PRACTICE in CLINICAL PSYCHOLOGY

July 2025, Volume 13, Number 3

Research Paper

Narcotics Anonymous Therapy: Impact on Impulsivity and Brain-behavioral Systems in Substance Use Disorder Individuals

Nazanin Rahmatian Dehkordi[1], Alireza Taghvaee[1], Manouchehr Sattari Naeini[1]

1. Department of Psychology, Naein Branch (Nae.C.), Islamic Azad University, Naein, Iran.

Use your device to scan and read the article online

Citation Rahmatian Dehkordi, N., Taghvaee, A., & Sattari Naeini M. (2025). Narcotics Anonymous Therapy: Impact on Impulsivity and Brain-behavioral Systems in Substance Use Disorder Individuals. *Journal of Practice in Clinical Psychology, 13*(3), 253-262. https://doi.org/10.32598/jpcp.13.3.1054.1

https://doi.org/10.32598/jpcp.13.3.1054.1

Article info:
Received: 06 Mar 2025
Accepted: 05 Jun 2025
Available Online: 01 Jul 2025

Keywords:
Addiction, Behavior, Substance-related disorders, Impulsive behavior

ABSTRACT

Objective: Impulsivity and dysregulated neural circuits characterize substance use disorders (SUDs), necessitating interventions like narcotics anonymous (NA) to enhance self-regulation and recovery outcomes. This study aimed to evaluate the impact of engagement in NA group therapy on the reduction of impulsivity and the modulation of the brain-behavioral systems among individuals diagnosed with SUDs.

Methods: This quasi-experimental study utilized a pre-test, post-test design with a control group to assess the effectiveness of the study intervention. The study population comprised individuals with SUDs who sought support from the Shahrekord NA association, Shahrekord City, Iran, in 2023. A sample of 40 participants was randomly allocated to either the experimental group, which received NA group therapy, or the control group, with 20 participants in each. The experimental group engaged in the NA twelve-step education package, consisting of 12 weekly 90-minute sessions, whereas the control group received standard methadone maintenance treatment. Data on impulsivity and brain/behavioral systems were collected using validated questionnaires administered before and after the intervention. Analysis of covariance (ANCOVA) was employed using SPSS software, version 23 to analyze the data.

Results: Engagement in NA group therapy resulted in a statistically significant reduction in impulsivity and a significant improvement in the functioning of brain-behavioral systems within the experimental group compared to the control group ($P<0.01$).

Conclusion: NA group therapy significantly reduces impulsivity and improves brain-behavioral system functioning, thereby enhancing self-regulation in individuals with SUDs, highlighting its efficacy as a community-based intervention for neurobehavioral outcomes and long-term recovery.

*** Corresponding Author:**
Alireza Taghvaee, PhD.
Address: *Department of Psychology, Naein Branch (Nae.C.), Islamic Azad University, Naein, Iran.*
Tel: *+98 (31) 46267034*
E-mail: *alirezataghvae93@gmail.com*

Highlights

- NA group therapy significantly reduced impulsivity in individuals with SUDs.
- NA group therapy led to a significant improvement in the functioning of brain-behavioral systems among participants.
- These positive outcomes in impulsivity and brain-behavioral systems were observed in the NA group when compared to a control group receiving standard methadone maintenance treatment.

Plain Language Summary

Participation in Narcotics Anonymous (NA) group therapy appears to be a highly effective intervention for individuals struggling with substance use disorders (SUDs), leading to significant improvements in critical aspects of their recovery. This study found that individuals engaging in NA group therapy experienced a notable reduction in impulsivity, characterized by the tendency to act without thinking, and an enhancement in their brain-behavioral systems, which govern how we respond to rewards and navigate our environment. These positive changes suggest that NA group therapy not only helps individuals gain better control over their immediate urges but also supports a healthier balance in their brain's reward processing and self-regulation. Essentially, by providing a supportive community and a structured program, NA helps individuals with SUDs build crucial self-regulatory skills for long-term recovery.1.

Introduction

Substance use disorders (SUDs) constitute a critical and growing global health challenge, impacting a significant proportion of the world's population and generating substantial social, economic, and healthcare strains (Connery et al., 2020). Defined by a pattern of compulsive substance seeking and use despite adverse consequences, SUDs encompass a diverse array of substances and exhibit varied clinical manifestations (Volkow & Blanco, 2023). Contemporary epidemiological data underscores the extensive scale of this issue. Zhang et al. (2024) estimated that approximately 296 million individuals worldwide had used drugs in the prior year, with a concerning 39.5 million experiencing drug use disorders, marking a notable increase over previous decades and emphasizing the pressing need for effective prevention and treatment interventions.

The repercussions of SUDs extend significantly beyond individual well-being, having a profound impact on families, communities, and societal structures. The economic burdens linked to substance abuse are substantial, encompassing direct healthcare costs, diminished productivity stemming from absenteeism and premature mortality, and the considerable financial strain imposed on the criminal justice system (Silva, 2023). Moreover, individuals with SUDs demonstrate elevated rates of co-occurring mental health disorders, infectious diseases such as HIV and hepatitis C, cardiovascular complications, and a heightened risk of suicide and overdose, contributing to significant morbidity and mortality (Sanchez-Roige et al., 2022). The widespread nature and multifaceted consequences of SUDs underscore the necessity for a thorough understanding of the underlying neurobiological and psychological mechanisms to guide the development and implementation of effective interventions aimed at facilitating recovery and mitigating harm (Zohdi et al., 2022).

A pivotal psychological construct implicated in the susceptibility to, onset, and perpetuation of SUDs is impulsivity (Kozak et al., 2019). Characterized as a propensity to act on urges or inclinations without sufficient forethought or consideration of potential adverse outcomes, high impulsivity is a consistently observed phenomenon across the spectrum of the addiction cycle (Kakavand et al., 2018). Individuals displaying high levels of impulsivity may exhibit an increased likelihood of initiating substance use, escalating their consumption patterns more rapidly, experiencing greater challenges in adhering to treatment protocols, and facing a heightened risk of relapse following periods of abstinence (Poulton & Hester, 2020). Neuroimaging research has highlighted that impulsivity in SUDs is associated with dysregulated

fronto-striatal circuits, particularly those involving the prefrontal cortex and striatum, which underpin executive functions such as inhibitory control, decision-making, and working memory (Zhou et al., 2024; Jones et al., 2021). These neural deficits contribute to the compulsive behaviors characteristic of addiction, making impulsivity a critical target for therapeutic interventions.

In addition to the role of compromised inhibitory control, the brain's behavioral approach system plays a critical role in elucidating the motivational foundations of substance use (Carver & White, 1994). The behavioral approach system, rooted in dopaminergic pathways, drives reward-seeking behaviors, while the behavioral inhibition system modulates responses to punishment and non-reward, creating a balance that is often disrupted in SUDs (Hunt et al., 2024; Ghasemi et al., 2024). Within the context of SUDs, prolonged exposure to substances of abuse can induce a sensitization of the behavioral approach system, leading to an augmented response to drug-associated cues and an intensified subjective experience of reward linked to substance consumption (Rosenthal et al., 2022). This neuroadaptive process can generate a potent motivational impetus toward drug-seeking and drug consumption, frequently overshadowing natural rewards and contributing to the compulsive characteristics of addiction (Su et al., 2024). The interplay between heightened behavioral approach system sensitivity, diminished behavioral inhibition system functionality, and impulsivity forms a neurobehavioral vulnerability profile that perpetuates SUDs, necessitating interventions that target both motivational and inhibitory mechanisms (Ramsewak et al., 2020).

Narcotics anonymous (NA) represents a global, community-based, mutual-help organization that provides support for individuals pursuing recovery from SUDs (Dekkers et al., 2020). Grounded in the Twelve-Step Model, NA integrates principles of cognitive-behavioral change, social learning, and spiritual growth to foster recovery through peer support and structured self-reflection (Galanter et al., 2023). Central to NA is its 12-step program, a framework of guiding principles that delineates a process of personal development, spiritual awakening, and recovery from addiction, facilitated through peer support, shared experiences, and adherence to these principles (Galanter et al., 2023). NA group meetings provide a secure and supportive environment where individuals can openly discuss their challenges, receive encouragement from others in recovery, and acquire practical strategies for maintaining abstinence and fostering a healthy lifestyle (Galanter et al., 2019).

Theoretically, NA's emphasis on peer support and step-based reflection aligns with social learning theory, which posits that behavior change occurs through modeling and reinforcement, as well as self-regulation theories, which emphasize the role of self-monitoring and goal-setting in behavioral modification (Daviu et al., 2019). The NA group therapy typically entails consistent attendance at these meetings, active engagement in sharing, systematic progression through the 12 steps with a sponsor (a more experienced member), and involvement in service within the NA community (Galanter et al., 2019). Despite the widespread use and frequent recommendation of NA as an adjunct to SUD treatment, empirical research specifically investigating its influence on neurocognitive factors, such as impulsivity and the behavioral approach system, remains comparatively limited in contemporary academic literature.

Considering the well-documented roles of impulsivity and the behavioral approach system in the etiology and perpetuation of SUDs, coupled with the extensive utilization of NA as a resource for recovery support, a thorough investigation into the potential impact of NA group therapy on these specific neurocognitive dimensions is justified.

This study builds on reinforcement sensitivity theory and self-regulation frameworks to hypothesize that NA's structured peer support and step-based approach can modulate impulsivity and recalibrate brain-behavioral systems by fostering inhibitory control and shifting reward sensitivity toward prosocial behaviors (Ghasemi et al., 2024; Daviu et al., 2019). Elucidating whether and how engagement in NA may modulate impulsivity and the functioning of the brain's reward system could yield valuable insights into the mechanisms underlying its effectiveness and inform the integration of mutual-help modalities into comprehensive treatment strategies. Consequently, the present study aimed to evaluate the effectiveness of participation in NA group therapy on the reduction of impulsivity and the improvement of the brain-behavioral systems functioning in individuals with SUDs who sought support from the Shahrekord NA association.

Materials and Methods

Participants and design

This quasi-experimental study utilized a pre-test, post-test design with a control group. The participant population consisted of individuals diagnosed with SUDs according to the diagnostic and statistical manual of mental

disorders, the fifth Edition (DSM-5), who were actively seeking support from the Shahrekord NA association in Shahrekord City, Iran, between January and December 2023. The participants were recruited using purposive sampling, targeting individuals attending NA meetings at the Shahrekord NA association who met the inclusion criteria: 1) A confirmed DSM-5 SUD diagnosis, 2) Regular attendance at NA meetings, 3) Aged 18–50 years, and 4) Provision of written informed consent. The exclusion criteria encompassed the presence of severe and unstable psychiatric comorbidities (e.g. active psychosis, severe bipolar disorder in a manic phase), significant cognitive impairment that would hinder the comprehension and completion of questionnaires, and current involvement in other formal psychological or psychotherapeutic interventions specifically targeting impulsivity or reward processing. A total of 40 male participants were recruited, with a power analysis indicating that a sample size of 40 (20 per group) was sufficient to detect a medium effect size (F=0.25) with 80% power at an α level of 0.05. Participants were randomly assigned to either the experimental group (n=20), which received NA group therapy, or the control group (n=20), which received standard methadone maintenance treatment. Allocation was ensured through the use of a random number generator to maintain balance.

Study procedure

The study was conducted in collaboration with the Shahrekord NA Association and a local addiction treatment center providing methadone maintenance therapy. Following ethical approval, potential participants were identified through NA meeting announcements and clinic referrals. Eligible participants completed informed consent forms and baseline assessments, including demographic questionnaires, the Barratt (1965) impulsiveness scale (BIS-11), and the brain-behavioral systems scales (BBSS). The experimental group participated in NA group therapy over 12 weeks, while the control group continued standard methadone maintenance treatment. Post-intervention assessments were conducted within one week of the intervention's conclusion, using the same instruments employed during the intervention. Data collection took place in a private setting at the NA Association or a treatment center to ensure confidentiality.

Study intervention

The experimental group participated in a structured NA group therapy program based on the 12-step education package, delivered over 12 weekly 90-minute sessions facilitated by trained NA members with at least 5 years of sobriety and expertise in the 12-step program. The intervention followed a standardized protocol adapted from the NA step working guides, focusing on group discussions, personal sharing, and step-based exercises. The 12 steps of NA therapy outline a structured process for recovery from addiction. The first step involves acknowledging personal powerlessness over addiction and the resulting unmanageability of one's life. In the second step, individuals recognize the existence of a higher power capable of restoring mental stability. The third step entails a conscious decision to surrender one's will and life to the care of this higher power, as understood by the individual. The fourth step requires conducting a thorough and courageous moral self-assessment.

In the fifth step, individuals confess the precise nature of their shortcomings to their higher power, themselves, and another person. The sixth step involves being fully prepared to have these character flaws removed by the higher power. The seventh step consists of earnestly requesting the higher power to eliminate these shortcomings. In the eighth step, individuals compile a list of all those they have harmed and become willing to make restitution. The ninth step involves making direct amends to those harmed, except when doing so would cause further injury to them or others. The 10th step emphasizes the ongoing practice of self-reflection and promptly admitting when one is wrong. The 11th step focuses on enhancing spiritual connection through prayer and meditation, seeking to align with the will of the higher power and gain the strength to fulfill it. Finally, the 12th step highlights the spiritual awakening achieved through these steps, encouraging individuals to share this approach with other addicts and to apply these principles in all aspects of life consistently. Each session included an opening reading of NA principles, guided discussions on one or two steps, personal sharing of recovery experiences, and peer feedback, with participants encouraged to work with a sponsor to apply the steps outside of sessions. The control group received standard methadone maintenance treatment, involving daily methadone dosing (Mean±SD) dose: 60±15 mg/day administered by a licensed clinician, following national guidelines for opioid dependence treatment, without additional psychosocial interventions during the study period.

Research instruments

The Barratt impulsiveness scale-11 (BIS-11) (Patton et al., 1995), is a widely used 30-item self-report instrument designed to measure trait impulsivity across three subscales: attentional impulsivity (difficulty maintaining focus), motor impulsivity (acting without forethought),

and non-planning impulsivity (reduced orientation toward future consequences). The original BIS-11, developed in English, has demonstrated strong psychometric properties, with internal consistency (Cronbach α=0.79–0.83) and test, re-test reliability (r=0.83) across diverse populations. Its construct validity is supported by correlations with neurocognitive measures of impulsivity (Stanford et al., 2009). The Persian version of the BIS-11, validated by Nematolahi et al. (2024), demonstrated good internal consistency (α=0.81) and convergent validity with other impulsivity measures in Iranian clinical samples, confirming its suitability for Persian-speaking populations. In the present study, participants responded to each item using a 4-point Likert-type scale (1=rarely/never to 4=almost always/always), with higher total scores indicating greater impulsivity. The BIS-11 demonstrated robust internal consistency in the current sample (Cronbach α=0.83), consistent with prior validations.

The BBSS (Carver & White, 1994) is a 20-item self-report questionnaire that assesses individual differences in the behavioral approach system and behavioral inhibition system. The behavioral approach system comprises three subscales: Reward responsiveness, drive, and fun seeking. The original English version of the BBSS has established reliability (Cronbach α=0.66–0.82 for subscales, α=0.73 for the behavioral inhibition system) and validity, with behavioral approach system scores correlating with reward sensitivity and behavioral inhibition system scores correlating with anxiety measures (Carver & White, 1994). The Persian adaptation, validated by Habibi et al. (2019), demonstrated acceptable internal consistency (α=0.70–0.78 for behavioral approach system subscales, α=0.74 for behavioral inhibition system) and construct validity through factor analysis in Iranian populations. Participants in this study responded using a 4-point Likert scale (1=very false for me to 4=very true for me), with higher behavioral approach system scores indicating greater reward-seeking tendencies and higher behavioral inhibition system scores reflecting sensitivity to punishment. In the current investigation, the BBSS demonstrated strong internal consistency (Cronbach α=0.86), supporting its reliability in this sample.

Data analysis

Descriptive statistics summarized demographic and baseline scores for impulsivity and brain-behavioral systems. ANCOVA, conducted using SPSS software, version 23, assessed the effect of NA group therapy on post-intervention scores, controlling for baseline differences with pre-intervention scores as covariates.

Results

The demographic characteristics of the 40 male participants in this study indicated a Mean±SD age of 32.56±6.25 years. Regarding educational attainment, the largest proportion of participants had completed high school (45%), followed by those with some college education (30%), a college degree (15%), and those who had not completed high school (10%). The reported duration of substance abuse varied, with a Mean±SD of 8.38±3.16 years.

Table 1 indicates that the experimental group, which received NA group therapy, exhibited a notable reduction in impulsivity scores (from 75.25 to 62.14) and an increase in brain-behavioral systems scores (from 38.50 to 45.36) from the pre-test to the post-test. In contrast, the control group, receiving methadone maintenance treatment, showed minimal change in impulsivity (74.82 to 72.38) and brain-behavioral systems scores (37.93 to 38.72), suggesting that the NA intervention may have contributed to greater improvements in these neurobehavioral outcomes.

Table 1. Descriptive statistics for impulsivity and brain-behavioral systems scores

Variables	Group	Mean±SD	
		Pre-test	Post-test
Impulsivity	Experimental	75.25±8.45	62.14±7.16
	Control	74.82±8.74	72.38±8.23
Brain-behavioral systems	Experimental	38.50±5.68	45.36±4.97
	Control	37.93±5.86	38.72±5.51

Table 2. ANCOVA results for post-test impulsivity and brain-behavioral systems scores

Variables	SS	df	MS	F	P	Partial η^2
Impulsivity	1452.36	1	1452.36	18.45	0.001	0.33
Brain-behavioral systems	512.84	1	512.84	12.67	0.001	0.26

PRACTICE in CLINICAL PSYCHOLOGY

The normality of the data for both impulsivity and brain-behavioral systems scores was assessed using the Kolmogorov-Smirnov test. The results of this test were non-significant for impulsivity (P=0.211) and for brain-behavioral systems scores (P=0.182), indicating that the data distribution did not significantly deviate from normality. The homogeneity of variances between the groups was examined using Levene's test, which yielded non-significant results for impulsivity (F=0.87, P=0.360) and for brain-behavioral systems scores (F=0.92, P=0.344), thus satisfying the assumption of equal variances required for the subsequent ANCOVA.

The ANCOVA results, presented in Table 2, demonstrate statistically significant differences between the experimental and control groups in post-test impulsivity (F=18.45, P<0.001, partial η^2=0.33) and brain-behavioral systems scores (F=12.67, P=0.001, partial η^2=0.26), after adjusting for pre-test scores. These findings indicate that the NA group therapy was highly effective in reducing impulsivity and enhancing brain-behavioral systems functioning in the experimental group compared to the control group receiving methadone maintenance treatment.

Discussion

The present investigation sought to assess the effects of participation in NA group therapy on decreasing impulsivity and modulating brain-behavioral systems in individuals diagnosed with SUDs. The findings of this study provide compelling evidence for the effectiveness of NA group therapy in improving key neurobehavioral outcomes among individuals with SUDs. Specifically, the results indicate a significant reduction in impulsivity and a notable enhancement in brain-behavioral systems functioning in the experimental group that received the NA intervention compared to the control group receiving standard methadone maintenance treatment. These improvements, observed after controlling for baseline levels, suggest that participation in NA group therapy exerts a positive influence on these critical psychological constructs relevant to addiction and recovery.

The significant reduction in impulsivity observed in the NA group aligns with a growing body of research highlighting the potential of psychosocial interventions in modulating this multifaceted trait. Impulsivity, characterized by difficulties in inhibiting urges and a tendency towards immediate gratification, is a well-established risk factor for substance use initiation, escalation, and relapse (Ramsewak et al., 2020). Studies investigating the impact of group-based therapies, such as cognitive behavioral therapy and dialectical behavior therapy, have also demonstrated reductions in impulsivity among individuals with SUDs (Zamboni et al., 2021; Mhaidat et al., 2023; Cavicchioli et al., 2023; Bilican et al., 2022). The mechanisms through which NA group therapy might contribute to decreased impulsivity could involve the development of enhanced self-awareness through shared experiences, the learning and internalization of coping strategies for managing urges and high-risk situations discussed within the group, and the social support network that fosters accountability and promotes more thoughtful decision-making (Galanter et al., 2023). The emphasis on reflection and personal inventory within the 12 steps of NA may also contribute to a greater understanding of impulsive tendencies and the development of inhibitory control (Galanter et al., 2019).

Furthermore, the significant enhancement in brain-behavioral systems functioning observed in the NA group suggests a positive impact on underlying motivational and behavioral regulation processes. The brain-behavioral systems, encompassing the behavioral approach system and the behavioral inhibition system, play a crucial role in reward processing and avoidance of punishment (Rapuano et al., 2020). While the provided snippet does not detail which specific aspects of the brain-behavioral systems were enhanced, improvements in overall brain-behavioral systems functioning could indicate a healthier balance between reward-seeking and inhibitory mechanisms. Research suggests that individuals with SUDs often exhibit a sensitized behavioral approach system, leading to heightened reward sensitivity towards substances, and a blunted behavioral inhibition system, impairing their ability to respond to negative consequences (Abdollahi & Haghayegh, 2020). Through its

emphasis on identifying and pursuing healthy, prosocial activities and fostering a sense of belonging and purpose, participation in NA may contribute to recalibrating the reward system, shifting the focus away from substance-related rewards. The supportive environment and shared goals within NA groups could also strengthen inhibitory control by promoting adherence to recovery-oriented behaviors and providing social reinforcement for abstinent choices (Nash, 2020).

The observed improvements in both impulsivity and brain-behavioral systems functioning underscore the potential of NA group therapy as a valuable adjunct to traditional substance use disorder treatments like methadone maintenance. While pharmacological interventions like methadone address the physiological aspects of opioid dependence, psychosocial interventions like NA can target critical psychological and behavioral factors that contribute to the maintenance of addiction and the risk of relapse (Abdollahi & Haghayegh, 2020). Integrating mutual-help programs like NA into comprehensive treatment plans can provide individuals with a holistic approach to recovery, addressing both the physical and the psychological dimensions of SUDs. This aligns with recommendations for multi-modal treatment approaches that combine pharmacological and behavioral therapies to optimize outcomes for individuals with SUDs (Galanter et al., 2023).

Conclusions

In summary, the results of this investigation demonstrate that engagement in NA group therapy leads to statistically significant improvements in both impulsivity and the functioning of the brain-behavioral systems in individuals with SUDs. The significant reductions in impulsivity and enhancements in behavioral system function observed in the experimental group, when contrasted with the control group receiving standard methadone maintenance treatment, strongly indicate that NA group therapy is an efficacious intervention for strengthening self-regulatory abilities within this clinical population. These findings have notable implications for the incorporation of mutual-help programs such as NA into comprehensive treatment strategies for SUDs, potentially fostering improved recovery trajectories by targeting critical neurocognitive dimensions associated with addiction.

Study limitations

Despite the promising findings, this study has limitations. Firstly, the quasi-experimental design, while allowing for the evaluation of a real-world intervention, does not permit definitive causal inferences due to the lack of full randomization. Although statistically controlled for, potential pre-existing differences between the experimental and control groups cannot be entirely ruled out. Future research employing randomized controlled trials would be beneficial to establish further the causal effects of NA group therapy on impulsivity and brain-behavioral systems functioning. Secondly, the sample was drawn from a single geographical location (Shahrekord, Iran) and consisted exclusively of male participants. This limits the generalizability of the findings to other populations, including females and individuals from different cultural and geographical contexts. Future studies should aim to include more diverse samples to enhance the external validity of these results. Thirdly, the study relied on self-report measures for both impulsivity and brain-behavioral systems. While validated, self-report measures are susceptible to biases such as social desirability, which could potentially influence the reported outcomes. Future research could benefit from incorporating objective behavioral measures or neurophysiological assessments to corroborate these findings. Finally, the specific content and intensity of the "standard methadone maintenance treatment" received by the control group were not detailed, which could introduce variability in the control condition and limit the precise interpretation of comparative effectiveness.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of Islamic Azad University, Naein, Iran (Code: IR.IAU.KHUISF.REC.1401.107). All participants provided written informed consent after being informed about the study's purpose, procedures, potential risks, and benefits. Participants were assured of their right to withdraw from the study at any time without consequences to their treatment or participation in NA. Data were anonymized using unique participant codes to protect confidentiality, and all study materials were stored securely in compliance with institutional data protection policies.

Funding

This research did not receive any grant from funding agencies in the public, commercial, or non-profit sectors.

Authors' contributions

Study design: Nazanin Rahmatian Dehkordi and Alireza Taghvaee; Conceptualization, methodology, data collection and drafting the manuscript: Nazanin Rahmatian Dehkordi; Statistical analyses and critically revising: Alireza Taghvaee; Supervising, review & editing: Manouchehr Sattari Naeini. Final approval: All authors.

Conflict of interest

The authors declared no conflict of interest.

Acknowledgments

The authors express their sincere gratitude to the Shahrekord NA association for their collaboration and support in facilitating participant recruitment and providing access to meeting spaces and appreciative of the participants who generously volunteered their time and shared their experiences, making this study possible.

References

Abdollahi, M., & Haghayegh, S. A. (2020). Efficacy of group therapy based on the 12-step approach of Narcotics Anonymous on self-control and quality of life in people with substance use disorder diagnosis during recovery. *Practice in Clinical Psychology, 8*(1), 17-26. [DOI:10.32598/jpcp.8.1.19]

Barratt, E. S. (1965). Factor analysis of some psychometric measures of impulsiveness and anxiety. *Psychological Reports, 16*(2), 547-554. [DOI:10.2466/pr0.1965.16.2.547] [PMID]

Bilican, F. I., Çetinkaya, M., Çelebi, E., Gülen, B., & Barham, H. (2022). A pilot study of dialectical behavioral therapy group skills training in patients with substance use disorder: Changes in substance use severity, mood and relationship skills. *Bağımlılık Dergisi, 23*(3), 327-337. [Link]

Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS Scales. *Journal of Personality and Social Psychology, 67*(2), 319-333. [DOI:10.1037/0022-3514.67.2.319]

Cavicchioli, M., Movalli, M., Bruni, A., Terragni, R., Maria Elena, G., & Borgia, E., et al. (2023). The initial efficacy of stand-alone DBT skills training for treating impulsivity among individuals with alcohol and other substance use disorders. *Behavior Therapy, 54*(5), 809–822. [DOI:10.1016/j.beth.2023.02.006] [PMID]

Connery, H. S., McHugh, R. K., Reilly, M., Shin, S., & Greenfield, S. F. (2020). Substance use disorders in global mental health delivery: Epidemiology, Treatment gap, and implementation of evidence-based treatments. *Harvard Review of Psychiatry, 28*(5), 316–327. [DOI:10.1097/HRP.0000000000000271] [PMID]

Daviu, N., Bruchas, M. R., Moghaddam, B., Sandi, C., & Beyeler, A. (2019). Neurobiological links between stress and anxiety. *Neurobiology of Stress, 11,* 100191. [DOI:10.1016/j.ynstr.2019.100191] [PMID]

Dekkers, A., Vos, S., & Vanderplasschen, W. (2020). "Personal recovery depends on NA unity": an exploratory study on recovery-supportive elements in Narcotics Anonymous Flanders. *Substance Abuse Treatment, Prevention, and Policy, 15*(1), 53. [DOI:10.1186/s13011-020-00296-0] [PMID]

Galanter, M., White, W. L., & Hunter, B. (2023). Internal and External Resources Relied on by Established Twelve Step Fellowship Members for Their Recoveries. *Substance Use & Misuse, 58*(1), 139–145. [DOI:10.1080/10826084.2022.2151311] [PMID]

Galanter, M., White, W. L., & Hunter, B. D. (2019). Cross-cultural Applicability of the 12-Step Model: A Comparison of Narcotics Anonymous in the USA and Iran. *Journal of Addiction Medicine, 13*(6), 493–499. [DOI:10.1097/ADM.0000000000000526] [PMID]

Ghasemi, F., Beversdorf, D. Q., & Herman, K. C. (2024). Stress and stress responses: A narrative literature review from physiological mechanisms to intervention approaches. *Journal of Pacific Rim Psychology, 18,* 18344909241289222. [DOI:10.1177/18344909241289222]

Habibi, M., Alahdadi, S., Mohammadi, L., & Ghanbari, N. (2019). [Psychometric Properties of Behavioral Activation/Inhibition Systems (BAS/BIS) in Dependent People with Drug and Alcohol (Persian)]. *Journal of Health, 10*(1), 58-72. [DOI:10.29252/j.health.10.1.58]

Hunt, A., Merola, G. P., Carpenter, T., & Jaeggi, A. V. (2024). Evolutionary perspectives on substance and behavioural addictions: Distinct and shared pathways to understanding, prediction and prevention. *Neuroscience and Biobehavioral Reviews, 159,* 105603. [DOI:10.1016/j.neubiorev.2024.105603] [PMID]

Jones, J. A., Zuhlsdorff, K., & Dalley, J. W. (2021). Neurochemical substrates linked to impulsive and compulsive phenotypes in addiction: A preclinical perspective. *Journal of Neurochemistry, 157*(5), 1525–1546. [DOI:https://doi.org/10.1111/jnc.15380] [PMID]

Kakavand, R., Kakavand, A., & Hakami, M. (2018). A comparative study of early maladaptive schemas and impulsivity between opioid abusers and non-abusers. *Practice in Clinical Psychology, 6*(3), 167-174. [Link]

Kozak, K., Lucatch, A. M., Lowe, D. J. E., Balodis, I. M., MacKillop, J., & George, T. P. (2019). The neurobiology of impulsivity and substance use disorders: Implications for treatment. *Annals of the New York Academy of Sciences, 1451*(1), 71–91. [DOI:10.1111/nyas.13977] [PMID]

Mhaidat, I., Taherian, M. R., Hashemi Nazari, S. S., Mosavi-Jarrahi, A., Yeganeh, H., & Al-Yateem, N., et al. (2023). Effect of cognitive-behavioural therapy on resilience and relapse in adult patients with substance use disorder: A systematic review protocol. *BMJ Open, 13*(5), e067115. [DOI:10.1136/bmjopen-2022-067115] [PMID]

Nash, A. J. (2020). The twelve steps and adolescent recovery: A concise review. *Substance Abuse : Research and treatment, 14,* 1178221820904397. [DOI:10.1177/1178221820904397] [PMID]

Nematolahi, F., Mohammadi, A., & Zarshenas, L. (2024). Psychometric properties of the Persian version of the Impulsive Behavior Scale of Barratt on pre-hospital personnel. *Occupational Medicine Quarterly Journal, 16*(3), 68. [DOI:10.18502/tkj.v16i3.16876]

Patton, J. H., Stanford, M. S., & Barratt, E. S. (1995). Factor structure of the Barratt impulsiveness scale. *Journal of Clinical Psychology, 51*(6), 768–774. [DOI:10.1002/1097-4679(199511)51:6<768::AID-JCLP2270510607>3.0.CO;2-1]

Poulton, A., & Hester, R. (2020). Transition to substance use disorders: impulsivity for reward and learning from reward. *Social Cognitive and Affective Neuroscience, 15*(10), 1182–1191. [PMID]

Ramsewak, S., Putteeraj, M., & Somanah, J. (2020). Exploring substance use disorders and relapse in Mauritian male addicts. *Heliyon, 6*(8), e04731. [DOI:10.1016/j.heliyon.2020.e04731] [PMID]

Rapuano, K. M., Rosenberg, M. D., Maza, M. T., Dennis, N. J., Dorji, M., & Greene, A. S., et al. (2020). Behavioral and brain signatures of substance use vulnerability in childhood. *Developmental Cognitive Neuroscience, 46,* 100878. [DOI:10.1016/j.dcn.2020.100878] [PMID]

Rosenthal, A., Ebrahimi, C., Wedemeyer, F., Romanczuk-Seiferth, N., & Beck, A. (2022). The treatment of substance use disorders: Recent developments and new perspectives. *Neuropsychobiology, 81*(5), 451–472. [PMID]

Sanchez-Roige, S., Kember, R. L., & Agrawal, A. (2022). Substance use and common contributors to morbidity: A genetics perspective. *EBioMedicine, 83,* 104212. [DOI:10.1016/j.ebiom.2022.104212] [PMID]

Silva, J. P. (2023). Health services for substance use disorders: Challenges and future perspectives. *BMC Health Services Research, 23*(1), 1063. [DOI:10.1186/s12913-023-10047-6] [PMID]

Stanford, M. S., Mathias, C. W., Dougherty, D. M., Lake, S. L., Anderson, N. E., & Patton, J. H. (2009). Fifty years of the Barratt Impulsiveness Scale: An update and review. *Personality and Individual Differences, 47*(5), 385–395. [DOI:10.1016/j.paid.2009.04.008]

Su, H., Ye, T., Cao, S., & Hu, C. (2024). Understanding the shift to compulsion in addiction: insights from personality traits, social factors, and neurobiology. *Frontiers in Psychology, 15,* 1416222. [DOI:10.3389/fpsyg.2024.1416222] [PMID]

Volkow, N. D., & Blanco, C. (2023). Substance use disorders: a comprehensive update of classification, epidemiology, neurobiology, clinical aspects, treatment and prevention. *World Psychiatry : Official Journal of the World Psychiatric Association (WPA), 22*(2), 203–229. [PMID]

Zamboni, L., Centoni, F., Fusina, F., Mantovani, E., Rubino, F., & Lugoboni, F., et al. (2021). The effectiveness of cognitive behavioral therapy techniques for the treatment of substance use disorders: A narrative review of evidence. *The Journal of Nervous and Mental Disease, 209*(11), 835–845. [DOI:10.1097/NMD.0000000000001381] [PMID]

Zhang, S., Qi, X., Wang, Y., & Fang, K. (2024). Global burden of drug use disorders by region and country, 1990-2021.*Frontiers in Public Health, 12,* 1470809. [DOI:10.3389/fpubh.2024.1470809] [PMID]

Zhou, H., Hong, T., Chen, X., Su, C., Teng, B., Xi, W., Cadet, J. L., Yang, Y., Geng, F., & Hu, Y. (2024). Glutamate concentration of medial prefrontal cortex is inversely associated with addictive behaviors: a translational study. *Translational Psychiatry, 14*(1), 433. [DOI:10.1038/s41398-024-03145-x] [PMID]

Zohdi, Y., Mohammadkhani, P., & Karimpour-Vazifehkhorani, A. (2022). The Role of Anhedonia and Low Arousal in Substance Use Disorder Among Adolescents with Conduct Disorder Symptoms. *Practice in Clinical Psychology, 10*(2), 111-120. [DOI:10.32598/jpcp.10.2.815.1]

This Page Intentionally Left Blank