communication skills among individuals with substance use disorders (SUDs). The findings indicated that both interventions significantly improved cognitive flexibility and communication skills, with mindfulness training showing a slightly higher impact on communication skills compared to forgiveness training. These results underscore the potential of these interventions to enhance key psychological and interpersonal functions in individuals with SUDs, contributing to their overall recovery process.

The significant improvement in cognitive flexibility observed in both the forgiveness and mindfulness training groups aligns with existing literature that highlights the positive effects of these interventions on cognitive processes. Cognitive flexibility, the ability to adapt one's thinking and behavior in response to changing situations, is crucial for individuals recovering from SUDs as it helps them navigate the challenges of sobriety and reduce the likelihood of relapse (Villalba et al., 2019). The current study's findings are consistent with those of Carmo et al. (2022), who found that a mindfulness-based intervention significantly enhanced cognitive flexibility among male prisoners, a population similarly vulnerable to rigid thought patterns and impulsive behaviors (Carmo et al., 2022).

Forgiveness training also proved effective in improving cognitive flexibility, albeit to a slightly lesser degree than mindfulness training. This outcome is supported by Haro et al. (2017), who demonstrated that forgiveness training can reduce negative emotions such as resentment and anger, which in turn may free cognitive resources and promote more adaptive thinking patterns (Haro et al., 2017). The process of forgiveness involves reframing negative experiences and letting go of grudges, which directly contributes to the enhancement of cognitive flexibility. These findings are particularly relevant in the context of SUDs, where unresolved emotional issues often contribute to the persistence of addictive behaviors (Aggs & Bambling, 2010).

The significant gains in communication skills observed in both the mindfulness and forgiveness groups further highlight the value of these interventions for individuals with SUDs. Effective communication is critical for maintaining social support networks, which are essential for recovery. The study found that mindfulness training had a slightly greater impact on communication skills compared to forgiveness training, a result that resonates with previous research by Kou et al. (2022). Their study showed that mindfulness training enhances supportive communication and emotional intelligence, suggesting that the increased self-awareness and emotional regulation cultivated through mindfulness practice contribute to more effective interpersonal interactions (Kou et al., 2022).

Forgiveness training, while slightly less impactful than mindfulness in this area, still led to significant improvements in communication skills. This finding is consistent with the work of Baby et al. (2018), who reported that forgiveness can help repair and strengthen interpersonal relationships by reducing negative emotions that often hinder effective communication (Baby et al., 2018). By promoting empathy and understanding, forgiveness training allows individuals to engage more positively with others, an outcome that is especially important for those recovering from SUDs, who may have strained relationships due to their past behaviors (Chen et al., 2021).

The comparative analysis revealed that while both interventions were effective, mindfulness training had a slightly greater impact overall, particularly on communication skills. This finding aligns with the broader literature that suggests mindfulness training may offer a more comprehensive approach to enhancing both cognitive


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and interpersonal functions. For instance, the study by Baer et al. (2012) showed that mindfulness-based stress reduction (MBSR) led to significant reductions in stress and improvements in various cognitive and emotional outcomes, supporting the notion that mindfulness practices cultivate a state of present-moment awareness that benefits multiple aspects of psychological functioning (Baer et al., 2012).

The effectiveness of mindfulness training in improving communication skills is further supported by the work of Chen et al. (2021), who found that mindfulness practices, including loving-kindness meditation, significantly enhanced empathy and communication skills among healthcare professionals. These findings suggest that mindfulness not only helps individuals manage their own emotions but also fosters a greater understanding of others' perspectives, which is crucial for effective communication (Chen et al., 2021). Given that individuals with SUDs often struggle with emotional regulation and empathy, the slightly higher effectiveness of mindfulness training observed in this study is particularly relevant.

Forgiveness training, while slightly less effective than mindfulness, nonetheless showed substantial benefits, particularly in enhancing cognitive flexibility. This aligns with the findings of Haro et al. (2017), who demonstrated that forgiveness can lead to significant cognitive and emotional improvements by reducing the mental burden of holding onto negative emotions. The process of forgiveness requires individuals to cognitively reframe their experiences and let go of past grievances, which directly contributes to increased cognitive flexibility (Haro et al., 2017). This suggests that while mindfulness may have a broader impact, forgiveness training is particularly effective in targeting specific cognitive processes related to emotional regulation and adaptation.

The results of this study are consistent with previous research that highlights the effectiveness of both mindfulness and forgiveness interventions in improving cognitive and interpersonal outcomes. For example, Lindsay et al. (2019) found that mindfulness training reduced loneliness and increased social contact in a randomized controlled trial, which is in line with the current study's findings on the benefits of mindfulness for communication skills (Lindsay et al., 2019). Similarly, the work of Haro et al. (2017) on the cognitive benefits of forgiveness training supports the present study's results, emphasizing the value of forgiveness in enhancing cognitive flexibility (Haro et al., 2017).

Furthermore, the study by Carmo et al. (2022) on the impact of mindfulness-based interventions in male prisoners provides additional support for the observed improvements in cognitive flexibility in the current study (Carmo et al., 2022). Their findings, coupled with those of Kou et al. (2022) on the benefits of mindfulness for communication, suggest that mindfulness training is a versatile and powerful tool for enhancing multiple aspects of psychological functioning in diverse populations (Kou et al., 2022).

The slightly greater effectiveness of mindfulness training observed in this study may be attributed to the comprehensive nature of mindfulness practices, which address both cognitive and emotional aspects of functioning. This is supported by the work of Baer et al. (2012), who demonstrated that mindfulness training leads to widespread improvements in cognitive flexibility, emotional regulation, and stress management (Baer et al., 2012). The ability of mindfulness to enhance present-moment awareness and reduce automatic, maladaptive responses likely contributes to its broader impact compared to forgiveness training, which, while effective, is more narrowly focused on emotional processing and cognitive reframing.

Despite the promising results, this study has several limitations that should be acknowledged. First, the sample size was relatively small, which may limit the generalizability of the findings. A larger sample would provide more robust data and allow for greater confidence in the results. Second, the study was conducted in a specific population—individuals with substance use disorders residing in a rehabilitation center—which may not be representative of all individuals with SUDs. Future research should include a more diverse population to assess the broader applicability of the findings.

Another limitation is the reliance on self-report measures, which may be subject to social desirability bias and may not fully capture the complexity of cognitive flexibility and communication skills. While self-report questionnaires are commonly used in psychological research, they may not always provide an accurate reflection of participants' true abilities or changes over time. Future studies should consider incorporating more objective measures, such as behavioral tasks or physiological assessments, to complement self-report data and provide a more comprehensive evaluation of the interventions' effects.

Finally, the study's design did not include a long-term follow-up to assess the sustainability of the observed improvements. While the follow-up period in this study was sufficient to detect immediate post-intervention effects, it is


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unclear whether the benefits of mindfulness and forgiveness training are maintained over the long term. Future research should include extended follow-up periods to determine the durability of these interventions' effects and to assess whether additional booster sessions or continued practice is necessary to sustain the benefits.

Building on the findings of this study, future research should explore the mechanisms underlying the observed improvements in cognitive flexibility and communication skills following mindfulness and forgiveness training. Understanding the specific processes through which these interventions exert their effects could help refine and optimize the interventions, making them more targeted and effective. For example, examining the role of emotional regulation, stress reduction, and cognitive reappraisal in mediating the effects of mindfulness and forgiveness training could provide valuable insights into how these interventions work and for whom they are most effective.

Future studies should also consider comparing mindfulness and forgiveness training with other therapeutic interventions, such as cognitive-behavioral therapy (CBT) or dialectical behavior therapy (DBT), to determine their relative effectiveness. Such comparative studies could help identify the most effective components of each intervention and guide the development of integrative treatment programs that combine the strengths of multiple therapeutic approaches. Additionally, research should explore the potential synergistic effects of combining mindfulness and forgiveness training, as these interventions may complement each other in enhancing both cognitive and emotional outcomes.

Furthermore, there is a need for research that examines the effectiveness of these interventions in diverse populations, including different age groups, cultural backgrounds, and levels of severity of substance use disorders. Understanding how mindfulness and forgiveness training work across different contexts and populations would help tailor these interventions to meet the specific needs of various groups. This could involve adapting the content and delivery of the interventions to ensure cultural relevance and accessibility, thereby increasing their reach and impact.

The findings of this study have important implications for the practice of addiction treatment and recovery. First, mindfulness and forgiveness training should be considered as valuable components of comprehensive treatment programs for individuals with substance use disorders. Given their demonstrated effectiveness in improving cognitive flexibility and communication skills, these interventions can help individuals develop the psychological tools necessary for successful recovery. Practitioners should be trained in delivering these interventions, ensuring they can effectively guide clients through the processes of mindfulness and forgiveness.

Practitioners should also consider integrating mindfulness and forgiveness training with other therapeutic approaches, such as CBT or DBT, to create more holistic and personalized treatment plans. By addressing both the cognitive and emotional aspects of substance use disorders, such integrated programs could provide more comprehensive support for clients, helping them build resilience and reduce the risk of relapse. The use of mindfulness practices to enhance emotional regulation and present-moment awareness, combined with the cognitive restructuring techniques of forgiveness training, could offer a powerful approach to supporting long-term recovery.

Finally, it is important for treatment programs to include follow-up support to ensure the sustainability of the benefits gained from mindfulness and forgiveness training. This could involve offering booster sessions, ongoing group support, or access to online resources that encourage continued practice. Given the potential for relapse in individuals with substance use disorders, ongoing support is critical to maintaining the gains achieved through these interventions and helping clients navigate the challenges of long-term recovery.

In conclusion, the integration of mindfulness and forgiveness training into treatment programs for individuals with substance use disorders offers a promising approach to enhancing cognitive flexibility and communication skills, key components of successful recovery. The findings of this study provide strong support for the use of these interventions in clinical practice and highlight the need for further research to refine and expand their application across diverse populations and settings. By continuing to explore the potential of these interventions, we can contribute to the development of more effective and comprehensive treatment strategies that support lasting recovery and improved quality of life for individuals with substance use disorders.

## Authors' Contributions

All authors significantly contributed to this study.

## Declaration



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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

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

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