

Does Age Matter? Age-Related Variation in Treatment Response Following Motivational Interviewing among Recreational Substance Use

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Abstract: ***Background:** Young adulthood is a developmental period characterized by increased experimentation and vulnerability to recreational substance use. Although Motivational Interviewing (MI) is an evidence-based intervention for reducing substance-related risk behaviours, limited research has examined whether its effectiveness differs across developmental stages within young adulthood. The present study investigated age-related differences in response to MI among recreational substance users. **Methods:** A quantitative pre-test–post-test comparative study was conducted among recreational substance users who received MI as part of a randomized intervention study. Forty-seven participants who completed the intervention and four-week follow-up assessment were included and categorized into two age groups: 18–22 years ($n = 24$) and 23–26 years ($n = 23$). Substance-related risk was assessed using the NIDA-modified Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) at baseline and four weeks following the intervention. Within-group changes were analysed using the Wilcoxon signed-rank test, while changes in ASSIST scores between age groups were compared using the Mann–Whitney U test. **Results:** Significant reductions in NIDA-modified ASSIST scores were observed following Motivational Interviewing among participants aged 18–22 years ($Z = -3.90, p < .001$) and 23–26 years ($Z = -3.10, p = .002$), indicating that MI was associated with significant reductions in substance-related risk in both age groups. Participants aged 18–22 years demonstrated a greater mean change in ASSIST scores (mean change = 1.17) than participants aged 23–26 years (mean change = 0.83). However, the difference in change scores between the two age groups was not statistically significant ($U = 330.00, p = .227$), suggesting that age did not significantly influence treatment response following Motivational Interviewing. **Conclusion:** MI was associated with significant reductions in substance-related risk among recreational substance users across both age groups. Although younger participants demonstrated greater numerical improvement, age-related differences in treatment response were not statistically significant. These findings support the use of MI as an effective early intervention for young adults while highlighting the need for larger studies to clarify the influence of age on treatment outcomes.*

Keywords: Motivational Interviewing; recreational substance use; young adults; age differences; treatment response; NIDA-modified ASSIST; early intervention.

1. Introduction

Recreational substance use among young adults has become a significant public health concern because of its association with impaired physical and mental health, risky behaviours, and the potential progression to substance use disorders (Ambekar et al., 2019; United Nations Office on Drugs and Crime [UNODC], 2024). Young adulthood, particularly between the ages of 18 and 26 years, is characterized by increased autonomy, identity exploration, changing social roles, and greater exposure to opportunities for experimentation with psychoactive substances (Arnett, 2000). Although substance use during this developmental period is often perceived as experimental or recreational, repeated use may increase the likelihood of dependence, psychological distress, academic and occupational impairment, and engagement in other high-risk behaviours. Consequently, early interventions targeting recreational substance users are essential to prevent the escalation of substance use and its associated consequences.

Despite being grouped under a single developmental stage, young adults between the ages of 18 and 26 years are not a homogeneous population. Emerging adulthood encompasses substantial developmental transitions that influence cognitive, emotional, and behavioural functioning (Arnett, 2000). Individuals in the younger age range (18–22 years) are more likely to be engaged in identity exploration, peer-oriented lifestyles, and novelty seeking, whereas those in the older age range (23–26 years) often begin assuming greater educational, occupational, and interpersonal responsibilities.

These developmental changes are accompanied by continued maturation of executive functions, emotional regulation, decision-making abilities, and future-oriented thinking, all of which may influence health-related behaviours and readiness to change (Steinberg, 2014). Consequently, individuals at different stages of young adulthood may differ not only in their patterns of recreational substance use but also in their responsiveness to behavioural interventions.

Motivation for behavioural change is recognized as a dynamic construct that varies across individuals and developmental stages. Younger adults often initiate substance use because of curiosity, peer influence, sensation seeking, and social acceptance, whereas older young adults may become increasingly aware of the adverse consequences of continued substance use as they encounter academic, occupational, financial, or relationship responsibilities. These developmental experiences may influence an individual's perception of risk, motivation to reduce substance use, and willingness to engage in intervention programmes. Understanding whether age influences treatment response is therefore important for designing developmentally appropriate preventive interventions.

Motivational Interviewing (MI) is a collaborative, person-centred counselling approach developed to strengthen intrinsic motivation for behavioural change by exploring and resolving ambivalence (Miller & Rollnick, 2023). Rather than confronting or directing individuals, MI emphasizes empathy, autonomy, and the elicitation of personal reasons for change. Over the past four decades, MI has been widely applied across

a variety of health-related behaviours, including alcohol use, tobacco use, illicit drug use, medication adherence, and lifestyle modification. Numerous systematic reviews and meta-analyses have demonstrated that MI is effective in reducing substance use and improving treatment engagement, particularly among individuals who are ambivalent about changing their behaviour (Lundahl et al., 2010; Smedslund et al., 2011).

Although the effectiveness of MI has been established across diverse populations, comparatively little attention has been given to factors that may influence individual variability in treatment response. Most studies have focused on overall intervention outcomes while treating young adults as a single age group. However, developmental theories suggest that responsiveness to motivational interventions may differ across stages of young adulthood because of variations in cognitive maturity, self-regulation, life responsibilities, and readiness for change. Identifying such differences is important because interventions that are effective for one developmental subgroup may require adaptation for another.

Although MI has consistently demonstrated effectiveness across substance-using populations, few studies have examined whether developmental differences within emerging adulthood influence responsiveness to MI. Most studies treat young adults as a homogeneous group despite evidence that cognitive maturity, self-regulation, and life responsibilities change substantially between late adolescence and the mid-twenties. Consequently, it remains unclear whether younger and older emerging adults respond differently to MI.

Understanding whether age influences responsiveness to MI has important clinical and public health implications. If treatment outcomes differ across developmental stages within young adulthood, intervention strategies may need to be tailored according to age-specific developmental characteristics, motivational needs, and psychosocial contexts. Such evidence could contribute to the development of more targeted early intervention programmes aimed at preventing the progression from recreational substance use to problematic substance use.

Therefore, the present study examined age-related differences in the effectiveness of Motivational Interviewing among recreational substance users aged 18–26 years. Participants were categorized into younger (18–22 years) and older (23–26 years) age groups, and changes in substance-related risk following Motivational Interviewing were compared across these developmental stages. It was hypothesized that the effectiveness of Motivational Interviewing would differ between the two age groups, reflecting developmental variations in responsiveness to behavioural change interventions.

2. Method

Study Design

The present study employed a quantitative pre-test–post-test comparative design to examine age-related differences in response to Motivational Interviewing (MI) among recreational substance users. The study focused exclusively

on participants who received the MI intervention. Changes in substance-related risk from baseline to four-week follow-up were compared between younger (18–22 years) and older (23–26 years) participants.

Participants

Participants were drawn from a larger randomized intervention study conducted among recreational substance users aged 18–26 years in Guwahati, Assam. In the parent study, 180 participants were randomly allocated to one of three intervention conditions: Motivational Interviewing (MI), Awareness Intervention, or Control.

The present study included only participants who completed the Motivational Interviewing intervention and the four-week follow-up assessment. Of the 60 participants initially assigned to the MI group, complete post-intervention data were available for 47 participants. These participants constituted the study sample and were categorized into two age groups: 18–22 years ($n = 24$) and 23–26 years ($n = 23$).

Inclusion Criteria

Participants were eligible if they:

- Were between 18 and 26 years of age;
- Had completed higher secondary education (10+2) or above;
- Reported recreational use of one or more psychoactive substances;
- Demonstrated adequate cognitive functioning to complete the assessment and intervention procedures;
- Were residents of a Northeastern state of India and had been residing in Guwahati for at least one year;
- Reported at least one episode of aggression while under the influence of psychoactive substances.

Exclusion Criteria

Participants were excluded if they:

- Met diagnostic criteria for substance dependence or another substance use disorder requiring specialized treatment;
- Had a current diagnosis of a severe psychiatric disorder, including schizophrenia spectrum disorders, mood disorders, dissociative disorders, or anxiety disorders;
- Had insufficient language proficiency to participate in the assessment and intervention procedures;
- Had received formal Motivational Interviewing within the previous 12 months.

3. Measures

Sociodemographic Data Sheet

A structured sociodemographic data sheet was administered to collect information regarding age, gender, education, occupation, marital status, place of residence, and substance use history.

NIDA-Modified Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST)

Substance-related risk was assessed using the NIDA-modified Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST). The ASSIST was administered at baseline and four weeks following the intervention. Higher

scores indicate greater substance-related involvement and associated risk.

Procedure

Ethical approval was obtained from the Department Ethics Committee before commencement of the study. Eligible participants provided written informed consent before enrolment.

Participants completed baseline assessments using the sociodemographic data sheet and the NIDA-modified ASSIST. Individuals assigned to the Motivational Interviewing condition received a standardized individual MI session delivered by the investigator according to the principles of Motivational Interviewing. The intervention focused on developing a collaborative therapeutic relationship, resolving ambivalence toward substance use, eliciting change talk, enhancing intrinsic motivation, and strengthening commitment to behavioural change.

Four weeks following the intervention, participants completed the post-intervention assessment using the NIDA-modified ASSIST. For the present study, only participants with complete pre-test and post-test data in the MI group were included in the analysis. Participants were subsequently categorized into two age groups (18–22 years and 23–26 years) to examine age-related differences in treatment response.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics. Descriptive statistics (frequencies, percentages, means, and standard deviations) were computed for demographic and clinical variables.

Baseline equivalence between the two age groups was examined using an independent-samples *t*-test (or Mann–Whitney U test if assumptions of normality were not met).

Within each age group, changes in NIDA-modified ASSIST scores from pre-test to post-test were examined using paired-samples *t*-tests (or Wilcoxon signed-rank tests where appropriate).

To compare treatment response between younger (18–22 years) and older (23–26 years) participants, change scores (post-test minus pre-test) were calculated for each participant. The mean change scores of the two age groups were compared using an independent-samples *t*-test or the Mann–Whitney U test, depending on the distribution of the data. Statistical significance was set at $p < .05$.

4. Results

Table 1

Variable	18-22 years (n=24)	23-26 years (n=23)
Mean Age (years)	19.03	25.56
Males n (%)	16 (66.7)	13 (56.5)
Females n (%)	8 (33.3)	10 (43.5)

Table 2

Age Group	n	Pre-test Mean (SD)	Post-test Mean (SD)	Mean Change (Pre-Post)	Z	p	Effect size (r)
18–22	24	3.21 (0.72)	2.04 (0.36)	1.17	-3.9	<.001	0.8
23–26	23	3.22 (0.85)	2.39 (0.50)	0.83	-3.1	0.002	0.66

A Wilcoxon signed-rank test was conducted to examine changes in NIDA-modified ASSIST scores following Motivational Interviewing within each age group. Significant reductions in ASSIST scores were observed among participants aged 18–22 years ($Z = -3.9$, $p < .001$) and among those aged 23–26 years ($Z = -3.1$, $p = .002$), indicating that Motivational Interviewing was associated with significant reductions in substance-related risk in both age groups.

Table 3: Comparison of Mean Change in NIDA-modified ASSIST Scores Between Age Groups

Comparison	Mean Change (18–22)	Mean Change (23–26)	U	p
Pre–Post Change	1.17	0.83	330	0.227

A Mann–Whitney U test was conducted to compare the change in NIDA-modified ASSIST scores (pre-test minus post-test) between participants aged 18–22 years and those aged 23–26 years. Participants aged 18–22 years demonstrated a greater mean change in ASSIST scores ($M = 1.17$) than participants aged 23–26 years ($M = 0.83$). However, the difference in change scores between the two age groups was not statistically significant ($U = 330.00$, $p = .227$), suggesting that age did not significantly influence the response to Motivational Interviewing within the present sample.

5. Discussion

The present study examined whether age influences the response to Motivational Interviewing (MI) among recreational substance users by comparing changes in substance-related risk between younger (18–22 years) and older (23–26 years) participants. The findings demonstrated that MI was associated with significant reductions in NIDA-modified ASSIST scores within both age groups. Participants aged 18–22 years exhibited a significant reduction in substance-related risk following the intervention, with a large treatment effect ($r = .80$), while participants aged 23–26 years also demonstrated significant improvement with a similarly large effect size ($r = .66$). These findings support the effectiveness of MI as an early intervention for reducing substance-related risk among recreational substance users across young adulthood and are consistent with previous evidence demonstrating the efficacy of MI in promoting behaviour change among individuals engaging in risky substance use (Miller & Rollnick, 2023; Lundahl et al., 2010; Smedslund et al., 2011).

Although participants aged 18–22 years demonstrated a greater mean change in ASSIST scores (1.17) than those aged 23–26 years (0.83), the difference in improvement between the two age groups was not statistically significant. This

finding suggests that, within the present sample, age was not significantly associated with differences in treatment response to Motivational Interviewing. Nevertheless, the greater numerical improvement observed among younger participants is noteworthy and may reflect developmental characteristics associated with the earlier stages of emerging adulthood.

One possible explanation for this trend relates to neurodevelopment during emerging adulthood. The period between late adolescence and the mid-twenties is characterized by continued maturation of the prefrontal cortex and associated executive functions, including planning, self-regulation, impulse control, and decision-making (Steinberg, 2014). Motivational Interviewing encourages individuals to reflect on their behaviours, resolve ambivalence, and make autonomous decisions regarding change. Younger adults, whose cognitive and behavioural patterns are still developing, may therefore be particularly receptive to interventions that enhance self-reflection and strengthen intrinsic motivation. Similarly, Arnett's (2000) theory of emerging adulthood emphasizes that individuals in this developmental stage actively explore their identities and future goals, potentially making them more open to modifying health-related behaviours when provided with appropriate motivational support.

Another explanation may be that recreational substance use among younger adults is often characterized by experimentation and peer influence rather than long-standing behavioural patterns (Arnett, 2005). Because substance use behaviours may be less entrenched during the earlier years of emerging adulthood, they may be more amenable to change through brief motivational interventions. In contrast, participants aged 23–26 years may have had relatively longer histories of recreational substance use and more established behavioural routines. As substance use becomes increasingly integrated into daily lifestyles and social environments, behavioural change may require repeated or more intensive interventions. Nevertheless, the significant within-group improvements observed among older participants indicate that MI remains effective even when behavioural patterns may be comparatively more established.

Despite these developmental considerations, the absence of a statistically significant difference in mean change scores indicates that chronological age alone may not be a major determinant of treatment response among recreational substance users. Rather than age itself, responsiveness to MI may depend more strongly on individual factors such as readiness to change, intrinsic motivation, perceived consequences of substance use, self-efficacy, peer influences, family support, and the severity and duration of substance use. This interpretation is consistent with previous research suggesting that the effectiveness of Motivational Interviewing is primarily driven by motivational and psychosocial processes rather than demographic characteristics alone (Hettema et al., 2005; Lundahl et al., 2010).

The present findings also have important clinical implications. The large within-group effect sizes observed in both age groups suggest that MI is an effective brief intervention for recreational substance users irrespective of

age. These findings support the use of MI as an early preventive strategy before recreational substance use progresses to more severe substance-related problems. Rather than restricting MI to specific age groups, clinicians may consider implementing MI broadly among young adults while tailoring discussions to address age-relevant developmental concerns, personal goals, peer influences, and life responsibilities. Such individualized adaptations may enhance engagement and strengthen motivation for sustained behaviour change.

Several methodological considerations should be taken into account when interpreting these findings. Although younger participants demonstrated greater numerical improvement, the between-group comparison of change scores was not statistically significant, indicating that the observed difference could have occurred by chance. The relatively small sample size ($n = 47$) may have limited the statistical power to detect modest age-related differences in treatment response. Furthermore, the follow-up period was limited to four weeks, which may not have been sufficient to capture longer-term developmental differences in the maintenance of behaviour change. Future studies employing larger samples, longer follow-up periods, and longitudinal designs are needed to determine whether developmental stage moderates the long-term effectiveness of Motivational Interviewing among recreational substance users.

Overall, the present study demonstrates that Motivational Interviewing is associated with significant reductions in substance-related risk among recreational substance users aged 18–26 years. Although younger participants exhibited greater numerical improvement than older participants, age did not significantly influence treatment response. These findings suggest that MI is an effective intervention across young adulthood while highlighting the importance of investigating additional developmental and psychosocial factors that may better explain individual variability in treatment outcomes.

6. Conclusion

The present study examined age-related differences in response to Motivational Interviewing among recreational substance users aged 18–26 years. Significant reductions in NIDA-modified ASSIST scores were observed in both the 18–22-year and 23–26-year age groups following the intervention, indicating that Motivational Interviewing is an effective brief intervention for reducing substance-related risk across young adulthood. Although younger participants demonstrated greater numerical improvement than older participants, the between-group difference did not reach statistical significance. These findings suggest that Motivational Interviewing may be beneficial irrespective of age within young adulthood and support its use as an early intervention for recreational substance users. Future research involving larger samples and longer follow-up periods is needed to determine whether developmental differences meaningfully influence treatment response.

7. Limitations and Future Directions

Several limitations should be considered when interpreting the findings of the present study. First, the sample size for the subgroup analysis was relatively small ($n = 47$), which may have limited the statistical power to detect significant age-related differences in treatment response. Second, participants were recruited from a single geographic region in Northeast India, limiting the generalizability of the findings to other populations and cultural contexts. Third, substance-related risk was assessed using a self-report measure, which may be influenced by recall bias and social desirability. Fourth, the follow-up period was limited to four weeks, preventing conclusions regarding the long-term sustainability of treatment gains. Finally, the study focused exclusively on participants who completed the Motivational Interviewing intervention; therefore, the findings should be interpreted as an exploratory subgroup analysis rather than a comparison of intervention efficacy across treatment conditions. Attrition from the original Motivational Interviewing group (60 to 47 participants) may have introduced attrition bias, as only participants who completed the four-week follow-up were included in the analysis.

Future research should recruit larger and more diverse samples to improve statistical power and external validity. Studies incorporating longer follow-up assessments are needed to examine whether age-related differences emerge over time and whether treatment gains are maintained. Future investigations should also examine additional moderators of treatment response, such as readiness to change, motivation, severity of substance use, peer influences, family support, and psychological functioning, to better understand individual variability in response to Motivational Interviewing. Moreover, employing multivariable approaches, such as moderation or longitudinal analyses, may provide a more comprehensive understanding of the factors that influence treatment outcomes among recreational substance users.

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