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# EVIDENCE OF THE INTERNAL STRUCTURE OF THE BRAZILIAN VERSION OF THE GLOBAL ASSESSMENT OF INDIVIDUAL NEEDS SCALE - SHORT SCREENER

## *EVIDÊNCIAS DE ESTRUTURA INTERNA DA VERSÃO BRASILEIRA DA ESCALA AVALIAÇÃO GLOBAL DAS NECESSIDADES INDIVIDUAIS - RASTREIO RÁPIDO*

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**ABSTRACT**

Objective: To find evidence of the internal structure of the Global Assessment of Individual Needs-Short Screener (Portuguese version), obtained during the care of users of alcohol and other drugs in CAPSadII, by means of Explanatory Factor Analysis (EFA). Method: The study sample consisted of 200 users of the Alcohol and Other Drugs Psychosocial Care Center (CAPSadII) with an average age of 39.08. Exploratory and Confirmatory Factor Analysis were applied. Results: The results for both techniques indicated that the unidimensional model presents more precise levels of measurement compared to the model with 4 domains. The one-dimensional model had a variance of 56.91% and better factor loadings and model fit indices. Conclusion: The instrument shows evidence of a consistent and reliable internal structure, with a balanced assessment of the severity of individuals, with items well distributed along the spectrum.

**Keywords:** Mental Health; Validation Study; Substance-Related Disorders; Community Mental Health Services; Alcohol-Related Disorders.

***RESUMO***

*Objetivo: Buscar evidências de estrutura interna da Avaliação Global de Necessidades Individuais-Short Screener (versão portuguesa), obtidas durante o atendimento a usuários de álcool e outras drogas em CAPSadII, por meio da Análise Fatorial Explaratória (AFE). Método: A amostra do estudo foi composta por 200 usuários do Centro de Atenção psicossocial Álcool e outras Drogas - CAPSadII com média de idade de 39,08. Foram aplicadas a Análise Fatorial Exploratória e Confirmatória. Resultados: Os resultados para ambas as técnicas indicaram que o modelo unidimensional apresenta níveis mais precisos de medida em relação ao modelo com quatro domínios. O modelo unidimensional obteve variância de 56,91%, com cargas fatoriais e índices de ajustamento mais robustos. Conclusão: O instrumento apresenta evidências de estrutura interna consistentes e confiáveis, com equilibrada avaliação da gravidade dos indivíduos, com itens bem distribuídos ao longo do espectro de gravidade/severidade, o que resulta em um instrumento de boa capacidade avaliativa.*

***Palavras-chave:*** *Saúde mental; Estudo de Validação; Transtornos Relacionados ao Uso de Substâncias; Serviços Comunitários de Saúde Mental; Transtornos Relacionados ao Uso de Álcool.*

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## INTRODUCTION

The World Health Organization report indicates that in 2016 approximately 43% of the world's population used alcohol, a figure that reaches 54.1% for the Americas region. It is estimated that around 269 million people used an illicit drug at least once in the previous year, equivalent to 5.4 percent of the global population aged 15 to 64 (WHO, 2008; UNODC, 2021).

Another important fact is that the use of alcohol and other drugs is among the five main causal factors involved in approximately 200 diseases, highlighting illnesses such as depression and anxiety. Research has shown a significant relationship between alcohol use and problems related to crime and violence, and alcohol is also linked to a higher prevalence and incidence of mental health problems (BASTOS *et al*., 2017; UNODC, 2021; CLARO *et al*., 2019; MILLER *et al*., 2021; ADZRAGO *et al*., 2023).

An important factor is the relationship between driving and alcohol use, as driving under the influence is the most frequently associated consequence among users of alcohol and other drugs in the last 12 months, highlighting that approximately 7.5% of the population uses alcohol, and 0.7% uses illicit drugs (BASTOS *et al*., 2017; MILLER *et al*., 2021). There are other consequences to the misuse of psychoactive substances that go beyond harm to health, such as loss of productivity, job abandonment, family, relational and emotional problems, reduction of social networks, and increased healthcare costs, among others (MILLER *et al*., 2021; ADZRAGO *et al*., 2023).

In Brazil, the prevalence of use is 30.1% for alcohol and 3.6% for other illicit drugs among the population aged 12 to 65. Of this group, 6.1% meet the criteria for dependence (Bastos *et al*., 2017).

Early interventions for psychoactive substance use disorders improve prognosis and reduce costs, making the strategy for assessing interventions a priority. Consequently, a fast and accurate assessment of symptoms and comorbidities related to the disorder is necessary. To this end, health-care professionals must have access to valid, reliable, and cost-effective tools (CLARO *et al*., 2019; BALLESTAR-TARÍN *et al*., 2022).

In this process, screening tools aim to identify needs in people seeking treatment, and the information collected guides clinical decisions regarding diagnosis, treatment planning, care, and follow-up of outcomes (DENNIS *et al*., 2006; CLARO *et al*., 2019). Validating screening instruments that measure the biopsychosocial aspects of a person is important for obtaining a comprehensive approach to these different problems. Furthermore, it is necessary that these tools have empirical support that provides comprehensive early interventions to help and reduce the vulnerability of these individuals (CLARO *et al*., 2015).

The AGNI - *Avaliação Global das Necessidades Individuais* is the Brazilian version of the GAIN - *Global Appraisal of Individual Needs*, which is a family of evidence-based assessments. It is a semi-structured assessment tool used to provide a formal psychiatric diagnosis based on the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), aiming to identify individuals who will need feedback, brief intervention, or referral for more specialized assessment or treatment (DENNIS *et al.*, 2006; DENNIS *et al.*, 2008).

GAIN-I (*Global Appraisal of Individual Needs - Initial*) is one of the tools, with GAIN-SS (*Global Appraisal of Individual Needs-Short Screener*) being its most widely used variant. The Brazilian version of GAIN-SS is AGNI-RR - Short Screener - its application takes five to ten minutes, with a fast assessment of 30 to 45 minutes, and a comprehensive biopsychosocial diagnosis (DENNIS *et al.*, 2006; DENNIS *et al.*, 2008; CLARO *et al.*, 2016).

The GAIN-SS originated in the United States and aims to create a short and easy-to-use screening tool so that healthcare professionals and researchers can identify needs related to mental health, alcohol and other drugs, crime, and violence, classifying them on a risk spectrum. The GAIN-SS instrument is valid and has high sensitivity and specificity in predicting substance use disorders in adolescents and adults, translated and culturally adapted into Portuguese (DENNIS *et al.*, 2006; DENNIS *et al.*, 2008; CLARO *et al.*, 2015; CLARO *et al.*, 2016; CLARO *et al.*, 2019; KHANANO *et al.*, 2021).

Thus, this study aimed to examine the internal structure of the Global Appraisal of Individual Needs-Short Screener (Portuguese version) obtained during the care of alcohol and other drug users in CAPSad II, using Exploratory Factor Analysis (EFA). Exploratory Factor Analysis (EFA) presents benefits because it assesses whether some items provide more information about severity, which makes it useful for decision-making in care.

## METHODOLOGY

This study analyzes the psychometric properties of the Global Appraisal of Individual Needs-Short Screener (Portuguese version), based on evidence obtained during the care of alcohol and other drug users in CAPSad II, using Exploratory Factor Analysis (EFA), for use in research and clinical practice in health (CLARO *et al.*, 2016; KHANANO *et al.*, 2021).

Two hundred interviews were conducted with users of a CAPSad II located in a city in the interior of São Paulo state, Brazil. The municipality has 142,000 inhabitants and has a CAPSad II that operates weekly, with a multidisciplinary team to meet the needs of this population. The sample was one of convenience, considering the users' availability, their interest in participating in the research, and their presence at the health unit on the days of data collection. Users in the intake phase were interviewed, and they were contacted by telephone.

The inclusion criteria were: individuals aged between 18 and 75 years old, able to participate in an interview lasting approximately 10 minutes, conditions verified with the service team members, and with the participant themselves. The focus on the adult population is justified both by the interest of the research and by the fact that CAPSad II exclusively serves this population.

The exclusion criteria were: users under the acute effect or in withdrawal syndrome from psychoactive substances, as well as crisis situations (exacerbation of symptoms), including cognitive impairment or decline, manic syndromes (from hypomania to mania), among others.

Data collection was conducted between January 22nd and April 4th, 2021, through telephone interviews using a Google Forms questionnaire, as this was the most accessible method for participants. Sociodemographic data were obtained from medical records and validated with the research participants themselves.

The data collection instrument consisted of sociodemographic data, such as gender, age, marital status, education level, employment status, family income, race/color, family/marital status, and vulnerability status. It also included clinical data, such as diagnosis of mental disorder, alcohol and other drug use (age of onset, substance, and pattern of use). The Brazilian version of the GAIN-SS instrument was also used. This instrument contains 23 items in four domains: IDSr (internal disorders - 6 items), EDScr (external disorders - 7 items), SDScr (substance use disorder - 5 items), and CVScr (crime and violence - 5 items) (CLARO *et al.*, 2016). Each item is preceded by a question with the following response options, according to the Likert scale: "In the last month" (4); "2 to 3 months ago" (3); "4 to 12 months ago" (2); "1 year or more" (1), and "Never" (0) (8).

The instrument's total score is obtained by summing the number of participant responses for each time period, classified as: last month, last 90 days, last year, and ever in a lifetime. For the score used in this analysis, the sum of symptoms experienced by the individuals over the past 90 days was calculated. The total possible symptom score is 23 - with scores closer to 23 indicating more severe cases (DENNIS *et al.*, 2006). In this study, a sum covering a 90-day period was chosen, as this timeframe allows for the identification of current problems.

The classification of needs has the following levels: Low (0), likely requiring no services; Moderate (one to two), with a possible diagnosis and likely to benefit from brief intervention; and High (three or more), with a high probability of diagnosis and requiring more detailed assessment and intervention (directly or by referral). The higher the final score, the greater the need for more detailed assessment. In practice, mental health care is presumed to be necessary when the score in each of the four domains is one or more (DENNIS *et al.*, 2006).

The AGNI-RR can be self-administered or applied by the team, on paper or computer, as part of the reception process in the service or during primary care visits, due to its easy-to-understand language (CLARO *et al.*, 2015; CLARO *et al.*, 2019; KHANANO *et al.*, 2021).

## *EXPLORATORY FACTOR ANALYSIS* (EFA)

A key step is verifying the factorability of the data using the Measure of Sampling Adequacy (MSA). For this step, Bartlett's test of sphericity, the determinant of the matrix, and the

Kaiser-Meyer-Olkin (KMO) index were assessed. In addition to assessing the database, the individual analysis of the items was also assessed, as recommended (LORENZO-SEVA & FERRANDO, 2021). The inadequacy of the items to be factored can affect the model's solution. Missing items were handled using the multiple imputations technique.

Dimensionality testing was performed using Parallel Analysis through *Optimal Implementation of Parallel Analysis* (PA) with *Minimum Rank Factor Analysis,* which minimizes the common variance of the residuals (TIMMERMAN & LORENZO-SEVA, 2011). PA was implemented through permutation with 500 random matrices. Dimensionality in exploratory factor analysis (unrestricted model) tested by Parallel Analysis has been considered one of the most robust and accurate techniques for dimensionality testing (AUERSWALD & MOSHAGEN, 2019; LIM & JAHNG, 2019).

Polychoric matrix estimation was performed. The use of tetrachoric/polychoric correlations tends to increase the model's accuracy compared to Pearson's correlation (BAGLIN, 2014). Factor extraction was performed using the *Robust Unweighted Least Squares* (RULS), technique, which reduces matrix residuals and is more robust for non-normal data (OSBORNE & BANJANOVIC, 2016). If the instrument proves to be multidimensional, Promin oblique rotation will be used.

The following indicators were adopted for assessing unidimensionality (FERRANDO & LORENZO-SEVA, 2018) UNICO (*Unidimensional Congruence* > 0.95), ECV (*Explained Common Variance* > 0.80), and MIREAL (*Mean of Item Residual Absolute Loadings* < 0.30).

Instrument quality parameters: The explained variance of the instrument should be around 60% (HAIR *et al.*, 2018). Initial factor loadings of 0.30 are recommended for samples of at least 300 individuals (HAIR *et al.*, 2018), and communalities should have values above 0.40 (COSTELLO & OSBORNE, 2005). Maintaining or removing an item from the model will depend on the magnitude of the factor loadings, communalities, the absence of cross-loading and Heywood cases, as well as the interpretability of the factors.

Reliability was assessed using three indicators: Cronbach's alpha, omega, and ORION (*Overall Reliability of fully-Informative Prior Oblique N-EAP scores* (FERRANDO & LORENZO-SEVA, 2018).

The adoption of three indicators seeks to increase the reliability of the interpretation, as inconsistencies in reliability have occurred through Cronbach's alpha (VASKE *et al.*, 2016). Trizano-Hermosilla and Alvarado (2016) indicate that reliability indices are affected by the nature of the data distribution and the sample size. The most severe is the adoption of alpha as a measure of internal consistency, even though it is easy to prove that alpha is not a measure of internal consistency (SIJTSMA, 2009).

For the CFA, factor loadings, item predictive power ($R^2$), and item standard errors were analyzed and presented in the form of a path diagram. The following model fit indices were adopted: $\chi 2$/df; *Non-Normed Fit Index* (NNFI $\geq$ 0.95); *Comparative Fit Index* (CFI $\geq$ 0.95); *Goodness Fit Index* (GFI $\geq$ 0.95); *Tucker-Lewis Index* (TLI), *Root Mean Square Error of Approximation* (RMSEA $\leq$ 0.08) and *Root Mean Square of Residuals* (RMSR ≤ 0.08). Unlike EFA, Hair *et al.* (2018) suggest that factor loadings for CFA should start at 0.50 for a better model fit.

The data were analyzed using the statistical software Factor 12.03.01 and JASP 17.01.

The project was approved by the Research Ethics Committee of the proposing institution with opinion number 2.125.494 (CAAE: 60683116.4.0000.5392). All participants signed the Free and Informed Consent Form (FICF).

## RESULTS

The sample consisted of 200 participants. The users interviewed were predominantly male, 84% (168), with a mean age of 39.08 years old (SD 12.02), ranging from 19 to 72 and with a median of 38. The average time to complete the interview was 6.52 minutes. Among the participants, 84% (168) were male; 84% (168) self-identified as white. Regarding marital and family profile, 62% (124) were separated, single, or widowed (living without a partner), and 43.5% (87) lived with family members but without a partner. Regarding education and schooling, 63.1% (126) had at least completed high school, with 53% (106) working in the informal market, and 53.5% (107) earning between 1 and 3 minimum wages per month. Among the respondents, 97.5% (n=195) reported not living in a vulnerable situation.

### EXPLORATORY FACTOR ANALYSIS (EFA)

The assessment of sample adequacy measures is the first step and aims to verify the factorability of the datasets. The overall dataset demonstrated good factorability, with KMO = 0.92, Bartlett's sphericity test = 2,193.2 (df = 253; $p < 0.0001$), and determinant of the matrix < 0.00001. However, items 6 (IDSr (f)), 13 (EDScr (g)), and 20 (CVScr (b)) presented inadequate values for factorization. This preliminary result may indicate problems with the fit of these items.

Initial testing was parameterized for a four-domain model, following the original instrument. However, parallel analysis indicated a structure with two domains - not four - showing an explained variance of 60.96% for these two factors.

The closeness to dimensionality values indicated a multidimensional model: ÚNICO = 0.87; ECV = 0.84, and MIREAL = 0.25 (Table 1). Again, items 6 (IDSr (f)), item 13 (EDScr (g)) and item 20 (CVScr (b)) stood out, with indicators pointing to unidimensional behavior.

**Table 1** - I-UNICO, I-ECV and I-REAL values of the items. Botucatu-SP, Brazil, 2021.

| ITEM | I-UNICO | I-ECV | I-REAL |
|---|---|---|---|
| 1) IDSr(a) | 0.992 | 0.887 | 0.254 |
| 2) DSr (b) | 0.974 | 0.811 | 0.296 |
| 3) IDSr (c) | 0.990 | 0.878 | 0.255 |
| 4) IDSr (d) | 0.996 | 0.914 | 0.189 |
| 5) IDSr (e) | 0.998 | 0.945 | 0.145 |
| 6) IDSr (f) | 0.529 | 0.384 | 0.333 |
| 7) EDScr (a) | 1.000 | 0.987 | 0.085 |
| 8) EDScr (b) | 0.998 | 0.939 | 0.196 |
| 9) EDScr (c) | 0.998 | 0.944 | 0.189 |
| 10) EDScr (d) | 1.000 | 0.982 | 0.101 |
| 11) EDScr (e) | 0.914 | 0.692 | 0.500 |
| 12) EDScr (f) | 0.893 | 0.665 | 0.529 |
| 13) EDScr (g) | 0.027 | 0.026 | 0.533 |
| 14) SDScr (a) | 0.996 | 0.921 | 0.221 |
| 15) SDScr (b) | 0.999 | 0.952 | 0.193 |
| 16) SDScr (c) | 0.999 | 0.968 | 0.160 |
| 17) SDScr (d) | 1.000 | 0.976 | 0.130 |
| 18) SDScr (e) | 0.999 | 0.957 | 0.176 |
| 19) CVScr (a) | 0.890 | 0.661 | 0.478 |
| 20) CVScr (b) | 0.126 | 0.112 | 0.429 |
| 21) CVScr (c) | 0.870 | 0.639 | 0.363 |
| 22) CVScr (d) | 1.000 | 0.972 | 0.105 |
| 23) CVScr (e) | 1.000 | 0.984 | 0.096 |

Source: The authors, 2021.

Due to this difference between the original model and the PA testing, two more dimensionality techniques were adopted: the HULL (TIMMERMAN & LORENZO-SEVA, 2011) analyzed by the CFI (*Comparative Fit Index*), and the *Minimum Avarege Partial*. This multi-technique testing procedure is recommended by Bandalos (2018) and Auerswalde and Moshagen (2019). indicated a unidimensional model (CFI = 0.967, *scree test* = 51.96) and MAP pointed to two domains (MAP = 0.0492). Due to this divergence in dimensionality, the factor loadings and communality (Table 2) were analyzed in three models (1 domain, 2 domains, and 4 domains-the original). A two-factor model was tested based on the suggestion by Stuchy, Edelen and Ramchand (2014) regarding the possibility of a two-factor version.

Items 6, 13, and 20 in the unidimensional model did not have substantial factor loadings nor communality values. The communality values indicate that these items are not associated with the other items in the instrument. They continue to present problems in the 2-domain and 4-domain models. Furthermore, several items are cross-saturated, meaning they measure more than one domain, which is another violation of the instrument's quality. The two-factor and four-domain models also presented the same problems. For this reason, the search for instrument adjustment began by removing these items.

**Table 2** - Factor loadings and communalities of the models. Botucatu-SP, Brazil, 2021.

| | 1 domain | | 2 domains | | | 4 domains | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **ITEM** | **(λ)** | **($h^2$)** | **1º(λ)** | **2º(λ)** | **($h^2$)** | **1º(λ)** | **2º(λ)** | **3º(λ)** | **4º(λ)** | **($h^2$)** |
| 1) IDSr(a) | 0.70 | 0.50 | 0.14 | 0.84 | 0.56 | -0.08 | 0.84 | -0.05 | 0.02 | 0.62 |
| 2) DSr (b) | 0.58 | 0.34 | -0.19 | 0.75 | 0.40 | -0.48 | 0.80 | 0.01 | 0.23 | 0.61 |
| 3) IDSr (c) | 0.67 | 0.45 | -0.15 | 0.81 | 0.51 | 0.17 | 0.80 | -0.13 | -0.12 | 0.58 |
| 4) IDSr (d) | 0.60 | 0.36 | -0.08 | 0.68 | 0.39 | 0.12 | 0.57 | -0.08 | 0.03 | 0.40 |
| 5) IDSr (e) | 0.59 | 0.35 | 0.30 | 0.35 | 0.36 | 0.54 | 0.36 | 0.15 | -0.29 | 0.52 |
| 6) IDSr (f) | 0.28 | *0.07* | 0.40 | -0.04 | 0.14 | 0.07 | 0.21 | 0.37 | -0.27 | *0.19* |
| 7) EDScr (a) | 0.74 | 0.50 | 0.36 | 0.45 | 0.56 | 0.01 | -0.04 | 0.31 | 0.65 | 0.67 |
| 8) EDScr (b) | 0.76 | 0.58 | -0.07 | 0.84 | 0.63 | -0.03 | 0.04 | -0.10 | 0.99 | 0.91 |
| 9) EDScr (C) | 0.78 | 0.62 | -0.06 | 0.85 | 0.66 | -0.04 | 0.09 | -0.09 | 0.95 | 0.90 |
| 10) EDScr (d) | 0.75 | 0.56 | 0.08 | 0.69 | 0.57 | 0.03 | 0.09 | 0.03 | 0.71 | 0.69 |
| 11) EDScr (e) | 0.77 | 0.59 | 0.91 | 0.05 | 0.90 | 0.12 | -0.05 | 0.76 | 0.23 | 0.89 |
| 12) EDScr (f) | 0.76 | 0.58 | 0.94 | 0.01 | 0.92 | 0.22 | -0.12 | 0.76 | 0.22 | 0.91 |
| 13) EDScr (g) | 0.10 | *0.01* | 0.75 | -0.50 | 0.30 | -0.16 | -0.28 | 0.72 | -0.02 | 0.34 |
| 14) SDScr (a) | 0.78 | 0.61 | -0.04 | 0.83 | 0.64 | -0.18 | 0.80 | 0.08 | 0.13 | 0.72 |
| 15) SDScr (b) | 0.88 | 0.78 | -0.07 | 0.96 | 0.83 | 0.09 | 0.75 | -0.04 | 0.16 | 0.83 |
| 16) SDScr (c) | 0.90 | 0.82 | -0.01 | 0.93 | 0.85 | 0.21 | 0.77 | -0.02 | 0.03 | 0.87 |
| 17) SDScr (d) | 0.87 | 0.76 | 0.05 | 0.84 | 0.77 | 0.08 | 0.90 | 0.09 | -0.11 | 0.86 |
| 18) SDScr (e) | 0.84 | 0.71 | -0.03 | 0.89 | 0.74 | 0.03 | 0.83 | 0.02 | 0.01 | 0.78 |
| 19) CVScr (a) | 0.73 | 0.53 | 0.74 | 0.14 | 0.71 | 0.04 | 0.19 | 0.66 | 0.05 | 0.72 |
| 20) CVScr (b) | 0.22 | *0.05* | 0.69 | -0.34 | 0.28 | -0.23 | 0.21 | 0.81 | -0.43 | 0.53 |
| 21) CVScr (c) | 0.5 | 0.32 | 0.56 | 0.11 | 0.43 | 0.07 | -0.03 | 0.49 | 0.24 | 0.44 |
| 22) CVScr (d) | 0.50 | 0.33 | 0.27 | 0.36 | 0.34 | 0.88 | -0.07 | -0.03 | 0.03 | 0.72 |
| 23) CVScr (e) | 0.74 | 0.55 | 0.23 | 0.56 | 0.55 | 0.70 | 0.12 | -0.01 | 0.14 | 0.77 |

(λ) - factor loadings: (h2) - communalities; bold - relevant loadings

Source: The authors, 2021.

To find the instrument fit, it was necessary to remove items 6, 13, and 20. After doing this, the AP, HULL, MAP, and closeness values (UNICO = 0.96; ECV = 0.86; and MIREAL = 0.26) converged to a unidimensional model. The variance explained with only one dimension was 56.91%. Table 3 shows the primary indices of the adjusted unidimensional model. No fit was found for the two-domain and four-domain models, nor for the two-factor model. The double saturation problems persisted and suggested Heywood Case problems (violation of the -1 to 1 limits of the factor loadings).

**Table 3** - Factor loadings and communalities of the fitted unidimensional model. Botucatu-SP, Brazil, 2021.

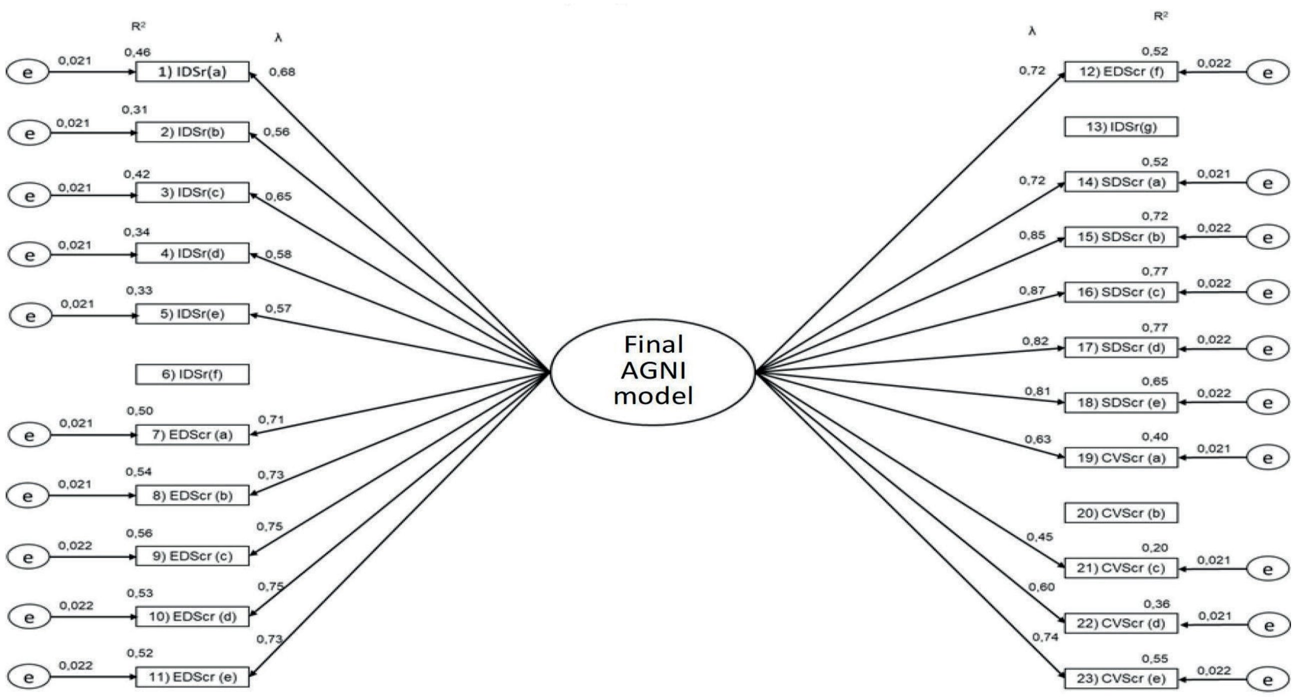
| ITEM | (λ) | ($h^2$) | I-UNICO | I-ECV | I-REAL |
|---|---|---|---|---|---|
| 1) IDSr (a) | **0.71** | 0.50 | 0.98 | 0.88 | 0.31 |
| 2) DSr (b) | 0.58 | 0.34 | 0.89 | 0.67 | 0.43 |
| 3) IDSr (c) | **0.67** | 0.46 | 0.98 | 0.90 | 0.28 |
| 4) IDSr (d) | **0.60** | 0.37 | 0.99 | 0.90 | 0.21 |
| 5) IDSr (e) | **0.59** | 0.34 | 0.99 | 0.90 | 0.20 |
| 6) IDSr (f) | | | | | |
| 7) EDScr (a) | **0.73** | 0.54 | 1.00 | 0.97 | 0.14 |
| 8) EDScr (b) | **0.77** | 0.60 | 1.00 | 0.98 | 0.11 |
| 9) EDScr (c) | **0.79** | 0.63 | 1.00 | 0.97 | 0.11 |
| 10) EDScr (d) | **0.76** | 0.57 | 1.00 | 1.00 | 0.02 |
| 11) EDScr (e) | **0.76** | 0.57 | 0.91 | **0.75** | 0.49 |
| 12) EDScr (f) | **0.75** | 0.57 | 0.87 | **0.74** | 0.55 |
| 13) EDScr (g) | | | | | |
| 14) SDScr (a) | **0.78** | 0.60 | 0.99 | 0.96 | 0.27 |
| 15) SDScr (b) | **0.88** | 0.79 | 1.00 | 1.00 | 0.18 |
| 16) SDScr (c) | **0.91** | 0.82 | 1.00 | 1.00 | 0.13 |
| 17) SDScr (d) | **0.87** | 0.75 | 0.99 | 0.99 | 0.18 |
| 18) SDScr (e) | **0.84** | 0.71 | 0.99 | 0.98 | 0.19 |
| 19) CVScr (a) | **0.71** | 0.51 | 0.92 | **0.76** | 0.42 |
| 20) CVScr (b) | | | | | |
| 21) CVScr (c) | **0.56** | 0.31 | 0.78 | **0.40** | 0.42 |
| 22) CVScr (d) | **0.58** | 0.34 | 0.98 | 0.86 | 0.25 |
| 23) CVScr (e) | **0.74** | 0.55 | 0.99 | 0.97 | 0.21 |

(λ) - factor loadings: (h2) - communalities; bold - relevant loadings

Reliability indices should be analyzed only after the internal structure has been adjusted. In the final model, Cronbach's alpha was 0.959, McDonald's omega = 0.958, and ORION = 0.960. After completion of the EFA, the Confirmatory Factor Analysis was conducted. When tested with all items, items 6, 13, and 20 showed inadequate factor loadings - similarly to the EFA results - (respectively: 0.23, 0.07, and 0.13). The model fit indices were also unsatisfactory: $\chi 2/df = 4.34$; CFI = 0.78, GFI = -1.34 (parameter violation); TLI = 0.75; RMSEA = 0.13 and SRMR = 0.09). The four-domain model also did not present adequate indicators ($\chi 2/df = 4.34$; CFI = 0.778, GFI (no convergence) = -1.34; TLI = 0.749; RMSEA = 0.129 and SRMR = 0.08) with the same items below the cutoff criteria. After excluding these three items, the adopted model fit indices were: $\chi 2/df = 2.44$; CFI = 0.979, GFI = 0.989; TLI = 0.977; RMSEA = 0.08, and SRMR = 0.08). All indices have adequate results in the unidimensional model.

For the primary indicators of the CFA, factor loadings, item predictive power (R2), and item standard error were used, presented in the form of the path diagram (Figure 1) of the final model with items 6, 13, and 20 removed.

**Figure 1** - Path diagram of the unidimensional model: Factor loadings (λ) and predictive power of the item (R2), standard error (SE) of the final model. Botucatu-SP, Brazil, 2021.




Thus, the unidimensional model was the only one that allowed adjustment in both the EFA and CFA for these data, which required the exclusion of items 6, 13, and 20. The results of the one-dimensional structure were superior to those of the four-domain model also in the confirmatory stage.

## DISCUSSION

Extensive testing in EFA and CFA yielded a sufficiently robust and consistent set of indicators regarding the instrument's metric properties, attesting to the evidence of internal structure validity. In addition to the unidimensional model's quality surpassing that of the two- and four-domain models presented in the EFA, satisfactory fit was only achieved after the exclusion of three items.

It should be noted that the points raised in this discussion must be viewed with caution, given that the model adopted in this study lacks procedural equivalence with other studies that have used this instrument. One of the main difficulties in making this comparison (CLARO *et al.*, 2019; DENNIS *et al.*, 2006; DENNIS *et al.*, 2008) lies in the fact that none of these studies adopted the recommendations for extensive dimensionality testing carried out in the present study.

Despite the GAIN-SS not having extensive dimensionality testing studies, the use of this resource is supported by contemporary psychometric literature (ALVARENGA *et al.*, 2022; HOWELL *et al.*, 2020). Bandalos (2018) clearly recommends exploring the instrument with various configurations in order to detect the one that best measures the phenomenon. The study by Stucky, Edelen and

Ramchand (2014) performed dimensionality testing via CFA, which is not the most appropriate procedure. Furthermore, the aforementioned research does not clearly state which indicators underpinned this testing, limiting itself to recording the model fit indices. In addition, the study by Claro *et al.*

Rasch IRT models require a unidimensional instrument for their application. In the aforementioned study - although not indicated in the title - an exploratory analysis using principal components, dimensionality assessment based on eigenvalues, and varimax rotation was conducted. Such a combination of techniques has long ceased to represent the 'gold standard' in psychometrics. First, principal component analysis is not an exploratory analysis (DE WINTER & DODOU, 2016), varimax rotation is intended for orthogonal models; and dimensionality assessment based on the Kaiser criterion (*eigenvalue* > 1) tends to overestimate dimensionality, introducing relevant imprecision into the testing process (GORSUCH, 1990; GORSUCH, 1997; FABRIGAR *et al.*, 1999; PREACHER & MACCALLUM, 2003; COSTELLO & OSBORNE, 2005; TABACHNICK & FIDELL, 2013). Along these lines, due to these technical factors, comparing the indicators and models found in the articles is unproductive.

This study presents an analysis of the 23-item GAIN-SS, highlighting its viability as a tool for consistently and reliably assessing psychopathology and crime/violence as a tracker and as a measure to screen individuals prone to clinical diagnoses and requiring mental health care. While not sufficient to provide a specific diagnosis, the GAIN-SS is able to quickly identify a possible diagnosis/problem (CLARO *et al.*, 2019; STUCKY *et al.*, 2014).

The AGNI-RR instrument is considered to present consistent evidence of the validity of its internal structure for use with users of CAPSadII services.

It is important to emphasize that every study has inherent limitations related to sampling, statistical tests, and formulated hypotheses. The very use of statistics assumes the presence of preliminary hypotheses. The present sample was one of convenience, and is not robust enough for so many statistical tests. Although it has the advantage of being a clinical sample, the number of participants is considered small for factor analyses. Therefore, these results are preliminary analyses that require further testing, as well as verification of the convergent and discriminant validity of the instrument.

## CONCLUSION

The AGNI-RR instrument is a quick and economical method for screening co-occurring and coexisting needs in a healthcare setting. It offers a balanced assessment of individual severity, with items well distributed across the severity spectrum, resulting in an instrument with good assessment capacity.

t is important to highlight the need to seek evidence of the internal structural validity of this instrument with larger samples and in other devices of the Psychosocial Care Network (*Rede de*

*Atenção Psicossocial*) - RAPS to analyze the stability of the internal structure of this screening tool in relation to various contexts and subpopulations.

Furthermore, it is essential to conduct a follow-up analysis of the effects and cutoff scores of the unidimensional instrument across the various populations served. Instruments that assess factors beyond the symptoms of problems caused by alcohol and other drug use are more comprehensive for the holistic care of individuals.

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