Original Article

Journal of Addictions Nursing • Volume 30 • Number 4, 269–275 • Copyright © 2019 International Nurses Society on Addictions

Rasch Analysis of the Global Appraisal of Individual Needs in the City of São Paulo

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Abstract

Introduction: Approximately 5% of the global population used an illicit drug in 2013. Regarding licit drugs, alcohol is responsible for the occurrence of approximately 200 diseases, among them depression. In addition to health impairments, alcohol is also implicated in many acts of violence. This study aimed to measure the properties of the Rasch model of the Portuguese version of the Global Appraisal of Individual Needs-Short Screener based on evidence obtained during care for users of alcohol and other drugs.

Method: To collect the data, 128 interviews were held at the Psychosocial Care Center for Alcohol and Other Drugs in the state capital, during which the scale was applied.

Results: The Rasch model revealed that the subscales of the instrument were appropriate, with all items having mean infit and outfit values from 0.5 to 1.5, considered optimal for measurement. There was no evidence of differential performance for gender. Substance use and crime and violence items presented redundancy for severity measures.

Conclusion: Given the need for validated instruments for use in Brazil, it is encouraging that the Portuguese version of the scale was valid for the Rasch model. The results are consistent with studies using the other American, Brazilian, and Canadian versions of the instrument.

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The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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DOI: 10.1097/JAN.0000000000000310

Keywords: disorders related to alcohol use, disorders related to substance use, substance abuse detection, validation studies

INTRODUCTION

In 2013, approximately 246 million people globally used some sort of illicit psychoactive substance (United Nations Office on Drugs and Crime, 2014). Regarding licit substances, heavy alcohol use is one of the five main causal factors involved in approximately 200 diseases, including the psychiatric conditions of depression and anxiety disorders (World Health Organization, 2014). A statistically significant association exists between the number of symptoms related to alcohol and other drugs (AOD), the number of mental health symptoms, and problems related to crime and violence (Gallassi, Alvarenga, Andrade, & Couttolenc, 2008). Among marijuana users, 47.5% witnessed the occurrence of at least one violent event in childhood, compared with 21.7% of the general population. This figure is even higher for cocaine users (52%; Laranjeira, 2014). In addition, there are many other social consequences beyond health impairments (as the clinical situation worsens, more services are used and more interventions are performed). Many social costs exist, such as the use of tax money paid by society to finance treatment and prevention of heavy AOD use, the loss of productivity that society experiences because of abandonment of work, and accidents that can lead to physical disability and early death of the affected individuals (Gallassi et al., 2008).

When prevention or early intervention occurs in the early stages of drug use, cost savings may be achieved by reducing spending on criminal justice, such as the cost of detention and other harm resulting from criminal actions. In addition, active drug markets cause family breakdown and cost inefficiency. The negative impacts on social support networks increase vulnerability to other crimes, such as crimes against property, parallel power, deaths, and executions, as well as the black market (Pereira Filho, Tannuri-Pianto, & Sousa, 2010; Santos & Kassouf, 2007).

Screening tools aim to identify problems among individuals seeking treatment, and the information collected guides clinical decision making regarding the diagnosis, allocation, planning, treatment, and monitoring of results (Dennis, Chan, & Funk, 2006; Dennis, Funk, Godley, Godley, & Waldron, 2004; Dennis, White, Titus, & Unsicker, 2003). Thus, the validation of screening instruments that assess individual biopsychosocial

aspects is important for the sake of a comprehensive approach of these different problems. Empirically supported screeners are needed for use in Brazil to provide comprehensive early interventions to help and reduce these users' vulnerability (Garcia Claro et al., 2015).

The Global Appraisal of Individual Needs (GAIN) is a set of empirically supported assessments that includes a quick screening tool (GAIN-SS), applied in 5–10 minutes, a rapid assessment of 30–45 minutes, and a comprehensive biopsychosocial diagnostic assessment instrument that takes 90–120 minutes. The GAIN can be administered via online applications that organize data from interviews with patients into real-time computer-generated clinical reports. Health teams can use these reports in planning care (Dennis et al., 2003). These instruments are used in the United States, Canada (Kenaszchuk, Wild, Rush, & Urbanoski, 2013), Japan, Russia, the Philippines, Vietnam, and Indian states and regions where an Asian dialect (Hmong) is spoken, applying translated versions of the instrument. Analysis of those applications is in progress (Dennis, 2010), supporting the scientific publications (Dennis, Feeney, Stevens, & Bedoya, 2008; Gotham et al., 2008; Titus, Dennis, Lennox, & Scott, 2008; Titus et al., 2012).

The GAIN-SS was originally developed in the United States, with the aim of creating a user-friendly brief screening instrument for health workers and researchers to detect individuals with needs related to mental health, AOD, and crime and violence, classifying them into a spectrum of risks (Dennis et al., 2006). The GAIN-SS instrument is valid and has high sensitivity and specificity in predicting substance use disorders of adolescents, emerging adults, and adults (Dennis et al., 2008). It has been translated and culturally adapted to Brazilian Portuguese (Claro, 2015; Claro et al., 2012, 2015).

This study evaluated the psychometric properties of the Brazilian Portuguese version of the GAIN-SS instrument, by means of the Rasch model. Rasch models are beneficial in that they can assess whether some items contain more information about severity that is useful when making clinical decisions. This is the first Rasch analysis of the Brazilian Portuguese version of the GAIN-SS.

METHODS

Type of Study

This methodological study is focused on the development, validation, and evaluation of the cross-cultural adaptation of the GAIN-SS (Claro et al., 2016).

Place of Study and Ethical Aspects

Data collection was carried out in a Psychosocial Care Center for Alcohol and Other Drugs (CAPSad) in the city of São Paulo. These CAPSad centers provide integrated primary and behavioral health services, with individual (medication, psychotherapy, guidance, and others) and group (psychotherapy, operative group, support, and social activities) care, therapeutic workshops, visits and home care, family care, and community activities with an emphasis on integration and family and social reintegration (Ministry of Health, Brasil, 2002). The study was authorized by the developers of the GAIN and received approval from the Research Ethics Committee of University of São Paulo School of Nursing (proposing institution) and the Municipal Health Department of São Paulo (co-participant institution), under authorization CAE 15450713.8.0000.5392.

Sampling, Approach of Individuals, and Inclusion and Exclusion Criteria

Substance users who were admitted to CAPSad services during the data collection window were invited to participate in the study. Studies involving Rasch analyses of instruments normally require samples of 150–250 individuals. Participants in the sample were interviewed from March 11, 2014, to December 20, 2014 (Linacre, 1994) though, which limited the number of interviews performed. Individuals between 18 and 60 years old were interviewed, starting treatment in CAPSad (from first to 10th day after reception at the service), who agreed to participate after receiving explanations about the aims and who signed the consent form. Individuals under treatment exclusively for tobacco were excluded from the sample. In the CAPSad chosen as the research site, 444 individuals started treatment during the data collection period. Of these, 93 were excluded because they sought treatment for tobacco only, 33 were over 60 years old, and 14 were below 18 years old. Of the 304 subjects eligible for the study, 128 (42%) attended the scheduled assessment and agreed to be interviewed, signing the consent form.

Treatment and Analysis of the Data

The interviews were conducted using the GAIN Assessment Building System, which provides access to a password-protected system, in which the data are encrypted to ensure the security of confidential information. Data were exported to R Studio and Stata for Windows, which were used to complete the Rasch analysis models.

In the conventional Rasch model idealized in educational research involving knowledge assessment, the difficulty of the item (dependent variable) is measured. Thus, a subject with more severe problems has more positive responses to increasingly more difficult (i.e., more rarely endorsed) items than a person with less severe problems. In this analysis, the scale is capable of detecting different severities (Boone, Staver, & Yale, 2014; Chachamovich, 2007).

The response ability of the subject (independent variable) is also considered, which refers to the degree of the characteristic measured the individual possesses. For this study, response ability refers to AOD consumption severity (Φ) and the difficulty level of the item parameter (the most appropriate word would be "rarity"—rarer symptoms being answered positively by users with more severe problems [δ]; Chachamovich, 2007). For their measurement, the independent variables are combined additively, with the subscale score being considered sufficient to describe the individual and the difficulty of the item being subtracted from the ability of the subject. The probability of a positive response is modeled by the logarithm of chance of the subject positively responding to the item, being expressed by

the relationship between the probability of a positive response (P_{is}) and the probability of a negative response ($1 - P_{is}$), where i indicates the individual, s is the item, Φ is the ability of the subject i, and δ is the difficulty of the item s, following the mathematical notation (Chachamovich, 2007): $\log\left(\frac{P_{is}}{1-P_{is}}\right) = \Phi_s - \delta_i$. If the magnitude of Φ is equal to the difficulty δ, the probabilities of a positive response and a negative response are identical ($p = .5/0.5$). The relationship between Φ and δ indicates that the skill can be inferred from an item with known difficulty (Chachamovich, 2007).

Finally, before and after applying the Rasch model, principal component analyses were performed to check whether data are one-dimensional. That is, we evaluated whether the set of items represented a single latent dimension, which is required for the application of this model. For this, first, the raw scores of the subscales were analyzed to verify the existence of a latent variable, followed by the residuals of the Rasch model, to verify whether there was any other secondary variable after removing the variance of the latent factor.

RESULTS

Analysis of the distribution of the item characteristic curve was carried out for each of the 23 items in the four subscales. The response choices for each item in the GAIN-SS are as follows: 0 = *never*, 1 = *more than 12 months ago*, 2 = *from 4 to 12 months ago*, 3 = *from 2 to 3 months ago*, and 4 = *in the last month*—according to the severity of the individual's problems. The intermediate categories of response proved uninformative, as their response probabilities do not differentiate between individuals with more or less severe problems. Consequently, for a better application of the Rasch model, we dichotomized responses to differentiate between individuals who reported the problem mentioned in the item in the last month (1) or not (0). Next, the factor analysis of the four subscales was performed separately by means of the Rasch model, because of the multidimensional nature of the instrument.

Internal Disorders Screener

Exploratory principal component analysis, with varimax rotation of the data, indicated a one-factor solution. The first three units of variance (eigenvalues) were 2.61, 0.89, and 0.81. All six items presented factor loadings greater than 0.6 with the first factor, without identifying other factors. Thus, we verified that the data were sufficiently one-dimensional to meet the assumptions required to perform Rasch analyses. The estimated severity of the individuals' problems and the difficulty of the items were expressed as log-odds units, so that the scale was intervallic and referred to the same dimension. Thus, the difficulty of the item is one point in the continuum of severity, in which a person presents a 50% chance of responding to the item affirmatively. The difficulty of the items varies between the values of −1.15 (Item SCR1b—sleep trouble, such as bad dreams, sleeping restlessly, or falling asleep during the day) and 1.06 (Item SCR1e—thinking about ending your life or committing suicide).

The severity coefficient of the individuals' problems ranged from −1.91 to 1.94, with the mean severity being −0.27 ($SD = 1.24$). The mean square values of infit and outfit indicate whether the items truly evaluate the characteristic that the subscale proposes. Values between 0 and 0.5 are considered unproductive for the measurement, although not detrimental. Scores from 0.5 to 1.5 are considered excellent, with values close to 1 being considered the best. Between 1.5 and 2, the scores are considered unproductive for the measurement, although not detrimental. If the value is superior to 2, it is considered that the item distorts the measurement (Boone et al., 2014). In this case, an analysis is made of the randomness test of the mean square (ZSTD). When this value is also superior to 2, it is concluded that the result is not random and that the item is detrimental to the measurement. In this subscale, these values ranged from 0.6 to 1.3, with no item superior to 2.

In the analysis of the individuals, two of them presented infit and ZSTD values greater than 2. In the outfit, five individuals were above 2; however, only four also had ZSTD values greater than 2. Therefore, the result was not random, meaning that the responses of these two people were not in agreement with the Rasch model. This typically occurs when participants have high severity and do not respond positively to the most severe items or they have low severity and responded positively to these items. The number of people in this condition was very low (less than 5%), which does not cause any concerns for the analysis (see Table 1).

The map of people and items assesses whether the items in each subscale cover a broad spectrum measuring the less severe, most severe, and intermediate characteristics in a well-distributed way. Such a distribution was observed for the items measuring internalizing symptoms on the Internal Disorders Screener (IDScr; see Figure 1).

The one-dimensionality was confirmed through principal component analysis of the residuals, as there was no evidence of another dimension in the IDScr subscale, in which the first component of the residuals accounted for only 1.5 units of variance, within the limit of 1.9 suggested in the Rasch literature (Humphreys & Montanelli, 1975). Differential item functioning (DIF) was also performed to check for differences in the measurement for a specific characteristic of the sample. The presence of DIF by gender was investigated, following the trend of studies using a different scale of the GAIN set (Kenaszchuk et al., 2013), with no statistically significant difference found between men and women with respect to the items of this subscale. This means that items are equally indicative of severity for both men and women.

External Disorders Screener

The principal component analysis with varimax rotation of the data indicated a multifactor solution. The first three units of variance (eigenvalues) were 2.45, 1.25, and 0.97. The Items SCR2b (had a hard time paying attention at school, work, or home) and SCR2c (had a hard time listening to instructions at school, work, or home) loaded onto Factor 1, with all loadings being superior to 0.6. Items SCR2e (were a bully or threatened

TABLE 1	Mean Infit and Outfit Values of the Rasch Model of the Items of the: IDScr Subscale (São Paulo, SP, Brazil, 2015)								
Item			**Statistics**			**Mean Square**		**ZSTD**	
Item	**%**	**Severity**	χ^2	***df***	***p***	**Outfit**	**Infit**	**Outfit**	**Infit**
SCR1e	14.73684	1.656	123.15	94	.023	1.296	0.878	0.91	–0.71
SCR1f	24.46809	0.997	81.723	93	.792	0.869	1.036	–0.5	0.31
SCR1d	47.36842	–0.148	84.367	94	.751	0.888	0.93	–0.75	–0.66
SCR1a	56.84211	–0.578	100.859	94	.296	1.062	1.055	0.44	0.56
SCR1c	61.05263	–0.769	58.729	94	.998	0.618	0.727	–2.58	–2.9
SCR1b	69.47368	–1.158	84.576	94	.746	0.89	0.99	–0.48	–0.06

Source: data collection, 2014. IDScr = Internal Disorders Screener; ZSTD = randomness test of the mean square.

other people), SCR2f (started physical fights with other people), and SCR2g (tried to win back your gambling losses by going back another day) loaded onto Factor 2 though. The fitness of the data for the Rasch model was verified. The difficulty of the items varied between values −1.4 (Item SCR2b) and 1.3 (Item SCR2g).

The severity coefficients of the individuals' problems ranged from −2.05 to 2.05, with the mean severity being −0.92 (*SD* = 1.15). The mean square values of infit and outfit were between 0.6 and 1.2 (i.e., optimal for Rasch models). There were no individuals with infit superior to 2. In the outfit, six individuals obtained values superior to 2, but none of them had ZSTD

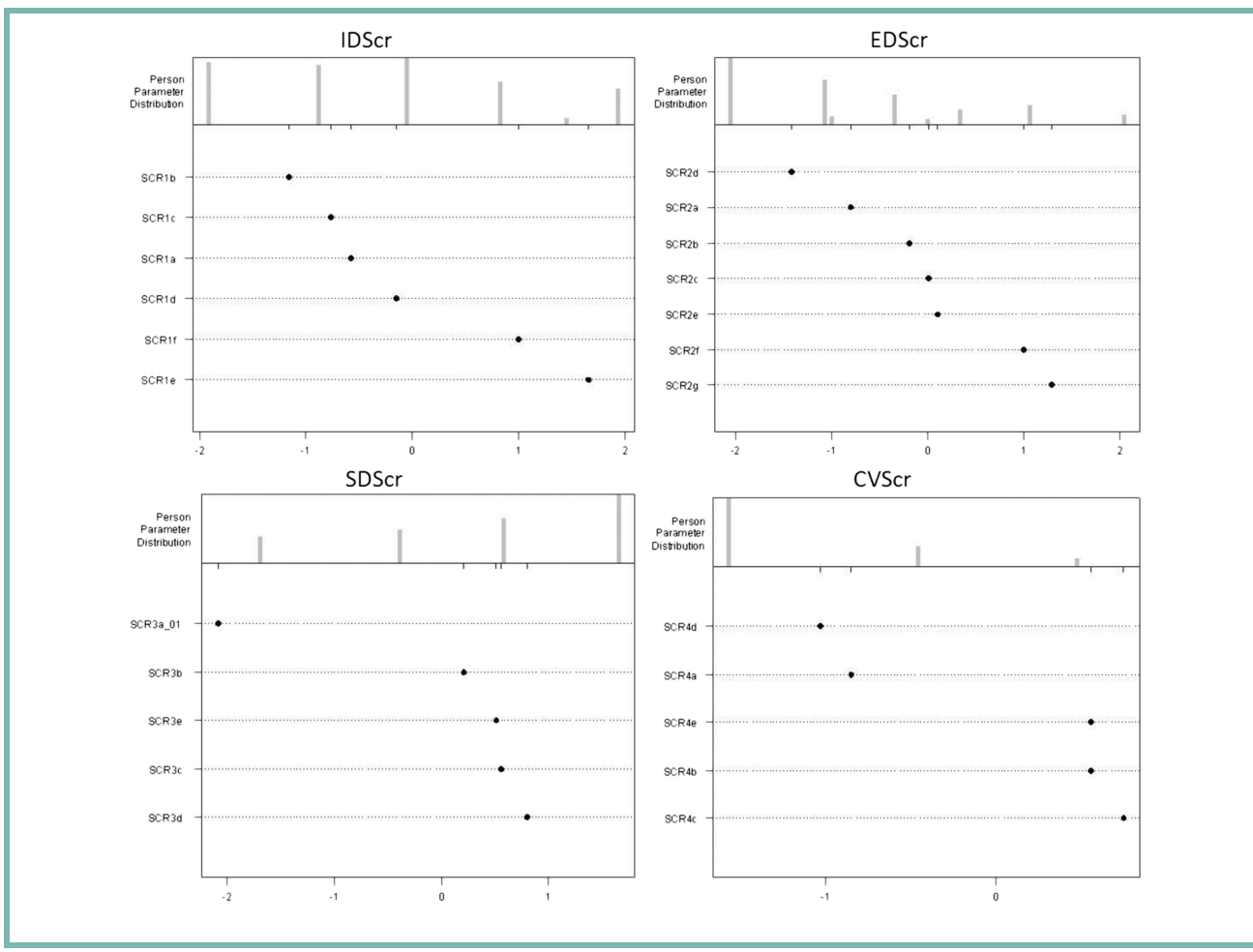

Figure 1. Map of people and items of the Subscales Internal Disorders Screener (IDScr), External Disorders Screener (EDScr), Substance Disorders Screener (SDScr), and Crime and Violence Screener (CVScr; São Paulo, SP, Brazil, 2015).

TABLE 2 Mean Infit and Outfit Values of the Rasch Model of the Items of the EDScr Subscale (São Paulo, SP, Brazil, 2015)

Item			Statistics			Mean Square		ZSTD	
Item	%	Severity	X^2	*df*	*p*	Outfit	Infit	Outfit	Infit
SCR2g	12.5	1.296	80.21	87	.684	0.911	1.123	–0.11	0.63
SCR2f	15.6	1.006	81.696	89	.696	0.908	0.805	–0.19	–1.04
SCR2e	28.9	0.102	59.983	89	.992	0.666	0.771	–1.93	–1.79
SCR2c	30.3	0.01	71.675	88	.897	0.805	0.877	–1.08	–0.92
SCR2b	34.4	–0.193	74.826	89	.859	0.831	0.902	–1.05	–0.79
SCR2a	47.8	–0.801	107.607	89	.087	1.196	1.18	1.36	1.74
SCR2d	63.3	–1.42	86.479	89	.556	0.961	1.042	–0.18	0.5

Source: data collection, 2014. EDScr = External Disorders Screener; ZSTD = randomness test of the mean square.

values greater than 2. Thus, the inadequacies were not statistically significant (Boone et al., 2014; see Table 2).

In the map of people and items shown in Figure 1, the absence of redundancy should be noted, as the items are evenly distributed in the latent dimension of severity, therefore covering a broad spectrum of individuals with this characteristic.

Although there were indications of other factors in the factor analysis, the principal component analysis of the residuals did not present another dimension in the subscale, which confirmed one-dimensionality. The first component of the residuals accounted for only 1.8 units of variance, within the limit of 1.9 (Humphreys & Montanelli, 1975). When verifying the presence of DIF by gender, there were no statistically significant differences between them.

Substance Disorders Screener

Similarly, the principal component factor analysis with varimax rotation for the Substance Disorders Screener (SDScr) data also indicated a one-factor solution. The first three units of variance (eigenvalues) were 2.49, 0.77, and 0.64. The loadings of all six items onto Factor 1 were superior to 0.6, without any item onto other factors. The difficulty of the items varied between −2.09 (Item SCR3a—you used alcohol or other drugs weekly or more often) and 0.8 (Item SCR3d—your use of alcohol or other drugs caused you to give up or reduce your involvement in activities at work, school, home, or social events?). The severity value of the individuals' problems ranged from −1.70 to 1.70, with the mean severity being 0.52 (*SD* = 1.18).

The mean infit and outfit values varied between 0.6 and 1.2, which are considered suitable for the measures of this characteristic (SDScr). Also regarding this analysis, there were three individuals with infit greater than 2, with ZSTD values being inferior to 2. In the outfit, six were superior to 2: Three also had ZSTD values greater than 2. For these subjects, the result was not random, meaning that these responses of these two people did not agree with the Rasch model. This being a very low number, it does not generate concerns for analysis though (Boone et al., 2014; see Table 3).

According to the map of people and items, the items are not well distributed in the latent dimension of severity, so they do not cover a broad spectrum. The first item is able to assess less severe cases; and the others, more severe cases. Items were missing that could evaluate individuals of intermediate severity, which would make the line continuous and ensure that all levels could be measured (see Figure 1).

One-dimensionality was confirmed by principal component analysis of the residuals. The first of these accounted for only 1.4 units of variance, within the limit suggested by the Rasch literature (Humphreys & Montanelli, 1975).

Proceeding with the DIF analysis of the SDScr subscale, Item SCR3a was eliminated because, of the 19 women in the sample, five presented extreme responses—two responded negatively to all questions, and three responded positively. Of the remaining 14, all responded positively to the item, which prevents the estimation of a confidence interval for the measure. Regarding the gender difference for the items, no statistical significance was observed.

Crime and Violence Screener

The factor analysis of the principal components of the data, with varimax rotation, did not indicate a one-factor solution. The first three units of variance (eigenvalues) were 1.43, 1.27, and 0.93. Items SCR4b (took something from a store without paying for it) and SCR4e (purposely damaged or destroyed property that did not belong to you) loaded higher than 0.6 onto Factor 1. Items SCR4c (sold, distributed, or helped to make illegal drugs) and SCR4d (drove a vehicle while under the influence of alcohol or illegal drugs) loaded onto Factor 2 though, indicating other dimensions in the subscale. The adequacy of the data for the Rasch model was verified. The difficulty of the items varied between −1.03 (Item SCR4d) and 0.75 (Item SCR4c). The severity value of the individuals' problems ranged from −0.56 to 0.48, with the mean severity being −1.26 (*SD* = 0.58). The mean square infit and outfit values indicate that all items ranged between 0.6 and 1.2 and were therefore considered optimal for the measurement. In

TABLE 3 Mean Infit and Outfit Values of the Rasch Model of the Items of the SDScr Subscale (São Paulo, SP, Brazil, 2015)

Item			Statistics			Mean Square		ZSTD	
Item	%	Severity	χ^2	*df*	*p*	Outfit	Infit	Outfit	Infit
SCR3d	43.53	0.800	74.762	84	.755	0.88	0.876	–0.75	–1.27
SCR3c	49.41	0.564	73.166	84	.795	0.861	0.934	–0.95	–0.6
SCR3e	50.59	0.515	102.922	84	.079	1.211	1.16	1.41	1.46
SCR3b	57.65	0.211	69.851	84	.866	0.822	0.866	–1.25	–1.18
SCR3a	92.94	–2.090	78.173	84	.659	0.92	0.782	0	–0.92

Source: data collection, 2014. SDScr = Substance Disorders Screener; ZSTD = randomness test of the mean square.

this analysis, there were no subjects with infit greater than 2, although there was one person in the outfit, however, with ZSTD inferior to 2. Thus, the inadequacies were not statistically significant (see Table 4).

According to the figure, there was a poor distribution of items in the dimension of latent severity; that is, the first two items address issues of less severity, whereas the remaining three address more severe issues. Therefore, there is a lack of intermediate issues to maintain the continuity of the line and thus ensure the broad spectrum of classification of the individuals (see Figure 1).

As predicted in the factor analysis, the principal component analysis of the residuals presented evidence that there is another dimension in the scale, failing to confirm its one-dimensionality, although the first component of the residues accounts for only 1.85 units of variance, which is within the suggested limit of 1.9. In relation to the DIF, as observed in the previous subscales, there was no statistically significant difference between the items with respect to men and women.

DISCUSSION

The main finding of this study is that the model parameters for all four subscales of interest in the GAIN-SS have optimal infit and outfit values. This implies that the scales can be used in Brazil. This analysis model extends findings from prior studies of Rasch analyses done with the longer version of these scales in Canada and Brazil. Because of the binary recategorization of the responses though, the results are limited to an analysis with two points, instead of the four of the original scale. Nevertheless, this study adds an important finding to the literature. That is, the four GAIN-SS scales studied here appear to be structurally sound, with no apparent differences in item severity.

One caveat, however, is that the Rasch analysis model, applied here using R software, eliminates extreme cases, as an individual who responds negatively to all items may have a degree of severity close to the difficulty of the easiest item or even severity much lower than this. Conversely, individuals who respond positively to all screening items likely have severity close to the most difficult item. Therefore, the items used do not permit the separation of these cases, making an estimate impossible for the severity of the problems that have acceptable negative responses.

The IDScr, External Disorders Screener, and SDScr subscales have one-dimensionality, shown by varimax rotation factor analysis. A possible second dimension was suggested in the Crime and Violence Screener (CVScr) subscale. This result is understandable, as it includes items that talk about violence (SCR4a), items that talk about the most frequent violations (SCR4d), and even items related to trafficking (SCR4c), which are very different things. This is illustrated by the title "Crime and Violence," which already suggests the existence of two dimensions.

The four subscales of the GAIN-SS were adequate for the Rasch model. In all items of each, the infits and outfits ranged between 0.5 and 1.5, which correspond to the optimal parameters of the model. It is clear, however, that for the SDScr and CVScr subscales, the items are not well distributed across the continuum of severity, which may indicate a lack of easier

TABLE 4 Mean Infit and Outfit Values of the Rasch Model of the Items of the CVScr Subscale (São Paulo, SP, Brazil, 2015)

Item			Statistics			Mean Square		ZSTD	
Item	%	Severity	χ^2	*df*	*p*	Outfit	Infit	Outfit	Infit
SCR4c	10.6	0.754	29.998	46	.967	0.638	0.82	–0.98	–0.51
SCR4b	12.8	0.559	36.855	46	.83	0.784	0.776	–0.59	–0.78
SCR4e	12.8	0.559	36.855	46	.83	0.784	0.776	–0.59	–0.78
SCR4a	42.6	–0.845	52.464	46	.238	1.116	1.127	1.09	1.23
SCR4d	48.9	–1.029	50.889	46	.287	1.083	1.03	0.9	0.37

Source: data collection, 2014. CVScr = Crime and Violence Screener; ZSTD = randomness test of the mean square.

(less rare) items in the SDScr subscale and a lack of intermediate (medium rare) items in the CVScr subscale (Boone et al., 2014). The DIF analysis of the items of this scale did not indicate statistically significant differences in the responses of men and women, in agreement with the findings in the studies of the Canadian and Brazilian versions, mentioned above.

CONCLUSIONS

The Rasch model validated the subscales of the GAIN-SS with no statistically significant differences for the responses of men and women. The CVScr subscale has an indication of multidimensionality, whereas the others are clearly one-dimensional. The SDScr and CVScr subscales have some redundant items, requiring items of lesser and greater severity, so that they can better classify individuals.

Future validation studies of this instrument with larger samples and in other services belonging to the Psychosocial Care Network - RAPS (hospitals, primary health units) are needed to verify the psychometric properties of this screening tool and make generalizations. Instruments that do not only assess different aspects and symptoms of the use of AOD but also investigate mental health and problems related to crime and violence are important for the integral care of individuals.

REFERENCES

Boone, W. J., Staver, J. R., & Yale, M. S. (2014). *Rasch analysis in the human sciences*. Amsterdam, The Netherlands: Springer.

Chachamovich, E. (2007). *Theory of response to the item: Application os the Rasch model in development and validation of instuments in mental health* (Doctoral dissertation, Universidade Federal do Rio Grande do Sul). Retrieved from https://lume.ufrgs.br/handle/10183/1

Claro, H. G. (2015). *Validação dos Instrumentos Avaliação Global das Necessidades Individuais-Inicial e rastreio rápido*. (Doctoral dissertation, Universidade de São Paulo, Escola de Enfermagem). Retrieved from http://www.teses.usp.br/teses/disponiveis/7/7141/tde-09062015-121013/pt-br.php

Claro, H. G., de Oliveira, M. A., Bourdreaux, J. T., Fernandes, I. F., Pinho, P. H., & Tarifa, R. R. (2015). Drug use, mental health and problems related to crime and violence: Cross-sectional study. *Revista Latino-Americana de Enfermagem*, 23, 1173–1180. doi:10.1590/0104-1169.0478.2663

Claro, H. G., Oliveira, M. A. F., Fernandes, I. F. A. L., Titus, J. C., Tarifa, R. R, Rojas, T. F., Pinho, P. H. (2016). Internal consistency and convergent validity of the Portuguese versions of the global appraisal of individual needs-initial and short screener. *Journal of Addictions Nursing*, 27(4), 241–246. doi:10.1097/JAN.0000000000000143

Claro, H. G., Oliveira, M. A. F., Paglione, H. B., Pinho, P. H., Pereira, M. O., & Vargas, D. (2012). Translation and cultural adaptation of the Global Appraisal of Individual Needs-Initial. *Revista da Escola de Enfermagem da USP*, 46(5), 1148–1155. doi:10.1590/S0080-62342012000500016

Dennis, M. (2010). *Global Appraisal of Individual Needs (GAIN): A standardized biopsychosocial assessment tool*. Paper presented at the 16th Annual Drug Court Training Conference of the National Association of Drug Court Professionals, Boston, MA.

Dennis, M., Chan, Y., & Funk, R. (2006). Development and validation of the GAIN Short Screener (GSS) for internalizing, externalizing and substance use disorders and crime/violence problems among adolescents and adults. *The American Journal on Addictions*, 15(Suppl. 1), 80–91. doi:10.1080/10550490601006055

Dennis, M., Feeney, T., Stevens, L., & Bedoya, L. (2008). *Global Appraisal of Individual Needs-Short Screener (GAIN-SS): Administration and scoring manual*. Bloomington, IL: Chestnut Health Systems. Retrieved from http://www.chestnut.org/LI/gain/GAIN_SS/index.html

Dennis, M., Funk, R., Godley, S., Godley, M. D., & Waldron, H. (2004). Cross-validation of the alcohol and cannabis use measures in the Global Appraisal of Individual Needs (GAIN) and Timeline Followback (TLFB; Form 90) among adolescents in substance abuse treatment. *Addiction*, 99(Suppl. 2), 120–128. doi:10.1111/j.1360-0443.2004.00859.x

Dennis, M., White, M., Titus, J., & Unsicker, J. (2003). *Global Appraisal of Individual Needs: Administration guide for the GAIN and related Measures*. Retrieved from https://www.researchgate.net/publication/267383950_GAIN_Global_Appraisal_of_Individual_Needs_Administration_Guide_for_the_GAIN_and_Related_Measures

Gallassi, A. D., Alvarenga, P. G., Andrade, A. G., & Couttolenc, B. F. (2008). The cost of problems caused by alcohol abuse. *Revista de Psiquiatria Clínica (São Paulo)*, 35(Suppl. 1), 6. doi:10.1590/S0101-60832008000700007

Garcia Claro, H., Ferreira de Oliveira, M. A., Almeida Lopes Fernandes, I. F., Titus, J. C., Ribeiro Tarifa, R., Fernandes Rojas, T., & Hayasi Pinho, P. (2015). Rasch model of the GAIN Substance Problem Scale among inpatient and outpatient clients in the city of São Paulo, Brazil. *Addictive Behaviors Reports*, 2:55–60. doi:10.1016/j.abrep.2015.08.001

Gotham, H., White, M., Bergethon, H., Feeney, T., Cho, D., & Keehn, B. (2008). An implementation story: Moving the GAIN from pilot project to statewide use. *Journal of Psychoactive Drugs*, 40(1), 97–107. doi:10.1080/02791072.2008.10399765

Humphreys, L. G., & Montanelli, R. G., Jr. (1975). An investigation of the parallel analysis criterion for determining the number of common factors. *Multivariate Behavioral Research*, 10(2), 193–205. doi:10.1207/s15327906mbr1002_5

Kenaszchuk, C. T. C., Wild, T. C., Rush, B. R., & Urbanoski, K. (2013). Rasch model of the GAIN Substance Problem Scale among Canadian adults seeking residential and outpatient addiction treatment. *Addictive Behaviors*, 38(7), 2279–2287. doi:10.1016/j.addbeh.2013.02.013

Laranjeira, R. (2014). *II Levantamento Nacional de Álcool e Drogas (LENAD)-2012*. São Paulo, Brazil: Instituto Nacional de Políticas Públicas do Álcool e Outras Drogas (INPAD). Retrieved from https://inpad.org.br/wp-content/uploads/2014/03/Lenad-II-Relat%C3%B3rio.pdf

Linacre, J. M. (1994). Sample size and item calibration stability. *Rasch Measurements Transactions*, 7(4), 328. Retrieved from https://www.rasch.org/rmt/rmt74m.htm

Ministry of Health, Brasil. (2002, February 19). Portaria n° 336/GM, de 19 de Fevereiro de 2002. Retrieved from http://bvsms.saude.gov.br/bvs/saudelegis/gm/2002/prt0336_19_02_2002.html

Pereira Filho, O. A., Tannuri-Pianto, M. E., & Sousa, M. C. S. (2010). Medidas de custo-eficiência dos serviços subnacionais de segurança pública no Brasil: 2001–2006. *Economia Aplicada*, 14, 313–338. doi:10.1590/S1413-80502010000300003

Santos, M. J., & Kassouf, A. L. (2007). Uma investigação econômica da influência do mercado de drogas ilícitas sobre a criminalidade Brasileira. *Economia Aplicada*, 8(2), 187–2010. Retrieved from https://www.researchgate.net/publication/4982768_Uma_Investigacao_Economica_da_Influencia_do_Mercado_de_Drogas_Ilicitas_Sobre_a_Criminalidade_Brasileira

Titus, J., Dennis, M., Lennox, R., & Scott, C. (2008). Development and validation of short versions of the internal mental distress and behavior complexity scales in the Global Appraisal of Individual Needs (GAIN). *The Journal of Behavioral Health Services & Research*, 35(2), 195–214. doi:10.1007/s11414-008-9107-5

Titus, J. C., Feeney, T., Smith, D. C., Rivers, T. L., Kelly, L. L., Dennis, M. L., & Center, G. C. (2012). *GAIN-Q3: Administration, clinical interpretation, and brief intervention*. Bloomington, IL: Chestnut Health Systems. Retrieved from https://portal.ct.gov/-/media/dcf/GAIN/pdf/GAIN-Q3-Manual-3_2.pdf?la=en

United Nations Office on Drugs and Crime. (2014). *World drug report (UNODC report 2014)*. Nova York, NY: Author.

World Health Organization. (2014). *Global status report on alcohol and health (WHO report 2014)*. Geneva, Switzerland: Author.