Development and validation of the Schedule for the Assessment of Insight in Alcohol Dependence (SAI-AD): Dimensions and correlates of insight in alcohol use disorder

George Konstantakopoulos,[a, b] * Anna Trova,[a] Elias Tzavellas,[a] Pentagiotissa Stefanatou,[a] Anthony S. David,[c] Thomas Paparrigopoulos[a]

[a] First Department of Psychiatry, Medical School, National and Kapodistrian University of Athens, Greece

[b] Research Department of Clinical, Education and Health Psychology, University College London, UK

[c] UCL Institute of Mental Health, Division of Psychiatry, University College London, UK

* Corresponding Author
George Konstantakopoulos
Eginition Hospital, 72-74 Vas. Sofias av., 11528 Athens, Greece
Tel: +30210764011, Fax: +302107662829,
e-mail: gekonst@otenet.gr, gekonst@med.uoa.gr

Abstract

Introduction: The objectives of this study were to develop a multidimensional, clinician-rated scale that assess impaired insight into illness in patients with alcohol use disorder (AUD) and to examine its reliability, validity and internal structure. Moreover,

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we investigated the relationships of overall insight and its dimensions with demographic and clinical characteristics in AUD.

Methods: We developed the Schedule for the Assessment of Insight in Alcohol Dependence (SAI-AD), based on scales that has already been used in psychosis and other mental disorders. Sixty-four patients with AUD were assessed with SAI-AD. The insight item from the Positive and Negative Syndrome Scale was used to evaluate convergent validity of SAI-AD. Hierarchical cluster analysis and multidimensional scaling were used to identify insight components and assess their inter-relationships.

Results: The SAI-AD demonstrated good convergent validity ($r = -0.73$, $p < 0.001$) and internal consistency (Cronbach's alpha = 0.72). Inter-rater and test-retest reliabilities were high (intra-class correlations 0.90 and 0.88, respectively). Three subscales of SAI-AD were identified which measure major insight components: awareness of illness, recognition of symptoms and need for treatment, and treatment engagement. Higher levels of depression, anxiety and AUD symptom severity were associated with overall insight impairment but not with recognition of symptoms and need for treatment, or with treatment engagement. Illness duration was specifically and positively associated with the treatment engagement component of insight.

Conclusions: Insight is a multidimensional construct in AUD and its major components appear to be associated with different clinical aspects of the disorder. The SAI-AD is a valid and reliable tool for the assessment of insight in AUD patients.

1. Introduction

Lack of awareness of their disorder, its symptoms and consequences, and the need for treatment is very common among patients with alcohol use disorder (AUD). Impaired insight contributes in various ways to the poor current therapeutic outcomes in AUD. Poor insight is strongly associated with avoidance of treatment (Probst et al., 2015), less successful quit attempts (Willems et al., 1973) and more premature dropouts (Ball et al., 2006) during treatment programs, less time of abstinence after discharge (Kim et al., 2007), and a higher risk of relapse (Dandaba et al., 2020, Shen et al., 2021).

Although largely investigated in schizophrenia, insight impairments are observed in many, if not all, mental disorders. Studies in psychosis and non-psychotic disorders have shown that insight is a multidimensional phenomenon (David, 1990; Konstantakopoulos, 2019). Several different components of insight have been examined, including the ability to recognize that one has a mental illness, the capacity to relabel symptoms as pathological, awareness of illness' consequences, and engagement with treatment (David et al., 2012, Konstantakopoulos et al., 2013). Therefore, based on multidimensional scales for the assessment of insight in psychosis, such as the Schedule for the Assessment of Insight - Expanded version (SAI-E) (Kemp & David, 1997) and the Scale to Assess Unawareness of Mental Disorder (SUMD) (Amador et al., 1993), disorder-specific insight scales have been developed for non-psychotic disorders, such as mood disorders (Sturman & Sproule, 2003; Olaya et al., 2012) and eating disorders (Konstantakopoulos et al., 2011; Konstantakopoulos et al., 2020). Similarly, a multidimensional assessment of insight in AUD could facilitate further research on the nature, determinants and role of its deficits in this disorder. A recent review that examined existing data on insight in AUD concluded that a more comprehensive understanding of the concept of insight and its clinical implications is

needed and is expected to promote advancements in the treatment and prognosis of the disorder (Raftery et al., 2020).

Most of the existing measures of illness awareness in AUD assess some, but not all the dimensions of insight, known from other mental disorders. For example, three questionnaires assess general recognition of illness and awareness of consequences (Miller & Tonigan 1996; Salloum et al., 1998; Poncin et al., 2015), while the more commonly used Hanil Alcohol Insight Scale (HAIS) (Kim et al., 1998) additionally assesses awareness of need for treatment. Recently, Kim et al. (2021) developed the Alcohol Use Awareness and Insight Scale (AAS) that includes also items on attribution of symptoms to the illness. However, the factor analysis of this scale revealed only a single component (Kim et al., 2021) Consequently, the hypothesis of multiple distinct, although partially overlapping, components of the insight construct in AUD warrants further investigation.

Moreover, most of the insight measures in AUD are self-report questionnaires. However, a self-report instrument may add to difficulties in assessing insight, especially in alcohol-using populations. Every self-report assessment of insight suffers from circularity, i.e., some patients with low awareness into their condition might report higher insight, whereas people who use alcohol often do not view their use as problematic. Indeed, in studies using self-report insight measures participants with more severe alcohol use report higher insight levels (Raftery et al., 2020). Furthermore, especially in clinical populations the use of self-report format may enhance the 'over-compliance' effect (the confounding effect of patients' eagerness to please resulting to 'pseudo-agreement') (Konstantakopoulos et al., 2020). To the best of our knowledge, clinician-rated scales of insight used in AUD so far were global assessments of illness awareness, either using a single item measure of insight (Willems et al., 1973) or of

illness denial (Newsome & Ditzler, 1993), or estimating insight from a Readiness to Change scale by subtracting pre-contemplation score from contemplation score (Blume et al., 2000).

Against this background, we developed the Schedule for the Assessment of Insight in Alcohol Dependence (SAI-AD), an interview-based multidimensional insight scale specific for patients with AUD. We anticipated that a clinician-rated instrument may be more accurate in assessing insight in AUD and better reveal distinct insight components. On the scope, we also included in the scale items on relabeling of specific symptoms of AUD and engagement with treatment, because these aspects of insight have been identified as distinct dimensions in other mental disorders. The construction of SAI-AD was based on the SAI-E, an interview-based multidimensional scale broadly used in patients with psychosis. Modified versions of SAI-E have been already developed for assessment of insight in eating disorders (Konstantakopoulos et al., 2011; Konstantakopoulos et al., 2020).

The objectives of this study were: (a) to examine the reliability and validity of the SAI-AD, (b) to detect possible dimensions of insight in AUD through the internal structure of the SAI-AD, and (c) to investigate the relationships of insight (overall and its dimensions) with demographic and clinical characteristics in AUD.

2. Methods

2.1. Construction of the SAI-AD

In order to determine the content and format of SAI-AD we considered the following demands. First, the scale needed to assess multiple aspects of insight in AUD, including the three major components identified in other psychiatric disorders (recognition of mental illness, awareness and relabeling of symptoms, treatment engagement). Second,

it should be easily administered and scored by a clinician who is aware of the patient's symptomatology and engagement with treatment. Third, it needed to assess awareness and relabeling of the specific AUD symptoms that the patient has (i.e., signs of tolerance, withdrawal, loss of control, craving, inability to quit drinking, time spent related to alcohol, excessive use despite the consequences). Finally, awareness of the physical health problems due to alcohol use (e.g., weakness, fatigue, gastrointestinal problems, sleep disorders) should be included in the scale.

In view of the above considerations the SAI-AD included the following items: (1) awareness of psychological changes, (2) awareness of having a psychological condition, (3) recognition that the psychological condition amounts to a mental disorder, (4) awareness of the psychosocial consequences of the condition, (5) awareness of the physical health problems related to the condition, (6) awareness of the need for treatment, (7) awareness of AUD related symptoms, (8) ability to relabel these symptoms as part of the disorder, (9) patient's capacity to take into account another person's perspective ('hypothetical contradiction' item) (Brett-Jones et al., 1987), (10) engagement with treatment – a supplementary item rated by patient's therapist. The formulation and the scoring of the items were adapted from the SAI-E. Items 1-6 are rated from 0 to 2, while items 7-9 are rated from 0 to 4, with higher scores indicating better insight. Treatment engagement is rated from 0 (complete refusal) to 5 (active participation).

2.2. Participants

Sixty-four patients with AUD (44 male and 20 female) were consecutively recruited within the first three days of admission to the Alcohol Treatment Ward of the Eginition University Hospital. All participants suffered from AUD according to DSM-5 criteria (American Psychiatric Association, 2013). All patients were fluent Greek speakers,

aged 22-60. Exclusion criteria for participation in the study were: intellectual disability, dementia, current psychotic mood episode, and a history of psychotic disorder. A total of 73 patients were invited to participate in the study, but 3 refused participation and 6 were not eligible for participation due to exclusion criteria.

2.3. Measures

The *Mini-International Neuropsychiatric Interview (MINI)* version 6.0.0 (Sheehan et al. 1998) was used to confirm the AUD diagnosis and assess the presence of comorbid mental disorders. The MINI is a structured interview that explores psychiatric diagnoses according to the DSM-IV and ICD-10. In the present study, diagnoses detected with MINI were subsequently confirmed by experienced clinicians (E.T. and T.P.) using the DSM-5 criteria.

The *Severity of Alcohol Dependence Questionnaire (SADQ-C)* (Stockwell et al. 1979; Stockwell et al. 1983) was used to measure the severity of alcohol dependence. This questionnaire includes 20 items rated on a 4-point Likert scale. Severe, moderate and mild alcohol dependence is indicated by SADQ-C total score of more than 30, from 16 to 30, and below 16, respectively.

The insight item of the *Positive and Negative Syndrome Scale (PANSS)* (i.e., general scale, item 12) was used in this study as the criterion variable in order to assess the convergent validity of SAI-AD, since it was the only existed measure of a similar construct in Greek with proven validity and reliability. This item is a global clinical assessment of insight impairment. It estimates the level of insight by assessing one's ability to recognize psychiatric illness, symptoms and need for treatment, and is rated from 1 (full illness awareness) to 7 (absolute lack of insight).

The *Hospital Anxiety and Depression Scale (HADS)* (Zigmond & Snaith, 1983; Michopoulos et al., 2008) was used to assess current anxiety and depressive symptoms.

This is a self-report scale consisting of two 7-item subscales (HADS – Anxiety and HADS – Depression).

The *Mini-Mental State Examination* (MMSE) (Folstein et al. 197)) was used as a gross measure of cognitive functioning. The Vocabulary subscale of the *Wechsler Adult Intelligence Scale-Revised* (WAIS-Vocabulary) (Wechsler, 1981) was used to estimate general intelligence (Groth-Marant, 1999).

2.4. Procedures

All clinical assessments were performed by the same rater (A.T.) with the exception of SAI-AD, which was independently administered by the first author (G.K.). All the interviews and questionnaires were administered to each participant on the same day. For the evaluation of SAI-AD interrater reliability, the 20 initial interviews were audiotaped and independently rated by three other authors (A.T., E.T., and T.P.). The SAI-AD was re-administered to one half of the participants by the same interviewer one week later in order to evaluate test-retest reliability. The study protocol was approved by the Eginition University Hospital Ethics Committee and all participants provided written consent after receiving detailed information about the study.

2.5. Statistical analysis

Intraclass correlations (ICCs) were used to evaluate interrater and test-retest reliability and Pearson's product moment coefficient r was used to determine correlations between each item and the total score minus that item. Cronbach's alpha was estimated in order to examine the internal consistency of the SAI-AD and its subscales. The convergent validity was examined through the Spearman's rho values between the SAI-AD total score and the insight item of the PANSS (PANSS-Insight).

Hierarchical cluster analysis (HCA) and multidimensional scaling (MDS) were used to assess the internal structure of the SAI-AD. Both HCA and MDS can produce

heuristic illustrations of the relationships between diverse items giving useful information unattainable through the statistical techniques based on correlations, such as factor analysis (Kemmler et al., 2002; Chang et al., 2009). The aim of HCA was to clarify the non-overlapping cluster structure of the SAI-AD. The Ward's method was used to optimize the minimum variance within clusters. The optimal number of clusters was determined according to the 'elbow' criterion (Everitt, 1993). MDS converts the degree of dissimilarity between two items into the geometric distance between two points in a space of a given number of dimensions (Kruskal & Wish, 1978) and the location of the items can be used for the detection of clusters of items (Kemmler et al., 2002). Moreover, the dimensions of the MDS map might reflect features of the construct under study that underlie the structure of the scale. We used the MDS proximity scaling (PROXSCAL) procedure and the Euclidean distance as a measure of (dis)similarities. The SAI-AD item scores were entered in both HCA and MDS after z transformation.

Normality was assessed with the Kolmogorov–Smirnov test, kurtosis values, and relevant plots. Since most of the examined variables did not follow normal distribution, the non-parametric Mann-Whitney U and Kruskal-Wallis H tests were used for comparisons between groups, and the strength of associations between insight and other variables was assessed with Spearman's coefficients rho. The alpha level was set at 0.05. Statistical analyses were performed using IBM SPSS Statistics version 27.0.

3. Results

3.1. Sample characteristics

The demographic and clinical characteristics of the sample are displayed in *Table 1*. The vast majority of the participants presented comorbid mental disorders, especially affective (85.9%) and anxiety (51.5%) disorders. Moreover, the majority was

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experiencing a major depressive episode (64.1%) and most of them suicidal ideation (39.1%). Problematic use of other substances was found in 23.4% of the participants. Most of the participants presented severe alcohol dependence (64.1%).

[Table 1]

3.2. SAI-AD reliability and validity

The overall internal consistency of the SAI-AD was high (Cronbach's alpha = 0.72). However, the item 'treatment engagement" correlated very weakly with the total score (r = 0.18) and its correlations with all other items were also weak or very weak (r = 0.03-0.24). The correlations of all other items with total score were satisfactory (r = 0.30 – 0.49), taking into account that, as we assumed, they measure distinct aspects of insight (see *Table 2*). We retain the "treatment engagement" item for the final scale for two reasons: a) this item is rated by the treating clinician while all others are rated based on patient's answers, and therefore it is plausible that there is a divergence between these two perspectives stronger than the differences among patient's opinions, and b) patient's attitude towards the offered treatment is a distinct behavioural indication, useful for an integrated assessment of insight. However, since the 'Treatment engagement' item is rated by the therapist and constitutes a separate component of insight, we suggest a subtotal score from the sum of all other items and a separate score for this item in the SAI-AD (see in the Appendix).

The interrater ICCs for the individual item scores ranged from 0.76 to 0.92 and for the total score was 0.90. indicating high interrater reliability. The test-retest reliability of the SAI-AD was also high as the ICCs ranged from 0.78 to 0.91 for the individual items and for the total score was 0.88 (see *Table 2*).

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Regarding the convergent validity, SAI-AD total score was strongly correlated with the score in the insight item of PANSS (rho = -0.73, p < 0.001).

[Table 2]

3.3 Internal structure of SAI-AD

The HCA solution is displayed as a dendrogram in *Figure 1*. The elbow criterion suggested that the optimal number of clusters was two. The first cluster included the items on awareness of psychological changes and psychological condition, recognition of having a mental disorder, awareness of the consequences and the physical health problems related to alcohol use. The second cluster included the items on recognition and relabeling of the symptoms, awareness of the need for treatment, and the hypothetical contradiction item. The item on engagement with treatment was not included in the HCA since it is not based on patient's answer.

[Figure 1]

The internal structure of the SAI-AD, as determined on the MDS map, is shown in *Figure 2*. The solution of the MDS procedure turned out to be two-dimensional. The normalised raw stress was 0.017 (badness-of-fit) and the Tucker's φ was 0.991 (goodness-of-fit), indicating the solution identified was robust (Borg & Groenen, 1997). Along the first dimension of the MDS map (dimension 1), we can clearly identify the two clusters revealed by the HCA. The "treatment engagement" item appears at great distance from the all the other items and could be identified as a distinct component, as expected.

Moreover, the two dimensions revealed by MDS are amenable to interpretation. Dimension 1 represents the degree of specificity of insight components: from the

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generic awareness of illness to the more specific relabeling of symptoms and treatment engagement. Dimension 2 could be considered as reflecting patients' self-evaluation processes regarding their mental condition, i.e., self-evaluation after introspection or taking the perspective of other people. Indeed, there is a distance between aspects of insight related to patients' agreement with clinicians' opinions and recommendations (need for treatment for mental disorder) and others' perspective (hypothetical contradiction) and aspects related to self-reflection (relabeling of symptoms and attribution of problems to the mental disorder). The recognition of mental disorder is located in the middle of this dimension and this could mean that it is the output of both introspection and perspective taking processes.

[Figure 2]

According to the results of HCA and MDS, in the following analysis we used three subscales of SAI-AD: 'Awareness of mental disorder', 'Recognition of symptoms and need for treatment', and 'Treatment engagement'. The Cronbach's alpha for the 'Awareness of mental disorder' was 0.72 and the 'Recognition of symptoms and need for treatment' subscales and 0.65, respectively (the coefficient cannot be computed for the 'Treatment engagement' dimension since it consists of only one item). Since values of alpha less than 0.7 are common and acceptable for scales with a small number of items (Cortina, 1993), the three subscales were retained.

The 'Recognition of symptoms and need for treatment' score was correlated strongly with the SAI-AD total score (rho = 0.72, p < 0.001), while the correlation of the other two dimensions with total score was moderate (rho = 0.54 for 'Awareness of mental disorder' and rho = 0.51 for 'Treatment engagement'). A moderate correlation between 'Awareness of mental disorder' and 'Recognition of symptoms and need for

treatment' was found (rho = 0.34, p < 0.01). The correlation of 'Treatment engagement' with 'Recognition of symptoms and need for treatment' was weak but significant (rho = 0.28, p < 0.05), while the correlation between 'Treatment engagement' and 'Awareness of mental disorder' was very weak and not statistically significant (rho = 0.05, p > 0.05).

3.4. Associations of insight and its dimensions with demographic and clinical characteristics

Table 3 displays the Spearman correlation coefficients of the SAI-AD subscales and total score with demographic and clinical variables. The levels of overall insight and its components were not significantly correlated with age, education, general intelligence (WAIS-Vocabulary) and cognitive functioning (MMSE). Illness duration was significantly correlated with treatment engagement and the number of previous detox hospitalizations was significantly correlated with awareness of having a mental disorder. The SADQ-C total score was significantly correlated with awareness of mental disorder and overall insight score. The stronger correlations found were between HADS depression and anxiety subscales with awareness of mental disorder and overall insight. However, the correlations between HADS scores and the other two insight components were not significant.

[Table 3]

No significant difference between genders in SAI-AD total and subscale scores was found. Similarly, no significant difference was found in comparisons between groups of participants with different family or occupational status. Participants with a current major depressive episode had significant higher SAI-AD total score (U=309.5, p=0.041) and higher score in the 'Awareness of mental disorder' subscale (U=292.0,

p=0.019) than those without a major depressive episode. Similarly, participants with suicide ideation had significant higher SAI-AD total score (U=304.5, p=0.033) and higher score in the 'Awareness of mental disorder' subscale (U=291.5, p=0.018) than those without current suicidal ideas. Participants with affective disorder diagnosis scored higher than the rest AUD patients in overall SAI-AD (U=43.0, p<0.001), 'Awareness of mental disorder' subscale (U=96.5, p=0.009) and 'Recognition of symptoms and need for treatment' subscale (U=54.5, p<0.001). There was no significant difference in SAI-AD total and subscale scores between participants with and without comorbid anxiety disorder or other substance use disorder.

4. Discussion

We developed the SAI-AD as a clinician-rated, scale for multidimensional assessment of insight in patients with AUD. Since impaired insight is a common feature of AUD with great clinical importance, we assumed that SAI-AD would be valuable in the clinical assessment of patients and could also provide important information on their response to treatment. It could also be very useful in further investigation of insight impairment in AUD, particularly because information about distinct components of insight and their specific role in the therapeutic process is scarce.

The internal consistency of SAI-AD was sufficiently high and both the inter-rater and test-retest reliability were very good. Although the 'treatment engagement' item exhibited weak correlations with the total score and all other items, it was retained in the scale because it is a special item rated by the therapist and assessing patient's attitude towards the treatment from the clinician's perspective, which is a distinct component of insight, useful for a global assessment of insight. This information is not available when using the existing self-report measures of insight in AUD, even with

questionnaires that assess patient's report on the need for treatment (Kim et al. 2021). Many patients reporting awareness of the need for treatment do not accept or engage with treatment in practice.

We examined the validity of the scale using as criterion the independent ratings of the insight item of the PANSS. We found a strong correlation between SAI-AD total score and the PANSS-insight item, indicating that it is a valid measure of insight in patients with AUD. However, since we used a global clinician-rated assessment of insight, further examination of the convergent validity using one of the existing self-report measures of insight in AUD is warranted.

Using HCA and MDS we detected clusters of SAI-AD that represent three main components of insight, namely awareness of mental disorder, recognition of symptoms and need for treatment, and treatment engagement. The insight components we identified are in accordance with those proposed by David (1990) for patients with psychosis. However, the item on need for treatment incorporated into the same cluster with recognition and relabeling of symptoms in our analysis, whereas in similar investigations of the original SAI-E and its modification for eating disorders this item was grouped together with items on awareness of illness and its consequences (Konstantakopoulos et al., 2013; Konstantakopoulos et al., 2020). It appears that especially in AUD the awareness of need for treatment keeps up with recognition and relabeling of symptoms, indicating that the assessment of insight into specific symptoms has a crucial role in AUD patients. As was to be expected, the treatment engagement item showed high degree of dissimilarity with other items in MDS and was therefore identified as a separate component of insight. The 'hypothetical contradiction' item was included into the awareness of symptoms component. This relationship has also been revealed from the HCA and MDS examining insight dimensions in patients

with schizophrenia (Konstantakopoulos et al., 2013) or eating disorders (Konstantakopoulos et al., 2020). It seems that there is a trans-diagnostical link between the ability to take into account the views of the others and the ability to relabel the symptoms as pathological. This link may be a manifestation of a more general interaction between the metacognitive abilities of self-reflection and perspective taking. In line with this, significant contribution of theory of mind deficits to insight impairments has been found in schizophrenia (Bora, 2017) and anorexia nervosa (Konstantakopoulos et al., 2020b). Mentalizing deficits has also been found in AUD (Onuoha et al., 2016) and therefore, their potential relationship with insight, especially with awareness of symptoms, could be examined in future studies.

The MDS map revealed two underlying dimensions within the insight construct. The first coordinate of the map may be interpreted as a continuous transition from more 'generic' to more 'specific' aspects of insight, i.e., from mere acceptance of having a mental illness to relabeling of specific experiences and behaviours, and to engagement with treatment. The second coordinate of the map may be considered to represent a spectrum of metacognitive processes underlying insight. Nearer to one pole are attitudes that may strongly rely on self-reflection (self-evaluation either after introspection or taking the perspective of other people), such as awareness of symptoms and consequences. Aspects of insight depending on patients' agreement with clinicians' opinions and recommendations, such as illness label, medical diagnosis and need for treatment, are placed nearer to the opposite pole of this dimension.

Significant positive correlations were found between AUD severity and overall insight as well as the "awareness of mental disorder" component. No significant correlation was found between AUD severity and the two other insight components, i.e., recognition of symptoms and need for treatment, and treatment engagement. In

several previous studies, a positive association between insight levels and severity of AUD has been found (Blume et al., 2000, Yen et al., 2008, Probst et al., 2015, Kim et al., 2021), although there are some findings in the opposite direction (Slepecky et al., 2018). Contrary to our results, Kim et al. (2021) found a positive correlation of awareness symptom and need for treatment with severity of AUD. They used a self-report insight scale and measured severity with AUDIT while we used SADQ-C. This may be a reason for the different findings. To the best of our knowledge, there has been no other study examining treatment engagement component of insight with severity of AUD.

Treatment engagement was specifically associated with longer illness duration. Another specific significant association was found between the number of previous detox hospitalizations and higher awareness of having a mental disorder. In line with this, Lyu et al. (2017) found a positive correlation between insight and the number of previous inpatient treatments. Taking together, these findings indicate that AUD patients recognize that they suffer from a mental disorder and actively engage with treatment later in the course of illness. It is crucial to develop interventions that improve patients' self-reflection and enhance motivation for change in the early stages of the disorder (Kim et al., 2021).

Depressive and anxiety symptoms were strongly correlated with better overall insight. Moreover, patients with comorbid major depressive episode or suicide ideation had higher levels of insight compared to the remaining patients. However, no significant association of depressive and anxiety symptoms or suicide ideation was found with recognition of symptoms and need for treatment, and with treatment engagement. Previous studies have also found positive association of insight with depressive symptoms (Wiseman et al., 1996), comorbid major depression and serious

psychological distress (Salloum et al., 1998) or negative affect (Kim et al., 2021). However, other studies did not find significant correlations between insight and depressive or anxiety symptoms in hospitalized patients with severe AUD (Lyu et al., 2017; Dandaba et al., 2020). An association between insight and depression was found in many other disorders from schizophrenia to Alzheimer's disease (Gilleen et al., 2010; Murri et al., 2012). We can assume a causal relationship in either direction: awareness that one is suffering from a mental illness is depressing or depression is provoking more realistic self-evaluation, including one's own mental health (David, 2018). According to our findings, this relationship is apparent in AUD too, although depression does not render AUD patients more capable of relabeling their symptoms or engaging with treatment.

No significant correlation was found between insight and general intelligence or cognitive functioning as estimated by MMSE. A previous study did not find association between denial of illness and MMSE score in patients with AUD (Wiseman et al., 1996), whereas in a more recent study a significant although weak correlation was found between insight and the score of Montreal Cognitive Assessment Test (MOCA) (Dandaba et al., 2020). Moreover, other studies using neuropsychological tests found associations between poor insight and specific deficits in memory, executive functions, and processing speed (Blume et al., 2000; Poncin et al., 2015; Walvoort et al., 2016). Therefore, further investigation of potential contributions of cognitive dysfunctions to insight impairments in AUD with comprehensive neuropsychological batteries is needed.

The SAI-AD is a reliable and valid tool for the multifaceted, disorder-specific assessment of insight in AUD. It could be useful in everyday clinical practice and in research studies for comprehensive clinical assessment of AUD patients since insight

is an important aspect of the disorder not assessed by other clinical scales. The interview-based evaluation of many insight dimensions overcomes some weaknesses of self-report instruments used so far. Therefore, using SAI-AD in future studies could shed light on the nature, the role and the trajectories of insight and its components in AUD. For example, improvement in insight may constitute an important prognostic marker of patients' response to treatment and therefore, the investigation of treatment efficacy in AUD should include the regular, accurate and comprehensive, assessment of insight.

Our study had some limitations. We used a global clinician-rated measure of insight to examine convergent validity, whereas SAI-AD assesses multiple insight dimensions. The use of a multidimensional instrument as criterion would have offered stronger evidence for the validity. Due to the relatively small sample size, we did not run a factor analysis of SAI-AD. On the other hand, HCA and MDS can provide useful and valid information on the internal structure of clinical scales, unattainable through statistical techniques based on correlations, such as factor analysis (Kemmler et al., 2002; Chang et al., 2009). Finally, all the participants in our study were help-seekers, most of them with chronic and severe alcohol dependence, and this limits the generalizability of our findings. AUD patients lacking insight often refuse any contact with mental health services. Therefore, the level of insight may be lower in patients with AUD in the community and significant associations might not be detected due to lower variance of insight in our study. Hence, further research with larger community and/or primary care samples is warranted.

In conclusion, the SAI-AD displayed good reliability and validity indices and can be used to evaluate insight levels in AUD patients. Multiple components of insight were identified in AUD, which appear to be associated with different clinical aspects

of the disorder and therefore, their potential role should be further investigated. The findings of future research on insight deficits in AUD may contribute to the development of new therapeutic interventions to improve patients' engagement with treatment and long-term outcomes.

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Figure 1
Hierarchical cluster analysis: Ward's method dendrogram which depicts the Schedule for the Assessment of Insight in Alcohol Dependence (SAI-AD) items in 64 patients with alcohol use disorder. Horizontal distance reflects the level of dissimilarity between items.

Figure 2
Two-dimensional plot from multidimensional scaling analysis of the items of the Schedule for the Assessment of Insight in Alcohol Dependence (SAI-AD) in 64 patients with alcohol use disorder. The circles are drawn to indicate groups of items according to the clusters revealed by hierarchical cluster analysis.