Confirmatory factor analysis (CFA) of the Crack Use Relapse Scale (CURS)

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Abstract

Background: When it comes to crack/drug use, relapse is a relatively common event in the first weeks after the end of treatment. However little is known about what happens to patients who relapse after discharge. **Objective:** To report the confirmatory factor analysis (CFA) of the Crack Use Relapse Scale (CURS) in an inpatient population. **Methods:** A five-point Likert scale with 25 items and, initially, 9 theoretical factors was generated and utilized in a cross-sectional study with a sample of 333 hospitalized male crack users. **Results:** CFA indicated a well-fitting model for the CURS. **Discussion:** The CFA shows that the CURS model is appropriate and well-fitting for assessment of latent variables common to psychiatric and psychological constructs – in this case, relapse of crack cocaine use after inpatient treatment.

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Keywords: Crack cocaine, drug, substance abuse, relapse, inpatient, scale.

Introduction

When it comes to crack/drug use, relapse is a relatively common event in the first weeks after the end of treatment, in both inpatient and outpatient care[1]. Recent data shows that crack users have increasingly sought care from rehabilitation facilities, but, still, little is known about what happens to patients who relapse after discharge as there are very few studies that focus on this subject[1-4].

A qualitative study[5] in which 14 crack users were interviewed showed that family, emotions, feelings, coping, sex, treatment, crime, positive expectations and craving are factors associated with relapse. Those reports served as basis for the instrument presented in another paper[6].

This study aims to describe the confirmatory factor analysis of CURS/Crack Use Relapse Scale, it is a unique and specific tool for assessing crack users relapse. The CURS assesses risk factors that may cause the user to slip back soon after discharge from treatment that may serve to help creating new strategies to increase their self-efficacy and coping skills over relapse to the specific use of crack.

Methods

Development of the scale

The development of the scale, presenting the pilot study and initial psychometric validation emphasizing the exploratory factor analysis can be accessed, respectively, in two previous publications[5,6].

Sample

Using a cross-sectional design, a convenience sample of male crack users hospitalized in a public psychiatric hospital in Porto Alegre, Brazil, was recruited. The total sample comprised 333 participants, most of whom were white (74.47%). Only a minority of subjects claimed to live in a marital relationship (16.52%). Mean age (25.9 years, SD 7.96) and educational attainment, were also noteworthy characteristics: n = 239 (71.8%) – incomplete elementary school, n = 65 (19.5%) – high school, n = 24 (7.2%) – Higher Education and n = 5 (1.5%) – Illiterate.

All research participants had a DSM-5[7] diagnosis of Cocaine Dependence – specifically, crack cocaine dependence – established by psychologists and psychiatrists specializing in drug dependence. All subjects reported crack as their drug of choice. No subjects were excluded from analysis.

Instruments

- Semi-structured interview: conducted to evaluate the socio-demographic profile of the sample and describe the pattern of psychoactive substance use, that is, to determine and record any other psychoactive substances subjects may have used before turning to crack cocaine.
- Crack Use Relapse Scale/CURS[6]: a 25-item scale, each item consisting of a statement on factors that may influence crack use relapse. Respondents are asked to score near agreement with each statement on a five-point Likert-type[8] scale, where 1 corresponds to "completely disagree" and 5, to "completely agree" (Table 1).

Data analysis

The exploratory factor analysis (EFA) was performed to classify the common items in clusters. The Kaiser-Meyer-Olkin test (KMO), was used to evaluate sampling adequacy, and Bartlett's test, to test for sphericity of CURS, to assess the suitability of the data for exploratory factor analysis and as a criteria of good adjustment of the scale[6].

Cronbach's alpha was used to test the reliability of internal consistency[9]. Analysis was performed for each factor individually and for the 25-item scale as a whole. The kappa coefficient was used to assess inter-rater reliability[6]. Confirmatory factor analysis (CFA) in this study, with the factors defined in the EFA[6] the confirmatory factor analysis was performed in the AMOS v.18 software environment[10]. Factor confirmation was based on the following fit indices, all of which range from 0 to 1, with values nearer 1 suggesting good model fit[11,12]: overall fit (OF), root mean square error of approximation (RMSEA). It is measured by the chi-square statistic (RMSEA) which estimates how well the model parameters reproduce the population covariance where values less than 0.05 indicate good fit, and values up to 0.08 represent reasonable error; goodness-of-fit index (GFI) and adjusted goodness-of-fit index (AGFI) that measure the relative amount of variance and covariance explained, where the latter suffers a penalty by the inclusion of an additional parameter will be included as indices of adjustments. Values near to 1 indicate a good fit of the model of the scale; comparative fit index (CFI), and Tucker Lewis index (TLI).

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Table 1. Crack Use Relapse Scale (CURS)
The following list presents several risk factors that may influence the relapse of crack users. Read each item and circle the number that best reflects your opinion on how much you disagree or agree, in relation to your use of crack during the past six months:

1	Family conflicts	I disagree completely	1	2	3	4	5	I agree completely
2	Intimate relationship conflicts (*e.g.*, with partner)	I disagree completely	1	2	3	4	5	I agree completely
3	Feelings of sadness	I disagree completely	1	2	3	4	5	I agree completely
4	Feelings of loneliness	I disagree completely	1	2	3	4	5	I agree completely
5	Feelings of anxiety	I disagree completely	1	2	3	4	5	I agree completely
6	No hope	I disagree completely	1	2	3	4	5	I agree completely
7	Dissatisfaction	I disagree completely	1	2	3	4	5	I agree completely
8	Feelings of pleasure	I disagree completely	1	2	3	4	5	I agree completely
9	Feelings of euphoria	I disagree completely	1	2	3	4	5	I agree completely
10	Excessive self-confidence	I disagree completely	1	2	3	4	5	I agree completely
11	Craving for crack	I disagree completely	1	2	3	4	5	I agree completely
12	Craving for crack after the use of another drug	I disagree completely	1	2	3	4	5	I agree completely
13	Exchange of sex for crack when craving strikes	I disagree completely	1	2	3	4	5	I agree completely
14	HIV infection	I disagree completely	1	2	3	4	5	I agree completely
15	Infection with sexually transmitted diseases other than HIV	I disagree completely	1	2	3	4	5	I agree completely
16	Difficulty accessing treatment in the public health service	I disagree completely	1	2	3	4	5	I agree completely
17	Imprisonment due to crack use	I disagree completely	1	2	3	4	5	I agree completely
18	Theft and robbery due to crack use	I disagree completely	1	2	3	4	5	I agree completely
19	Involvement with the drug trade	I disagree completely	1	2	3	4	5	I agree completely
20	Unemployment	I disagree completely	1	2	3	4	5	I agree completely
21	Favorable social environment for the consumption of crack	I disagree completely	1	2	3	4	5	I agree completely
22	Inability to cope with situations posing a high risk of crack use	I disagree completely	1	2	3	4	5	I agree completely
23	Lack of perspectives for a new lifestyle	I disagree completely	1	2	3	4	5	I agree completely
24	Lack of healthy habits, *e.g.* involvement in sports	I disagree completely	1	2	3	4	5	I agree completely
25	Lack of spirituality	I disagree completely	1	2	3	4	5	I agree completely

Methodology of final scores

In a previous publication[6], the factor loadings of each item in each domain were discriminated. These loadings are important for the development of the final scores. We realize that the largest factor loading links the item to its corresponding factor. For example, the first 7 items that have larger loadings 0.579 that are related with higher intensity to the factor 1contributing more of the other items.

Ethical aspects

The study was approved by the Institutional Review Board of Hospital de Clínicas de Porto Alegre.

Results

Dimensionality of the CURS

After EFA, the CURS had a six-factor model. The six factors represent the scale in its entirety[6]. The KMO found was 0.774 and the Bartlett's test was significant ($p < 0.001$). The composite model with 6 factors explained 62.2% of the variability of 25 items.

Six-factor model

Factor 1 – Emotions, family and affect – assesses feelings of loneliness, anxiety, hopelessness, sadness, and dissatisfaction; Factor 2 – Coping – assesses strategies used to cope with crack use, as well as lifestyle, habits, and spirituality; Factor 3 – Health, sex and treatment – assesses aspects pertaining to physical health, sexuality, and treatment access; Factor 4 – Legal and social aspects – assesses involvement in crime (theft, robbery, drug trafficking), imprisonment, and unemployment; Factor 5 – Positive expectations – assesses beliefs regarding crack consumption, euphoria, pleasure, and self-confidence; and Factor 6 – Craving – assesses users' cravings for crack cocaine.

Confirmatory factor analysis

OF was 775.9 with 258 degrees of freedom ($p < 0.001$). GFI and AGFI were 0.851 and 0.812 respectively, indicating good fit. CFI was 0.848 and TLI, 0.824. The RMSEA was 0.078 (< 0.080)[13]. All indices had satisfactory values, suggesting a well fitting model (Figure 1).

The Figure 1 shows the six factors of the CURS (represented by the large circles). Each rectangle represents one item of the questionnaire, linked to its parent factor by a single-headed arrow. The double-headed arrows connected to items 1, 2, 6, and 7 represent covariance between two latent variables. Only for items 6 and 7 was simplification of statements believed to facilitate understanding.

Reliability

The Cronbach's alpha values obtained for the total scale (0.86) and each of the six factors were high, suggesting high internal consistency, as the literature states that values > 0.60 are considered acceptable[9].

Discussion

Our findings show that the CFA then demonstrated satisfactory values for all fit indices, confirming the good fit of the underlying model of the scale and, consequently, the adequacy of the scale to measure its proposed construct. CFA is fully able to evaluate this adequacy, aiding the development of psychological, psychiatric and social models, particularly those designed to measure abstract constructs (latent variables), as in the present study[11,12].

Significant aspect of the study was demonstrated by CFA, which ratified all *prior* psychometric analyses and enabled assessment of the structural model underlying the CURS in a reliable, scientific manner, bearing in mind that the evaluation of latent variables (factors) can be particularly challenging, and these variables cannot be observed directly when the construct of interest is both biological and psychosocial in nature[12]. Therefore, we chose to simplify items

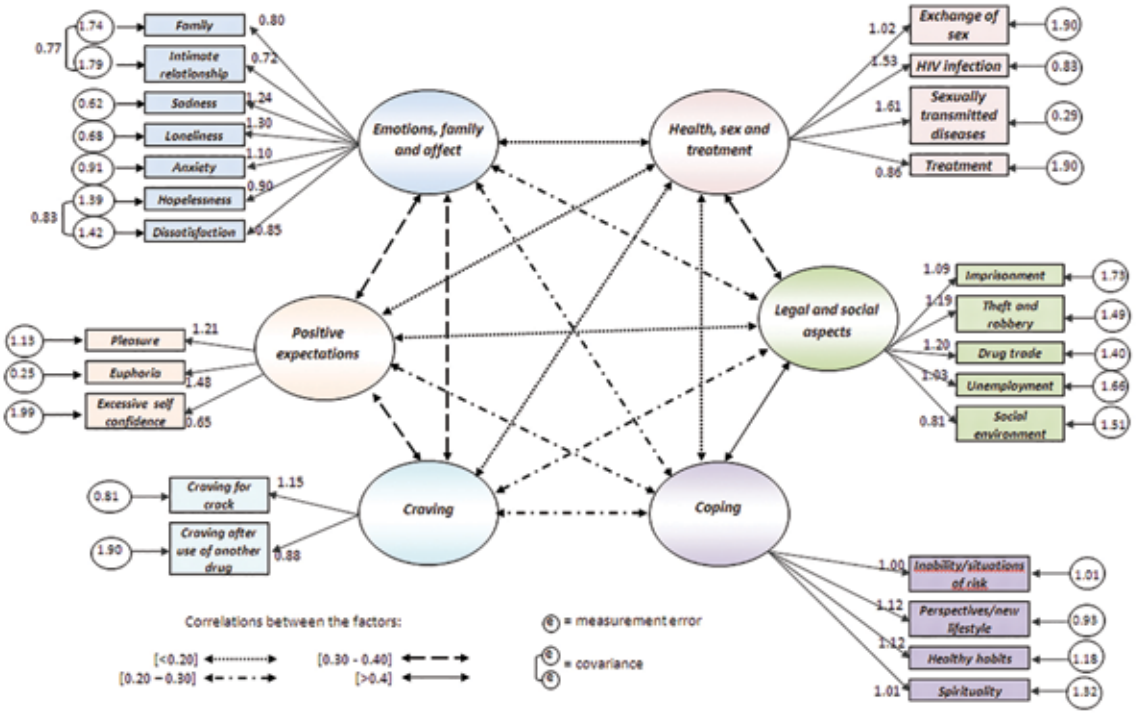

Figure 1. Path diagram of confirmatory factor analysis of the CURS items and their respective factors.

6 and 7 to "No hope" and "Dissatisfaction" respectively. On the basis of our theoretical knowledge in the results of prior studies conducted by our team[5], we had developed a priori postulates on the relationships between the measured variables and the factors defined initially. If on one hand the adjustment indices CFI, AGFI and TLI were moderate and the RSEMA index was fully satisfactory, indicating the appropriate model CURS, which was confirmed at the time that the scale was applied crack usersed by the adequacy of goodness-of-fit indices[11-13].

We are aware of some limitations of this study. A heterogeneous, diverse sample is usually advised for validation studies, but our sample was entirely male, as male crack users are still more likely to receive treatment in Brazil[5]. The facility where the study was conducted has a dedicated unit for treatment of male users, but no such unit for women, even though we believe studies of female samples would be important. It bears stressing that this study presents satisfactory results for the first-ever scale developed for assessment of crack use relapse, which can now act as an alternative to – at least partially – bridge the gap in preventive strategies for coping with high-risk situations in this population. According to the media, over 70% of crack cocaine users treated at inpatient drug dependence care facilities will relapse after discharge. However, scientifically sound data on what really happens to this population after discharge are still lacking[5]. The CURS proved adequate for assessment of risk factors associated with relapse after discharge and can also be used for follow-up interviews within a psychosocial treatment model[3], which we believe to be an essential intervention for following the trajectory of crack users after discharge from rehabilitation and, perhaps, even modifying the now almost-certain outcome that is relapse.

Conclusions

The six-factor model produced by exploratory factor analysis of the CURS reflects the several dimensions of the construct "crack use relapse", designating satisfactory values and good psychometric properties, including validity and reliability[14].

Finally, we believe the greatest efficacy in preventing relapse among crack users can be achieved through the fact that users know their own vulnerabilities, as enshrined in the health belief model, according to which individuals are able to carry out preventive behaviors with respect to a certain condition merely by believing they are susceptible to the condition and subsequently taking preventive action to modify their behavior. Possibly, the CURS is an instrument capable of providing these data to researchers and clinicians working with crack cocaine users[15].

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Authors' contributions

RSP managed the data collection, conducted preliminary data analysis, drafted the manuscript, conducted the final data analysis and revised the manuscript. LBZ, MP, JNS and VMG conducted preliminary data analysis and revised the manuscript, LSPG undertook interpretation of data, the statistical analysis and revised the manuscript, FHPK undertook interpretation of data, conducted preliminary data analysis and revised the manuscript, FP designed the research questions and was responsible for general coordination and revision of the manuscript. All authors read and approved the final manuscript.

Conflict of interest statement

The authors have no competing interests.

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