E-ISSN 2250-0944
ISSN 2250-1150
doi: 10.31838/ijprt/16.01.808

Original Research Article

Cognitive Function, Impulse Control and Aggressive Behaviour in Individuals with and Without Alcohol Use Disorder: A Comparative Study

Dr. Sumati Arikera[1*], Dr. Keshava H B[2]

[1]Assistant Professor, Department of Psychiatry, Belagavi Institute of Medical College, Belagavi, India.
[2]Assistant Professor, Department of Forensic Medicine and Toxicology, Belagavi Institute of Medical College, Belagavi, India.

Corresponding Author
Dr. Sumati Arikera, Assistant Professor, Department of Psychiatry, Belagavi Institute of Medical College, Belagavi, India.
Email: sumatimayur@gmail.com

Received: 05/04/2026, Revised: 08/03/2026, Accepted: 02/05/2026, Published: 01/06/2026

ABSTRACT
Background: Alcohol use disorder (AUD) may be associated with differences in cognitive function, impulse control and aggressive behaviour. Examining these domains together may help characterize their relationships.
Aim: To compare cognitive function, impulse control and aggressive behaviour in individuals with and without AUD.
Methods: A comparative cross-sectional study included 300 adults, with 150 participants in each group. Cognitive function, impulsivity and aggression were assessed using the Montreal Cognitive Assessment (MoCA), Barratt Impulsiveness Scale version 11 (BIS-11) and Buss–Perry Aggression Questionnaire (BPAQ), respectively. Group means were compared using Welch's t test, and correlations with BPAQ total score were assessed using Pearson's correlation.
Results: In the results, the AUD group had a lower mean MoCA score than the group without AUD (23.8±3.4 vs 26.2±2.6; $p<0.001$), and higher mean BIS-11 (71.4±11.2 vs 62.6±9.8; $p<0.001$) and BPAQ scores (82.5±15.8 vs 66.8±13.9; $p<0.001$). The AUD group also had lower scores across the reported MoCA domains and higher scores across BIS-11 and BPAQ subscales. BPAQ total score was negatively correlated with MoCA score ($r=-0.42$) and positively correlated with BIS-11 score ($r=0.55$); both $p<0.001$.
Conclusion: The results show lower cognitive scores and higher impulsivity and aggression scores in the AUD group, with pooled correlations between aggression, cognition and impulsivity. These findings require confirmation using actual study data and appropriate adjusted analyses. The cross-sectional design would not establish causation.

Keywords: Alcohol use disorder; cognition; impulsivity.

INTRODUCTION

Alcohol use disorder (AUD) is a chronic condition marked by impaired control over alcohol use despite harm to health and social functioning. Its effects extend beyond physical illness and can include changes in thinking, self-regulation and behaviour. The World Health Organization estimated that 400 million people aged 15 years or older were living with AUD worldwide, underscoring its substantial public health impact.

Cognition includes attention, memory, processing speed and executive abilities such as planning, flexible thinking and decision-making. These abilities support a person's capacity to weigh consequences and regulate behaviour. In their meta-analysis, Stavro et al. reported broad cognitive deficits in people with alcoholism, while Stephan et al. found impairments in several executive-function domains, including inhibition, planning and problem-solving.

Cognitive difficulties may vary with the duration and severity of alcohol use, nutritional and medical status, and length of abstinence. Powell et al.'s review of longitu-

dinal studies found that several neuropsychological functions could improve during abstinence, though recovery differed across domains and studies.

Impulse control refers to the ability to pause or regulate an immediate response. Reduced inhibitory control may contribute to continued alcohol use and difficulty managing conflict. Aggressive behaviour is also relevant: alcohol use and aggression can be linked through impaired judgement, emotional regulation and behavioural inhibition, although aggression is influenced by many personal and social factors and should not be attributed to alcohol alone. In a study of alcohol-dependent patients, Liu et al. observed that participants with aggressive behaviour had cognitive differences, including in memory and attention, compared with those without aggressive behaviour.

AIM

To compare cognitive function, impulse control and aggressive behaviour in individuals with and without alcohol use disorder.

OBJECTIVES

1. To assess and compare cognitive function in individuals with and without alcohol use disorder.
2. To assess and compare impulse control between the two groups.
3. To assess and compare aggressive behaviour between the two groups and examine its relationship with cognitive function and impulse control.

MATERIAL AND METHODOLOGY

Source of data

Data were obtained directly from consenting adult participants recruited from the psychiatry outpatient department and inpatient services. Participants in the AUD group were recruited from those attending for assessment or treatment of alcohol-related problems.

Study design

A hospital-based, comparative cross-sectional study was conducted. Participants were assigned to one of two groups:

- **AUD group:** 150 individuals who met DSM-5 diagnostic criteria for AUD.
- **Comparison group:** 150 individuals without a current or lifetime diagnosis of AUD.

Study location

The study was conducted in the Department of Psychiatry. Assessments were carried out in a quiet room that allowed privacy and min imized interruption.

Study duration

The study was conducted over 12 months. Recruitment, interviews, cognitive and behavioural assessments, data entry and analysis were completed within this period.

Sample size

The total sample size was 300 participants, with 150 participants in each group. The calculation was based on comparing two independent proportions, using an anticipated aggressive-behaviour prevalence of 40% in the AUD group and 25% in the comparison group, a two-sided confidence level of 95%, and 80% power.

Inclusion criteria

AUD group

- Adults aged 18–60 years.
- Participants who met DSM-5 criteria for current AUD, established through a clinical interview by a qualified mental-health professional.
- Participants who were medically stable and sufficiently free from acute intoxication or withdrawal to complete the assessments.
- Participants who provided written informed consent.

Comparison group

- Adults aged 18–60 years.
- Participants who did not meet DSM-5 criteria for current or lifetime AUD.
- Participants whose alcohol-use screening did not indicate hazardous use, according to the prespecified screening threshold.
- Participants who were medically stable and provided written informed consent.

Exclusion criteria

Participants were excluded if they had:

- Acute alcohol intoxication or clinically significant withdrawal at the time of assessment.
- A history of a neurological disorder, major head injury with loss of consciousness, intellectual disability or other condition likely to substantially affect cognitive testing.
- Current use disorder involving substances other than alcohol or nicotine.

- An acute psychotic or manic episode, severe behavioural disturbance or other condition preventing reliable participation.
- Severe uncorrected hearing, vision, language or communication difficulties that prevented completion of the assessments.
- A medical condition that made participation unsafe or prevented completion of the study procedures.

Procedure and methodology

After institutional ethics committee approval, eligible participants were approached, the study was explained in a language they understood, and written informed consent was obtained. Each participant was assigned a unique study identification number. A structured interview was used to document sociodemographic details, clinical history, medical and psychiatric history, medication use, and alcohol-use history, including age at initiation, duration and pattern of use, and prior treatment.

AUD status was determined using a clinical interview based on DSM-5 criteria. A standardized alcohol-use screening instrument, such as the Alcohol Use Disorders Identification Test (AUDIT), was used to support assessment of alcohol-use pattern and to screen comparison participants. The chosen instrument and its prespecified cut-off were applied consistently in both groups.

Cognitive function was assessed with the Montreal Cognitive Assessment (MoCA), using the locally validated language version where available and applying the education correction specified in the instrument guidance. Impulse control was assessed with the Barratt Impulsiveness Scale, version 11 (BIS-11). Aggressive behaviour was assessed with the Buss–Perry Aggression Questionnaire (BPAQ). The same versions and administration procedures were used for both groups. Assessments were undertaken when participants were sufficiently alert and clinically stable; testing was deferred if intoxication, withdrawal or acute distress was present.

Sample processing and scoring

No biological specimens were collected or processed. Completed assessment forms were checked for completeness and scored according to the manuals or published scoring procedures for the instruments used. Reverse-scored items, where applicable, were checked before totals and subscale scores were calculated. Data were entered using study identification numbers without names in the analysis file. A second check was performed against the source forms to identify missing, out-of-range or inconsistent entries. Any correction was made by referring to the original form and maintaining confidentiality.

Data collection

Data were collected by the principal investigator or trained study personnel using a structured case-record form and standardized assessment instruments. The following information was recorded:

- Sociodemographic details: age, sex, education, occupation, marital status and residence.
- Clinical details: medical and psychiatric history, current medication, relevant physical conditions and smoking status.
- Alcohol-use details: age at onset, duration, frequency, quantity or pattern of use, prior treatment and current clinical status.
- Assessment results: DSM-5 AUD status, alcohol-screening score, MoCA total score, BIS-11 total and subscale scores, and BPAQ total and subscale scores.

Statistical methods

Data were analysed using SPSS 28.0 version. Continuous variables were summarized as mean and standard deviation when approximately normally distributed, or as median and interquartile range when distributions were skewed. Categorical variables were summarized as frequencies and percentages.

Between-group comparisons used the independent-samples *t* test for normally distributed continuous variables and the Mann–Whitney U test for skewed continuous variables. Categorical variables were compared using the chi-square test or Fisher's exact test, as appropriate. Associations among cognitive-function, impulsivity and aggression scores were assessed using Pearson or Spearman correlation, depending on distribution and scale properties.

Multivariable linear regression was used, where appropriate, to examine group differences in scale scores while adjusting for relevant potential confounders such as age, sex, education, smoking status and relevant clinical variables. Regression assumptions were assessed before interpretation. Results were reported with effect estimates and 95% confidence intervals where appli-

cable. All tests were two-sided, and $p<0.05$ was considered statistically significant.

OBSERVATION AND RESULTS

Table 1: Overall comparison of cognitive function, impulse control and aggressive behaviour (N=300)

Outcome measure	AUD group (n=150)	Without AUD (n=150)	Mean difference (95% CI)	Test statistic	*p* value
MoCA total score	23.8 (3.4)	26.2 (2.6)	-2.40 (-3.09 to -1.71)	Welch's t=-6.87	<0.001
BIS-11 total score	71.4 (11.2)	62.6 (9.8)	8.80 (6.41 to 11.19)	Welch's t=7.24	<0.001
BPAQ total score	82.5 (15.8)	66.8 (13.9)	15.70 (12.32 to 19.08)	Welch's t=9.14	<0.001

The AUD group had a lower mean MoCA score than the group without AUD (23.8±3.4 vs 26.2±2.6), with a mean difference of -2.40 points (95% CI: -3.09 to -1.71; Welch's t=-6.87; $p<0.001$). Mean BIS-11 scores were higher in the AUD group (71.4±11.2 vs 62.6±9.8; mean difference 8.80, 95% CI: 6.41 to 11.19; t=7.24; $p<0.001$), indicating greater impulsivity on this measure. The AUD group also had a higher mean BPAQ score (82.5±15.8 vs 66.8±13.9; mean difference 15.70, 95% CI: 12.32 to 19.08; t=9.14; $p<0.001$).

Table 2: Comparison of cognitive function between groups

MoCA domain	Maximum score	AUD group (n=150), Mean (SD)	Without AUD (n=150), Mean (SD)	Mean difference (95% CI)	Test statistic	*p* value
Visuospatial/executive	5	3.7 (1.0)	4.3 (0.7)	-0.60 (-0.80 to -0.40)	Welch's t=-6.02	<0.001
Naming	3	2.8 (0.4)	2.9 (0.3)	-0.10 (-0.18 to -0.02)	Welch's t=-2.45	0.015
Attention	6	4.7 (1.1)	5.3 (0.8)	-0.60 (-0.82 to -0.38)	Welch's t=-5.40	<0.001
Language	3	2.5 (0.6)	2.7 (0.5)	-0.20 (-0.33 to -0.07)	Welch's t=-3.14	0.002
Abstraction	2	1.3 (0.6)	1.6 (0.5)	-0.30 (-0.43 to -0.17)	Welch's t=-4.70	<0.001
Delayed recall	5	3.1 (1.3)	3.5 (1.1)	-0.40 (-0.67 to -0.13)	Welch's t=-2.88	0.004
Orientation	6	5.7 (0.6)	5.9 (0.4)	-0.20 (-0.32 to -0.08)	Welch's t=-3.40	<0.001
MoCA total score	**30**	**23.8 (3.4)**	**26.2 (2.6)**	**-2.40 (-3.09 to -1.71)**	**Welch's t=-6.87**	**<0.001**

The AUD group had lower mean scores across each MoCA domain and on the total score. The largest domain difference was observed for visuospatial/executive function (3.7±1.0 vs 4.3±0.7; mean difference -0.60, 95% CI: -0.80 to -0.40; $p<0.001$) and attention (4.7±1.1 vs 5.3±0.8; mean difference -0.60, 95% CI: -0.82 to -0.38; $p<0.001$). Differences were also statistically significant for naming, language, abstraction, delayed recall and orientation, with p values ranging from 0.015 to <0.001. The overall MoCA score was 23.8±3.4 in the AUD group and 26.2±2.6 in the comparison group, a mean difference of -2.40 points (95% CI: -3.09 to -1.71; Welch's t=-6.87; $p<0.001$).

Table 3: Comparison of impulse control between groups

BIS-11 measure	AUD group (n=150), Mean (SD)	Without AUD (n=150), Mean (SD)	Mean difference (95% CI)	Test statistic	*p* value
Attentional impulsiveness	19.8 (4.0)	16.8 (3.4)	3.00 (2.16 to 3.84)	Welch's t=7.00	<0.001
Motor impulsiveness	25.6 (4.9)	22.2 (4.2)	3.40 (2.36 to 4.44)	Welch's t=6.45	<0.001
Non-planning impulsiveness	26.0 (5.1)	23.6 (4.4)	2.40 (1.32 to 3.48)	Welch's t=4.36	<0.001
BIS-11 total score	**71.4 (11.2)**	**62.6 (9.8)**	**8.80 (6.41 to 11.19)**	**Welch's t=7.24**	**<0.001**

Mean BIS-11 scores were higher in the AUD group across all three reported dimensions. Attentional impulsiveness was 19.8±4.0 in the AUD group compared with 16.8±3.4 in the group without AUD (mean difference 3.00, 95% CI: 2.16 to 3.84; p<0.001). Motor impulsiveness was also higher (25.6±4.9 vs 22.2±4.2; mean difference 3.40, 95% CI: 2.36 to 4.44; p<0.001), as was non-planning impulsiveness (26.0±5.1 vs 23.6±4.4; mean difference 2.40, 95% CI: 1.32 to 3.48; p<0.001). The total BIS-11 score was 71.4±11.2 in the AUD group and 62.6±9.8 in the comparison group (mean difference 8.80, 95% CI: 6.41 to 11.19; p<0.001). Each comparison was statistically significant.

Table 4: Comparison of aggressive behaviour and its relationship with cognition and impulse control

Measure	AUD group (n=150), Mean (SD)	Without AUD (n=150), Mean (SD)	Mean difference (95% CI)	Test statistic	*p* value
Physical aggression	22.1 (6.1)	17.2 (5.2)	4.90 (3.61 to 6.19)	Welch's t=7.49	<0.001
Verbal aggression	14.8 (3.8)	13.1 (3.2)	1.70 (0.90 to 2.50)	Welch's t=4.19	<0.001
Anger	21.9 (5.4)	17.8 (4.7)	4.10 (2.95 to 5.25)	Welch's t=7.01	<0.001
Hostility	23.7 (5.8)	18.7 (5.1)	5.00 (3.76 to 6.24)	Welch's t=7.93	<0.001
BPAQ total score	**82.5 (15.8)**	**66.8 (13.9)**	**15.70 (12.32 to 19.08)**	**Welch's t=9.14**	**<0.001**

Pooled-sample correlations with BPAQ total score (N=300)

Correlate	Pearson's *r* (95% CI)	Test statistic	*p* value
MoCA total score	-0.42 (-0.51 to -0.32)	$t(298)$=-7.99	<0.001
BIS-11 total score	0.55 (0.47 to 0.62)	$t(298)$=11.37	<0.001

The AUD group had higher mean scores than the group without AUD for physical aggression (22.1±6.1 vs 17.2±5.2), verbal aggression (14.8±3.8 vs 13.1±3.2), anger (21.9±5.4 vs 17.8±4.7) and hostility (23.7±5.8 vs 18.7±5.1). The differences were statistically significant for all four subscales (p<0.001). The mean BPAQ total score was also higher in the AUD group (82.5±15.8 vs 66.8±13.9; mean difference 15.70, 95% CI: 12.32 to 19.08; p<0.001).

In the pooled sample, MoCA total score had a negative correlation with BPAQ total score (r=-0.42, 95% CI: -0.51 to -0.32; p<0.001), while BIS-11 total score had a positive correlation with BPAQ total score (r=0.55, 95% CI: 0.47 to 0.62; p<0.001). Thus, lower cognitive scores and higher impulsivity scores were associated with higher aggression scores in this dataset. These pooled correlations are unadjusted and may partly reflect differences between the AUD and comparison groups; group-specific or adjusted analyses would be needed to assess whether the relationships persist after accounting for group membership and other relevant factors.

DISCUSSION

Table 1: Overall comparison of cognitive function, impulse control and aggressive behaviour

In the comparison, the AUD group had a lower mean MoCA score and higher mean BIS-11 and BPAQ scores than the group without AUD; all three differences were statistically significant. The lower MoCA score is consistent in direction with research reporting deficits in global cognition and executive functioning among some people with AUD. Stephan et al. (2017)[1] found deficits across executive-function and impulsivity measures, while Brion et al. (2017)[2] reported difficulties in inhibition, updating and cognitive flexibility. Le Berre et al. (2017)[3] also described impairments involving executive function, memory and social cognition. However, these studies used different assessment methods and populations, so their findings do not validate the specific mean differences in the present table.

Table 2: Comparison of cognitive function between groups

The MoCA results show lower scores in the AUD group across all domains, with statistically significant differences in visuospatial/executive function, attention, naming, language, abstraction, delayed recall and orientation. This broad pattern is compatible with studies describing cognitive difficulties across several domains, including attention, memory, visuospatial ability and executive functioning. Ros-Cucurull et al. (2018)[4] reported impairment in measures that included recall, working memory, set switching and sustained attention among older adults with hazardous alcohol use. Caneva et al. (2020)[8] found that many early-detoxified inpatients showed impairment in at least one neuropsychological domain, particularly executive, visuospatial and memory functions.

The pattern should not be interpreted as uniform impairment in every person with AUD. Schmid et al. (2021)[10] identified distinct executive-function profiles, including a subgroup with relatively unimpaired performance. Recovery and testing conditions may also influence scores: Angerville et al. (2023)[12] observed improvement in some neuropsychological measures during detoxification, and Powell et al. (2024)[13] found that recovery varied by cognitive domain and duration of abstinence. Teixeira et al. (2024)[14] further reported that cognitive performance during detoxification was associated with subsequent relapse outcomes. These differences in samples, clinical status, abstinence and instruments limit direct comparisons with the MoCA results shown here.

The domain-level *p* values should also be interpreted cautiously. Since several MoCA domains were tested, the chance of at least one false-positive result increases if no adjustment for multiple comparisons was planned. The analysis plan should state whether these domain comparisons were prespecified or exploratory and whether a correction was applied.

Table 3: Comparison of impulse control between groups

The BIS-11 results indicate higher attentional, motor and non-planning impulsiveness scores in the AUD group, as well as a higher total score. This direction is supported by Jakubczyk et al. (2018)[5], who compared 180 people receiving inpatient AUD treatment with 93 healthy controls and reported higher impulsivity across the BIS-11 domains examined. Stephan et al. (2017)[1] also reported deficits in inhibitory control and several forms of impulsivity across the studies in their meta-analysis.

These findings suggest a difference in self-reported impulsivity in the data; they do not establish that AUD caused the difference. Impulsivity may be associated with other clinical or social factors, including emotional regulation, psychiatric symptoms, alcohol-use severity and withdrawal status. Jakubczyk et al. (2018)[5] specifically examined emotion regulation alongside BIS-11 scores, supporting the need to consider these factors when interpreting group differences.

Table 4: Aggressive behaviour and its relationship with cognition and impulse control

The BPAQ scores were higher in the AUD group for physical aggression, verbal aggression, anger, hostility and the total score. In a study of alcohol-dependent patients, Liu et al. (2020)[9] reported lower immediate-memory and attention scores among patients classified as having aggressive behaviour than among alcohol-dependent patients without aggressive behaviour. Ritter et al. (2019)[6] found that past aggression and alcohol-use patterns interacted in predicting laboratory aggressive responding among male college students. These studies pro-

vide related evidence, but their samples and aggression measures differ from the clinical-group comparison here.

The pooled correlations show a negative association between MoCA and BPAQ scores and a positive association between BIS-11 and BPAQ scores. This direction is compatible with a possible relationship between cognitive or behavioural control and aggression, but the correlations are unadjusted and combine both study groups. They may partly reflect the differences between the AUD and non-AUD groups rather than relationships within either group. The results should therefore not be described as showing that poorer cognition or greater impulsivity independently predicts aggression. Group-specific correlations or a regression model adjusting for AUD status and relevant confounders would be needed. Nagar and Rabinovitz (2024)[16] also found that alcohol's association with aggression varied with drinking pattern in a controlled laboratory study, reinforcing the importance of considering context and individual differences.

CONCLUSION

In the comparison, individuals with alcohol use disorder had lower MoCA scores and higher BIS-11 and BPAQ scores than individuals without AUD. Differences were reported across the MoCA and BIS-11 domains and the BPAQ subscales. In the pooled sample, higher aggression scores were associated with lower cognitive scores and higher impulsivity scores.

If confirmed by the actual dataset, these findings would suggest that cognitive function, impulsivity and aggressive behaviour merit assessment together in people with AUD. Because the study is cross-sectional, the results would indicate associations and group differences, not causation. The pooled correlations would also need group-specific or adjusted analyses before being interpreted as relationships independent of AUD status.

LIMITATIONS OF STUDY

- The cross-sectional design would not establish the direction or cause of associations between AUD, cognition, impulsivity and aggression.
- Recruitment from a single hospital could limit how well findings apply to community populations or other clinical settings.
- MoCA, BIS-11 and BPAQ scores may be influenced by education, language, culture, insight and response bias. Self-report measures may not fully represent behaviour in everyday situations.
- Cognitive performance may vary with abstinence duration, recent intoxication or withdrawal, alcohol-use severity, sleep, nutrition, medical conditions and medication use.
- Psychiatric comorbidity, smoking and other social or clinical factors could confound group differences if not measured and adjusted for adequately.
- Comparisons across several MoCA domains and questionnaire subscales increase the risk of chance findings if multiple testing is not addressed.
- Pooled correlations may partly reflect the difference between the AUD and comparison groups. Analyses within each group or adjusted regression models would be needed.
- The sample size calculation was approximately 304 participants, while the planned sample was 300; this small shortfall may modestly reduce statistical power.
- The numerical results supplied for this draft are illustrative. They cannot support conclusions about actual participants until verified against the original data.

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