MIST: Severity of Dependence Scale (SDS)

Validity of the Severity of Dependence Scale (SDS) Construct Applying the Item Response Theory to a Non-Clinical Sample of Heroin Users

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Aims: The purpose of this work is to study the validity of the Severity of Dependence Scale (SDS) construct by applying Rasch models to a non-clinical sample of heroin abusers. Subjects: 982 (73% men) young people 30 years old or under (mean age 25.9 years) participated. All of them were captured from the community in the metropolitan areas of Madrid, Barcelona and Seville, between April 2002 and December 2003. Analysis: Dimensionality of the scale and calibration of items were studied using the Rating Scale model, which is a Rasch-type model. A factorial analysis was also performed to check the dimensionality of the scale. Results: The analysis of fit shows that all the items have infit and outfit values between ±2 logits, indicating that the data fit the model and that it may be assumed to be unidimensional. The principal components analysis also showed...
the existence of a principal factor that explains 52.5% of the variance observed. Item calibration found that they are between +0.89 and −1.04 logits on the scale. Conclusion: The results show unidimensional structure of the SDS scale. Item calibration shows they are distributed along the continuum, which must be taken into account when calculating total scores. The study’s limitations are noted.

Keywords Severity Dependence Scale (SDS); heroin addiction; Rasch models; Item Response Theory (IRT), validity

Introduction

One of the main goals of clinical evaluation of patients manifesting overconsumption of psychoactive substances is to diagnose their abuse or dependence. The best clinical evaluation instrument is a well-done clinical history. However, standardized instruments are an excellent diagnostic aid.

The diagnostic criteria for substance dependence established by the most widely accepted nosological classification systems (DSM-IV-TR and CIE-10) are based on the concept known as the Alcohol Dependence Syndrome (ADS), proposed by Edwards and Gross (1976) and accepted as the theoretical reference on addiction. Several different scales and clinical interviews have been designed in an attempt to measure each of the criteria for dependence proposed by those nosological systems and make them operable (e.g., the Schedule for Clinical Assessment in Neuropsychiatry [SCAN] or the Substance Dependence Severity Scale [SDSS]).

Other scales measuring severity of dependence have also been designed based on constructs that may be nearer or further from the most widely accepted nosological criteria.

These are based on a dimensional evaluation model (from lesser to greater severity) rather than on the categorical model using diagnostic criteria (“case” or “not case” of dependence). Among these are, for example, the Leeds Dependence Questionnaire (LDQ) and the Severity of Dependence Scale (SDS).

The SDS is made up of five easily administrable items, and is used to determine the degree of dependence on different types of drugs, focusing on the psychological components of dependence.

Some SDS studies published contribute evidence to the scale’s reliability and validity. Gossop et al. (1995) applied the scale to a sample of heroin, amphetamine, and cocaine users, and found sufficient internal consistency and evidence of validity to back the internal structure and relationships with other consumption variables. Other studies, such as those by Topp and Mattick (1997), Kaye and Darke (2001), and Cuevas, Sanz, de la Fuente, Padilla, and Berenguer (2000), on amphetamine, cocaine, and benzodiazepine abusers, respectively, have established the cutoff point that best discriminates between presence and absence of dependence on each of those substances. In work on the Spanish version of the SDS, González-Sáiz and Salvador-Carulla (1998) pointed out that the scale only measures some of the items necessary to completely evaluate substance dependence.

These studies were performed within the framework of measurement of the Classical Test Theory (CTT). At the present time, Item Response Theory models are being used more and more in the field of health, because they make it possible to show the metric properties of items and tests that cannot be studied with the CTT. Among these are the invariance of measurement, error in measurement per item (not for the entire instrument, as in the CTT), knowing the position of each item on the continuum, and finding the most probable response to each item for a person with a given severity of dependence (Bezručko, 2005; Conrad and Smith, 2004; McHorney and Monahan, 2004; Prieto, Alonso, and Lamarca, 2003).
Some of the studies performed in drug addiction have used these models to analyze the dimensionality of a nicotine dependency scale (Breteler, Hilberink, Zeeman, and Lammers, 2004), the uniformity of substance dependence syndrome elements based on the criteria in the DSM-III-R and ICD-10 (Kan, Breteler, van der Ven, and Zitman, 1998) and discrimination of items on an alcohol dependence scale (Kahler, Strong, Hayaki, Ramsey, and Brown, 2003). The purpose of this work was to apply an IRT model, and more specifically, the Rating Scale Model, which is a polytomous model, derived from Rasch Model, to contribute evidence of the validity of the SDS construct. The validation studies used concentrate on providing evidence of the dimensionality of the scale and calibrating the items on the severity of dependence continuum.

Method

Subjects

The participants were 982 young people between 18 and 30 years old who had consumed heroin at least 12 times in the last 12 months before the interview and at least once in the last 3 months. This is a multicenter study performed by three research groups. All of them were captured from the community in the metropolitan areas of Madrid (43.4%), Barcelona (36.2%), and Seville (20.4%). The sample was recruited in the street, in different drug consumption scenarios and not from drug user treatment centers. As there was no suitable sampling frame for participant selection, nonprobability sampling methods were used. At first, an attempt was made for one worker per city to collect an initial nucleus of drug users from various scenarios (targeted sampling; Watters, 1989), and who would then name other eligible consumers (snowball sampling; Hartnoll et al., 1997).

Participants were informed of the purpose and the stages of the study. They were explained that their participation was voluntary and that the data would be used exclusively for statistical purposes. At the end of the explanation, they were asked to sign an informed consent form for their participation.

However, this method was not very productive, and in the end, respondent-driven sampling, which is a snowball system providing incentives for participation and capturing or naming other participants (Heckathorn, 1997), was used.

The final sample was collected using four procedures: snowball sampling (47%), work of outside recruiters, such as users, ex-users and professionals (34.1%), direct capture by study fieldworkers in drug use scenarios where it was rather likely to find heroin users, especially places with massive drug consumption and/or sale (17.1%), and direct participation in response to advertising (1.7%). To improve representativeness, an attempt was made to capture heterogeneous drug consumers by diversifying places and ways of capture and actively searching for certain types of users (integrated, very young, new user, etc.).

Instrument

The purpose of the Severity of Dependence Scale (SDS) is to evaluate the severity of psychological dependence on different types of drugs (Gossop et al., 1995). It is made up of five items representing the psychological components of the subject’s dependence in the month before the test is given. A Likert-type scale codes the response to each item, with scores ranging from 0 to 3 (0 = never/almost never; 1 = sometimes; 2 = often; 3 = always/nearly always for items 1–4; and 0 = not difficult; 1 = quite difficult; 2 = very
difficult; 3 = impossible for item 5). The total SDS score has, therefore, a range of 0 to 15 points and a higher score indicates a greater degree of dependence on the drug in question. The SDS items are the following:

1. Did you think your use of (named drug) was out of control?
2. Did the prospect of missing a hit (line, dose) make you anxious or worried?
3. Did you worry about your use of (named drug)?
4. Did you wish you could stop?
5. How difficult would you find it to stop or go without (named drug)?

Procedure and Analysis

The SDS is applied using data from the first evaluation in the context of an epidemiological cohort study. Information was collected by trained interviewers in face-to-face interviews, in which the interview subjects responded to a questionnaire that included, among other things, sociodemographic variables, drug consumption patterns, risk factors for infection transmitted sexually or in blood, social conflicts, use of social/health-care services and quality of life with regard to health.

The metric properties of the SDS are found using the Rating Scale Model (RSM) (Andrich, 1978a, 1978b), which pertains to the Rasch family of models (Rasch, 1960).

These models belong to the IRT, which assumes a functional relationship between the variable measured by the items on a test and the person’s responses to them. This means that the probability of response to an item depends only on the ability of the person in the latent trait evaluated. Therefore, persons with different ability in the variable measured will have different probabilities of scoring on a given item.

Like other Rasch models, the RSM requires that the assumptions of unidimensionality, local independence, and homogeneous discrimination of the items be met (Masters, 1980; 1988a, 1988b). The assumption of unidimensionality implies that the items designed to measure the variable (severity of dependence) constitute a single dimension so they are measuring the same variable. The second assumption is that the response to an item by a subject with a certain value in the unidimensional variable (severity of dependence) is not influenced by his responses to others. The third assumption is specific to Rasch models, and implies that all items on the test have the same power of discrimination.

The Rasch analysis gives a measures of interval in which the items on the scale and the persons measured are hierarchically calibrated on a common logit scale, if the data fit the model. To test this, there are fit statistics that identify patterns of unusual or aberrant responses that violate model assumptions and prediction. For example, item-fit statistics detect items that do not contribute to the operational definition of the construct in the same direction as the rest of the items, which represents a violation of the assumption of unidimensionality. Person-fit statistics can detect whether an individual with less knowledge has unexpectedly answered a difficult question correctly, possibly by guessing, which would question the validity of that person’s measure. Using this system, an item or person can be assessed for inconsistency with model expectations. Therefore, fit statistics are a sort of “quality control” that identifies data that are unexpected or not predicted by the model (Rojas, González, and Padilla, 2000).

Of the various possible indices of fit, we used residual analysis, which tests the degree to which the test response data are as expected from the model. To do this, it analyzes the differences between observed and expected values for a person with certain ability on each item in the test (Hambleton, Swaminathan, and Rogers, 1991; Wright and Masters, 1982).
To perform this analysis, the continuum is divided into \( K \) intervals, and the percentage of correct responses \( P_{jk} \) and the percentage of responses expected according to the model are evaluated for each interval \( E(P_{jk}) \).

Two fit statistics were analyzed, mean-square (MNSQ) and standarized mean-square statistics (ZSTD; Wright and Linacre, 1994). The latter takes into account the sample error and follows a normal distribution with a 0 mean and a standard deviation of 1. There are, in turn, two MNSQ and ZSTD statistics called the infit and the outfit. The first is an information-weighted fit statistic, which is more sensitive to unexpected behavior affecting responses to items near the person’s level of ability. The outfit is an outlier-sensitive fit statistic, more sensitive to unexpected behavior by persons on items far from the person’s level of ability. In the case of MNSQ values, the region considered an acceptable fit varies between 0.6 and 1.4 with an ideal value of 1 (Wright and Linacre, 1994). For the ZSTD, the values near 0 indicate concordance between observed and model data. Linacre (2002) suggests that values located in the interval between \(-2\) and \(+2\) indicate an acceptable fit.

Interpretation of the degree of “severity of dependence” and item calibration were done by transforming data to the “logit” scale, which describes a probabilistic relationship between item difficulty \( (\delta_i) \) and a person’s ability \( (\theta_n) \). For any person and any item, the difference \( (\theta_n–\delta_i) \) is a magnitude with a uniform meaning across the scale (Wright and Masters, 1982).

The BIGSTEPS ver. 2.82 program developed by Wright and Linacre (1998) was used to apply the RSM.

**Results**

**Sociodemographic and Drug Consumption Characteristics**

Seventy-three percent of the persons interviewed in the study were men and 27% were women. The average age of the men was 25.9 years \( (SD = 3.2; \text{range} = 18–30 \text{ years}) \), whereas for women it was 25 years \( (SD = 3.7; \text{range} = 18–30 \text{ years}) \).

The percentage of those who had not finished primary school was 20.9%; 76.3% had finished primary or secondary, and 2.8% had gone to university. The percentage of those who were gainfully employed was 31.5%; 56.1% were unemployed, and the rest were in other classes (disabled, pensioned, etc.). During the 12 months prior to the interview, the majority had resided in single or family homes (69.9%), 11.5% were squatters, 9.6% were homeless, and the rest had been institutionalized (prison, therapeutic communities, etc.).

The average age when they first tried heroin was 17, beginning regular use at 18.04 years of age \( (SD = 3.4) \). Among the persons interviewed, 64% stated that they had injected themselves at some time, and 44.1% said that they had injected themselves in the last 30 days before the interview. In the last 30 days, the way 63.8% of the persons interviewed had most taken it was by smoking; 31.7%, by injection; and 4.4%, by inhalation.

Other drugs taken were, 78.6% crack and 74.7% cocaine. Ecstasy and amphetamines had been taken by 33.7% and 25.4%, respectively; tranquilizers, by 81.5%; cannabis, by 88.5%; and illegally sold methadone, by 36%.

**Data-to-Model Fit**

The RSM excludes persons with maximum and minimum scores from the analysis. In this study, 8 persons were found with the maximum store and 26 with the minimum. Therefore, the analysis of metric properties described next was made for 948 people.
Table 1

Overall fit of subjects and items to the model

<table>
<thead>
<tr>
<th></th>
<th>Model</th>
<th>Infit</th>
<th>Outfit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Measure</td>
<td>Error</td>
<td>MNSQ</td>
</tr>
<tr>
<td>Subjects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>.34</td>
<td>.71</td>
<td>1.00</td>
</tr>
<tr>
<td>SD</td>
<td>1.49</td>
<td>.11</td>
<td>.82</td>
</tr>
<tr>
<td>Max.</td>
<td>3.63</td>
<td>1.14</td>
<td>5.60</td>
</tr>
<tr>
<td>Min.</td>
<td>−3.61</td>
<td>.65</td>
<td>.08</td>
</tr>
<tr>
<td>Items</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>.00</td>
<td>.05</td>
<td>1.00</td>
</tr>
<tr>
<td>SD</td>
<td>.71</td>
<td>.00</td>
<td>.08</td>
</tr>
<tr>
<td>Max.</td>
<td>.89</td>
<td>.05</td>
<td>1.09</td>
</tr>
<tr>
<td>Min.</td>
<td>−1.04</td>
<td>.05</td>
<td>.90</td>
</tr>
</tbody>
</table>

Analysis of MNSQ and ZSTD indices of fit to the models generally yields acceptable values according to the aforementioned criteria, both for items and subjects (Table 1).

However, the maximums and minimums indicate the existence of misfits for certain subjects. Specifically, there are 52 persons who have infit and outfit misfits. As explained earlier, misfit of these persons is due to an incoherent response pattern. For example, Person 790, a misfit, scores 0 on item 4 ($\delta_4 = −1.04$) of the SDS, whereas on item 2 ($\delta_2 = 0.35$), he has a score of 3. This pattern is incoherent since item 2 is closer than item 4 to the end of the continuum that represents more severity of dependence (higher score represents greater severity). Therefore, the score on item 4 should be higher than that in item 2. This incoherent pattern may have been due to the person not understanding the statements in the items, lack of attention, being tired, and so forth.

Acceptable infit and outfit values were also observed for all of the items. The MNSQ is observed to be near 1 and the ZSTD is in the range of $−2y + 2$ for all the items (Table 2).

Table 2

Item fit to the model

<table>
<thead>
<tr>
<th></th>
<th>Infit</th>
<th>Outfit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MNSQ</td>
<td>ZSTD</td>
</tr>
<tr>
<td>1. Did you think your use of (named drug) was out of control?</td>
<td>1.00</td>
<td>.0</td>
</tr>
<tr>
<td>2. Did the prospect of missing a hit (line, dose) make you anxious or worried?</td>
<td>.93</td>
<td>−1.0</td>
</tr>
<tr>
<td>3. Did you worry about your use of (named drug)?</td>
<td>.90</td>
<td>−1.4</td>
</tr>
<tr>
<td>4. Did you wish you could stop?</td>
<td>1.07</td>
<td>.9</td>
</tr>
<tr>
<td>5. How difficult would you find it to stop or go without (named drug)?</td>
<td>1.09</td>
<td>1.1</td>
</tr>
</tbody>
</table>
In view of these results, it may be said that the data matrix fits the RSM acceptably, and this model can therefore be used to measure severity of dependence.

On the other hand, some authors argue that existence of a single variable can be assumed when the data fit the model (Gustafsson, 1980) so the unidimensional assumption is satisfied (Smith and Miao, 1994).

In this application of the SDS, the unidimensional assumption indicated by the analysis of fit of the items is reaffirmed by factorial analysis. As observed in Tables 3 and 4, the principal components analysis shows a principal factor that explains 52.5% of the variance, and all of the items are highly saturated in that factor. This supports the unidimensional structure found by the analyses performed previously.

**Table 3**

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Rotation Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% Variance</td>
</tr>
<tr>
<td>1</td>
<td>2.63</td>
<td>52.51</td>
</tr>
<tr>
<td>2</td>
<td>0.79</td>
<td>15.78</td>
</tr>
<tr>
<td>3</td>
<td>0.73</td>
<td>14.59</td>
</tr>
<tr>
<td>4</td>
<td>0.44</td>
<td>8.78</td>
</tr>
<tr>
<td>5</td>
<td>0.42</td>
<td>8.34</td>
</tr>
</tbody>
</table>

*Note:* Extraction method: Principal components analysis.

**Table 4**

<table>
<thead>
<tr>
<th>Component 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1</td>
</tr>
<tr>
<td>Item 2</td>
</tr>
<tr>
<td>Item 3</td>
</tr>
<tr>
<td>Item 4</td>
</tr>
<tr>
<td>Item 5</td>
</tr>
</tbody>
</table>

**Map of Persons and Items**

The map of persons and items shown in Figure 1 shows the calibration of items and the position of persons on the “severity of dependence” continuum. The common logit scale is represented on the vertical line in the center of the map (the letters M, S, and Q for item and person distributions represent the mean, 1 SD, and 2 SDs, respectively), and the logits for the interval scale are placed to the left of the figure.

A “#” in the “persons” column represents the position of the persons on the dependence severity continuum. “#” represents a group of 10 persons and “.” is a group of 9 persons or fewer.
The “map of items” column shows the position of each item on the continuum, representing the value on the scale for each item in the “severity of dependence” construct in parentheses.

Figure 1 shows items calibrated by difficulty and persons by level of ability together. The highest item/person values on the scale are at the top of the graph. For example, “Did you think your use of (drug named) was out of control?” ($\delta_1 = 0.42$ logits) was a more difficult question than “Did you worry about your use of (drug named)?” ($\delta_2 = -0.63$ logits).
Person measures on the common logit scale make it possible to find out the most likely response to the items composing the SDS. For example, in Figure 2, Person A has a low ‘severity of dependence’ score ($\theta_A = -1.2$). It may be observed that in Item 5 ($\delta_5 = 0.89$), the most likely response is 0 (never), in Item 1 ($\delta_1 = 0.42$) it is 1 (sometimes) and in Item 4 ($\delta_4 = -1.04$) the most likely response is 3 (often).

**Category Probabilities Curves**

The Category Probability Curves (CPC) are represented starting from the ability threshold parameters of the item steps ($\tau_m$). The interest in studying these curves resides in two main points: (a) the curves provide information on the functioning of the alternative responses. Specifically, the fact that all of the curves are at some point the most probable indicates correct functioning of the response alternative; and (b) the intersections between the curves (thresholds) define the limits of the “most probable response regions” on the continuum. That is, they define different regions on the continuum where there is a higher probability of the subjects responding to the category of response represented over this region.

As shown in Figure 3 all the response categories are the most probable in some section of the continuum, which indicates that they are functioning properly. The region of most probable response for persons with a severity of dependence score of 0 is between $-\infty$ and $-1.97$ logits; the most probable response is 1 for persons with scores between $-1.97$ and $-0.3$ logits; the most probable response is 2 for those who have scores between $-0.3$ and $2$ logits, and for respondents with scores over $2$ logits, the most probable response is 3.
Discussion

This work concentrated on contributing two types of evidence of the construct validity of the SDS scale. On one hand, unidimensional structure of the SDS scale was confirmed. On the other, the scale values of the items on the “severity of dependence” continuum were found.

With the results found, after checking that the data fit the model, unidimensionality may be assumed (Smith and Miao, 1994). This assumption has further been checked by factorial analysis, which led to the same conclusion. A review in the literature shows that Gossop et al. (1995) also found a unidimensional structure in their study of the SDS, whereas González-Saiz and Salvador-Carulla (1998) detected two factors in the SDS.

Some authors connect the use of Rasch models with evidence on the structure of the set of items selected (Bond, 2004; Simith and Suh, 2003; Smith, 2001). As described earlier, these models make it possible to find out the probability of response to the items according to the difference in ability of the persons and the location of the items. This implies a hierarchical structure (Linacre, 2004), which, in the case of the SDS, means that the persons with the highest level of severity of dependence will occupy the top positions on the continuum (Figure 1), whereas those with the lowest level of dependence will occupy the lowest positions. Analogously, it may be seen how the item positions vary by difficulty on the continuum. Therefore, in Rasch models, there is a confluence between the theoretical conception of the measure of a construct—in this case the severity of dependence—and its mathematical development. In this sense, the measurement can only be made when the set of items that measures the construct is theoretically coherent, which is given by the fit of items and persons. If the items on the SDS did not fit, we would have to think about other sources of variability outside of the “severity of dependence” construct. This in turn, implies a departure from the unidimensional assumption (Messick, 1995).

On the other hand, calibration of the items along the severity of dependence continuum has demonstrated that not all of the items on the SDS measure the construct with the same intensity. Finding different values on the scale for each item contradicts the assumption of parallel items that require Likert-type scaling typical of a CTT. Therefore, the total scores
on the SDS scale are found as a sum model of all the items, which must be weighted by a factor so that the relative weight of each item on the continuum is included in the total scores.

From the point of view of the measure, this finding shows that the items have a relative weight in the severity of dependence construct.

We therefore believe that the application of the IRT to the SDS scale points out some of its limitations and advantages in measuring the construct severity of dependence, although these properties are complementary to and do not exclude those offered by studies done in the frame of the CTT. The results obtained, then, provide new evidence making it possible for future studies using this scale to be interpreted more accurately.

**Study’s Limitations**

One of the limitations of the study is the use of a nonrandom sample. Without doubt this limits its representativeness, with the pertinent consequences for data analysis. On the other hand, this limitation is not a determining trait for calculating parameters of items or persons when the Rasch models are applied, although it is for other IRT models (Glas, 1989; Wright and Stone, 1979).

Finally, further research applying the IRT to measurement of severity of dependence using the SDS on clinical samples would be useful. This would enable the similarities and differences from results of epidemiological studies to be seen, and also how these results are related to those obtained from the perspective of the CTT.

**RÉSUMÉ**

**Validité de construct de la SDS (Echelle de la Sévérité de la Dépendance) en appliquant les modèles de Rasch dans un échantillon non clinique de consommateurs d’héroïne**

Objectifs: L’objet de cette recherche est d’étudier la validité de construct de la SDS (Echelle de la Sévérité de la Dépendance) en appliquant les modèles de Rasch dans un échantillon non clinique de consommateurs d’héroïne. Participants: Dans cette étude ont participé 982 jeunes de moins de 30 ans. Ils ont été sélectionnés dans un environnement non thérapeutique dans les régions de Madrid, Barcelone et Séville. Analyse: L’étude de la dimensionnalité de l’échelle et la calibration des items ont été réalisées d’après le Rating Scale Model, de la famille des modèles de Rasch. Une analyse factorielle a été également effectuée afin de contraster la dimensionnalité de l’échelle. Résultats: L’analyse de l’ajustement indique que tous les items ont une valeur de *infit* et *outfit* compris entre ± 2 logits, ce qui signifie que les données s’ajustent au modèle et que nous pouvons assumer l’unidimensionnalité. De même, l’analyse des composantes principales a montré l’existence d’un facteur principal qui explique le 52,5% de la variance observée. La calibration des items montre qu’ils prennent des valeurs d’échelle comprises entre +0,89 et −1,04 logits. Conclusions : Les résultats obtenus indiquent une structure unidimensionnelle de l’échelle SDS. La calibration des items reflète qu’ils sont distribués tout au long du continu et qu’il est nécessaire de le prendre en compte lors du calcul des ponctuations totales.

Mot Clés: Sévérité de la dépendance (SDS); Adiction à l’héroïne; Modèles de Rasch; Théorie de la Réponse à l’Item, Validité.
RESUMEN

Validez de constructo de la Escala de Severidad de la Dependencia (SDS) en una muestra no clínica de consumidores de heroína aplicando la Teoría de respuesta al Ítem

Objetivos: El propósito de este trabajo es estudiar la validez de constructo de la SDS aplicando los modelos de Rasch en una muestra no clínica de consumidores de heroína.

Participantes: Participaron 982 jóvenes menores de 30 años. Todos ellos fueron reclutados en ámbitos no terapéuticos en las áreas metropolitanas de las ciudades de Madrid, Barcelona y Sevilla.

Análisis: El estudio de la dimensionalidad de la escala y la calibración de los ítems se ha realizado aplicando el modelo Rating Scale, perteneciente a la familia de modelos de Rasch. También se ha realizado un análisis factorial para contrastar la dimensionalidad de la escala.

Resultados: El análisis del ajuste refleja que todos los ítems tienen valores de infit y outfit comprendidos entre ±2 logits, lo que indica que los datos se ajustan al modelo y podemos asumir la unidimensionalidad. Asimismo, el análisis de componentes principales ha mostrado la existencia de un factor principal que explica el 52,5% de la varianza observada. La calibración de los ítems muestra que estos toman valores de escala comprendidos entre +0,89 y −1,04 logits. Conclusiones: Los resultados obtenidos están indicando una estructura unidimensional de la escala SDS. La calibración de los ítems refleja que estos se encuentran distribuidos a lo largo del continuo, siendo necesario tenerlo presente en el cálculo de las puntuaciones totales.

Keywords: Severidad de la dependencia (SDS); Adicción a la heroína; Modelos de Rasch; Teoría de Respuesta al Ítem, Validez.

THE AUTHORS

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Glossary

Item Response Theory (IRT) modeling: A statistical technique that is applied after data have been collected. IRT consists of a class of statistical procedures that are used to model the association between an individual’s responses to survey questions/items (in probabilistic terms) and an underlying latent trait that is measured by the items.

The Rasch model: The only item response theory (IRT) model in which the total score across items characterizes a person totally. It is also the simplest of such models having the minimum of parameters for the person (just one), and just one parameter corresponding to each category of an item. This item parameter is generically referred to as a threshold.

Outfit: Outlier-sensitive fit statistic. This is based on the conventional chi-square statistic. This is more sensitive to unexpected observations by persons on items that are relatively very easy or very hard for them (and vice-versa).

Infit: Inlier-pattern-sensitive fit statistic. This is based on the chi-square statistic with each observation weighted by its statistical information (model variance). This is more sensitive to unexpected patterns of observations by persons on items that are roughly targeted on them (and vice-versa).

Mean-square: This is the chi-square statistic divided by its degrees of freedom. Consequently its expected value is close to 1.0. Values greater than 1.0 (underfit) indicate unmodeled noise or other source of variance in the data―these degrade measurement. Values less than 1.0 (overfit) indicate that the model predicts the data too well―causing summary statistics, such as reliability statistics, to report inflated statistics. See further dichotomous and polytomous mean-square statistics.

Z-Standardized: These report the statistical significance (probability) of the chi-square (mean-square) statistics occurring by chance when the data fit the Rasch model. The values reported are unit-normal deviates, in which .05% 2-sided significance corresponds to 1.96. Overfit is reported with negative values.

References


