

Development of the brief Spanish Cocaine Craving Questionnaire-General

Miguel A. Muñoz García, Julia A. Martínez*, Antonio Tejero** and Antonio Cepeda-Benito***

Universidad de Granada, * University of Missouri (Columbia), ** Unidad de Conductas Adictivas, Hospital de la Santa Creu i Sant Pau (Barcelona) and *** Texas A&M University

Combining two different samples of cocaine users (N= 183), we tested the factor structure of a brief (12-item), Spanish version of the Cocaine Craving Questionnaire-General using confirmatory factor analysis. The four-factor model provided excellent fit to the measure. Moreover, the measure significantly differentiated between recent cocaine users and abstainers, as well as between participants with different levels of severity of drug-use history. Factor 1 expresses highly intense and overwhelming desires, Factor 2 expresses lack of self-control over cocaine use, Factor 3 items express lack of positive reinforcement expectancies, and Factor 4 expresses stimulating expectancies for cocaine use. The results revealed the validity of the CCQ-General brief as an instrument to assess cocaine craving in Spanish and supported the conceptualization of cocaine craving as a multifaceted construct.

Desarrollo de la versión española breve del Cocaine Craving Questionnaire-General. En este estudio comprobamos la estructura factorial de una versión breve (12 ítems) del «Cocaine Craving Questionnaire-General» en población española, combinando dos muestras de consumidores de cocaína (N= 183). El análisis factorial confirmatorio señaló que el modelo se ajustaba a cuatro factores. Además, el cuestionario diferenciaba entre consumidores no abstinentes y abstinentes, así como diferentes grados de severidad en la adicción. El Factor 1 hacía referencia al deseo intenso por consumir, el Factor 2 hacía referencia a la ausencia de control sobre el consumo, el Factor 3 expresaba la ausencia de expectativas positivas sobre el consumo y el Factor 4 se refería a las expectativas sobre los efectos estimulantes derivados del consumo. Los resultados mostraron la validez del CCQ-G breve como instrumento para evaluar el craving por la cocaína en población española y apoyan la conceptualización del craving por la cocaína como un constructo multifactorial.

Drug cravings are subjective motivational states thought to promote compulsive drug use, hinder addicts' efforts to achieve abstinence, and cause relapse following sustained drug abstinence (Tiffany, 1990; O'Brien, 2005). The irresistible desire to consume plays such an important role in addiction that most treatment programs have strategies for managing craving, such as nicotine patches, chewing gum or cognitive coping strategies (Secades & Fernández, 2001; García-Rodríguez, 2007).

Beyond the hypothesized pivotal role of cravings in substance abuse, there is little consensus regarding the range of phenomena that includes the definition of cravings (Arce, Bernaldo, & Labrador 1994). While some research restricts the definition of craving to that of a strong desire for a drug (Kozlowski, Pillitteri, Sweeey, Whitfield, & Graham, 1996), other research conceptualizes craving as a multifaceted construct that includes expectancies, intentions to use, impulsivity and even affect and

cognitions as potential dimensions of craving (Shadel, Niura, Brown, Hutchison, & Abrams, 2001; Tiffany, 1997; Tiffany & Drobes, 1991).

Persuaded by the need to develop measures capable of capturing the different facets of craving, investigators have developed a number of multidimensional instruments to assess cravings for different substances, including alcohol (Singleton, Tiffany, & Henningfield, 1994; Flannery, Volpicelli, & Pettinati, 1999), benzodiazepines (Mol et al., 2003), marijuana (Heishman, Singleton, & Liguori, 2001), opiates (Franken, Hendriks, & Van den Brink, 2002), smoking (Cepeda-Benito & Reig-Ferrer, 2004) and even gambling (Raylu & Oei, 2004).

Tiffany, Singleton, Haertzen, and Henningfield (1993) developed a multidimensional cocaine craving measure, the Cocaine Craving Questionnaire General (CCQ-G). These authors used theory and empirical findings to generate five hypothesized dimensions of cocaine craving: a) desire, b) anticipation of positive reinforcement, c) anticipation of negative reinforcement, d) intention and planning to consume, and e) perceived lack of control over use. The items of the CCQ-G were written in the past tense, thus participants to report their average level of craving over the preceding week.

Using exploratory factor analysis techniques (EFA), Tiffany et al. (1993) found that a 34-item, four-factor model provided the

best solution for the CCQ-G data. Factor 1 included items that denoted intense desires to consume cocaine. Factor 2 consisted of items describing a perceived lack of control over cocaine use, as well as a few items from the intention and planning to consume category. Factor 3 included items from all the categories except for the anticipation of negative reinforcement category. Factor 4 was made up of items from the anticipation of negative reinforcement category. The internal consistency for the 34 items' scores was excellent ($\alpha = .92$), whereas each of the four factor-derived scale scores produced consistency estimates that ranged from .70 to .89. With regards to validity, the measure was negatively correlated with confidence in ability to quit using cocaine, and positively correlated with cocaine use and life-time use of cocaine.

Our objective was to develop and validate a brief, Spanish version of the CCQ-G for several reasons. The advantage of a brief measure is that short instruments are more practical in laboratory and clinical settings than long instruments (Sayette et al., 2000). Moreover, short measures are less susceptible to craving reactivity than long measures. That is, the mere act of asking questions about urges or desires to use a drug may itself intensify cravings (Sussner et al., 2006).

At the theoretical level, the extent to which findings replicate across samples from different cultures and nationalities allows investigators to examine the etic (universal) and emic (culturally specific) validity of psychological constructs (Cepeda-Benito & Reig-Ferrer, 2004). At the applied level, the present study makes the contribution of providing a tool not currently available for researchers and clinicians working with Spanish cocaine users. Current trends in cocaine use and associated problems have increased alarmingly in Spain (Moral, Rodríguez, & Sirvent, 2006). For example, of the emergency-treated drug-overdose cases in 2002, cocaine overdose constituted 49% of all the cases, an almost two-fold increase from the 27% reported in 1996 (PND, 2004). Moreover, during the same period of time, the number of individuals who sought treatment for cocaine addiction increased threefold, making cocaine abuse the most common presenting problem (42% in Spain) among patients seeking drug treatment for the first time (OEDT, 2007).

Methods

Participants

The overall sample consisted of 183 Spaniards in treatment for cocaine abuse or dependence. The sample was obtained by combining participants from two separate venues. The first subsample consisted of 71 participants receiving outpatient treatment at the drug-dependence unit of the *Hospital de la Santa Creu i Sant Pau*, which is located in Barcelona, Spain. Most of these participants were male (91%) and in their late 20s and early 30s ($M = 30.2$; $SD = 7.4$). Although their primary drug of abuse was cocaine, 50.6% of them reported abusing other drugs or taking cocaine in combination with other drugs. The most common method of self-administration was snorting/sniffing (89%). Of these participants, 49 had tested positive for cocaine on at least one of the three urinalyses given during the week that preceded data collection. Those participants that tested negative for cocaine had been abstinent for durations ranging from one month to two years. The urinalyses were given routinely as a component of the outpatient treatment program of the hospital.

The remaining 112 participants were recruited from various cocaine treatment centers from Andalucía, Spain. The participants were recruited from either outpatient ($N = 83$) or therapeutic community centers ($N = 29$). In comparison to outpatient services, therapeutic community treatments are a much more structured and controlled environment. Therapeutic communities tend to be prescribed to individuals who fail to achieve abstinence following outpatient treatment, have poor social support systems, and/or present with severe levels of drug addiction. In our sample, therapeutic community participants had been in treatment an average of four times ($M = 4.1$; $SD = 3.1$), whereas outpatient participants were typically in their second attempt to quit cocaine use ($M = 2.6$; $SD = 3.0$). Therapeutic community participants reported a longer history (years) of cocaine use ($M = 8.7$; $SD = 5.4$) than outpatient participants ($M = 6.5$; $SD = 5.2$). Likewise, weekly consumption (grams of cocaine) was greater for therapeutic community participants ($M = 4.2$; $SD = 5.4$) than for outpatient participants ($M = 2.2$; $SD = 3.4$). Therapeutic community participants had been abstinent for durations ranging from a month and a half to one year; outpatient participants had been abstinent for durations ranging from one month to two years.

Most of participants from Andalucía were men (91%) and in their late 20s or early 30s ($M = 30.3$; $SD = 7.0$), resembling very closely the demographic characteristics of the participants from Barcelona. Most participants (98.2%) reported abusing other drugs or taking cocaine in combination with other drugs. Although most participants preferred to snort/sniff cocaine (44.9%), many reported smoking (20.6%), intravenous use (15.0%), and no preference for a route of self-administration (19.5%).

Instruments

The assessment of licit and illicit drug history differed across subsamples. As part of their routine treatment program, the participants from Barcelona provided urine samples and were tested for drug use three days a week. Information about their past drug use was obtained confidentially from their hospital record. The participants from Andalucía completed a drug-use history questionnaire along with the CCQ-G. The questionnaire asked each participant for their age and gender, preferred method of cocaine self-administration, number of times in treatment for substance abuse, frequency of cocaine use during periods of active use (times/week) and the average level of consumption (grams/week), and years of cocaine use.

CCQ-G (Tiffany et al., 1993). The CCQ-G asks cocaine users to report their average level of craving over the preceding week by indicating how strongly they agree or disagree with each of 45 statements. Items are scored using a Likert-type scale that ranges from 1 to 7, with higher numbers indicating greater level of agreement. Twenty of the 45 items, or 4 items per craving category, are reverse-keyed by expressing the absence or denial of desire for cocaine, of intentions or plans to use cocaine, or of cocaine expectancies from drug use. Tiffany et al. (1993) reported that a four-factor, 34-item solution provided the best fit for their data, with Factors 1, 2, 3, and 4 containing 11, 8, 12, and 3 items respectively. A Spanish native fluent in both English and Spanish translated the 45 items of the CCQ-G. The Spanish translation was back translated to English by a different bilingual Spanish native. A native speaker of English compared the back translation to the original instrument, item by item. He reported that the items of the original and the back translation were equivalent.

Data analysis

The factor structure of the measure was tested using Confirmatory Factor Analysis (CFA) on a total of 12 items that best represented each of the four factors of craving reported by Tiffany et al. (1993) (see Table 1). That is, the 12 items had the highest factor-item specificity, where factor-item specificity was defined by the size of the difference of an item's highest loading on a factor, minus the item's second highest loading on another factor. All 12 items had factor-item specificities greater than or equal to: 0.4. Thus, these items contributed maximally to a given factor, while contributing minimally to other factors. Of note, Comrey (1985), points out that a factorial loading of 0.4 appropriately explains a factor. Congruent with the four factors described in Tiffany et al. (1993), Factor 1 items indicated highly intense and overwhelming desire for cocaine; Factor 2 items expressed a perceived lack of control over cocaine use; Factor 3 items were negatively keyed and expressed the absence of both positive reinforcement expectancies and intentions to use cocaine;

Factor 4 items articulated the anticipation that cocaine use would elevate energy and improve alertness.

Procedures

Hospital de la Santa Creu i Sant Pau de Barcelona. These participants completed the original 45-item CCQ-G as part of their routine treatment protocol. All participants in the present subsample gave prior informed consent to the confidential use of their assessment and case information data in archival research. The questionnaire was administered by a hospital psychologist on participants' treatment visits.

Outpatient and Treatment Communities, Andalucía. Individuals receiving treatment for cocaine substance/dependence were recruited by personnel from the different treatment centers. Patients were told that investigators from the University of Granada were seeking volunteers to participate in a study about cocaine cravings. They were told that their collaboration was strictly voluntary and that neither penalties nor incentives would

Table 1
Factors (Cronbach's alphas), items, and item factor loadings (standardized loadings from the LAMBDA X Matrix) for the Brief Spanish Cocaine Craving Questionnaire-General

Items	Standardized loadings
<i>Intense and Overwhelming Desires to Use ($\alpha = .64$)</i>	
16 Habría hecho cualquier cosa por tomar cocaína (I would do almost anything for cocaine)	.62
26 Lo único que deseé consumir fue cocaína (All I wanted to use was cocaine)	.64
34 Nada habría sido mejor que tomar «coca» (Nothing would be better than using «coke»)	.75
<i>Perceived Lack of Control over Use ($\alpha = .64$)</i>	
22 Si hubiera tenido cocaína, no habría sido capaz de controlar la dosis (I would not have been able to control how much cocaine I used if I had had some)	.49
29 Me habría sido difícil parar de consumir cocaína (It would be difficult to turn down cocaine)	.35
39 Si hubiese tenido cocaína no habría podido resistirme (I could not stop myself from using cocaine if I had have some)	.90
<i>Lack of Positive Reinforcement Expectancies ($\alpha = .76$)</i>	
15 No habría disfrutado tomando cocaína (I would not enjoy using cocaine)	.72
19 No habría sentido placer por tomar cocaína (I would not to be pleasant using cocaine)	.74
36 Me habría sido fácil dejar pasar la oportunidad de tomar cocaína (It would be easy to pass up the chance to use cocaine)	.54
<i>Stimulation Expectancies from Cocaine Use ($\alpha = .79$)</i>	
13 Si hubiese tomado cocaína me habría sentido muy despierto/a (I would feel very alert if I had used cocaine)	.68
25 Si hubiese tomado cocaína, me habría sentido con mucha energía (I would feel energetic if I had used cocaine)	.86
40 Tomar «coca» me habría hecho sentir menos cansado/a (Using «coke» would make me feel less tired)	.73
<p><i>Note:</i> Instructions: Indica en qué grado estás de acuerdo o en desacuerdo con cada una de las siguientes frases, poniendo una marca (como ésta: X) a lo largo de cada una de las líneas que hay entre MUY EN DESACUERDO Y MUY DE ACUERDO. Cuanto más cerca de cada uno de los extremos coloques la marca (X), mayor será tu desacuerdo o tu acuerdo con la frase correspondiente. Por favor, responde a todas las frases. Estamos interesados en conocer tus pensamientos y tus sentimientos EN GENERAL, durante la semana pasada</p>	

be given for their participation. In the outpatient clinics, this information was provided on an individual basis. In the treatment communities, the information was provided during the course of a community group meeting. Those patients who were interested in learning more about the experiment were invited to see an experimenter who explained in greater detail the procedures and purpose of the study. Those who agreed to participate signed their informed consent and then completed the addiction history form (administered as an interview) and the CCQ-G (paper-and-pencil). The questionnaire was administered by an external psychologist on participants' treatment visits, or, with regard to therapeutic community participants, while the participants were not involved in community treatment activities.

Results

Confirmatory factor analysis

As the initial step in item analysis, we examined Kaiser's measure of sampling adequacy (MSA; Kaiser, 1974) to determine if the data were appropriate for factor analysis, and to see if any items needed to be eliminated. Values ideally should be above .80 or .90 (Kaiser, 1974). The overall MSA was .96.

With the 12 items described above we specified a four dimensional model and performed CFA with Maximum Likelihood estimation. In addition to reporting the χ^2 statistic (and associated p value), we evaluated model fit using an absolute fit index, the standardized root mean squared residual (SRMSR; Bentler, 1995), and an incremental fit index, the Comparative Fit Index (CFI; Bentler, 1990). Hu and Bentler (1999) examined various *rules of thumb* criteria for the most common fit indexes used to evaluate model fit. These authors found that, for small sample sizes ($n \leq 250$), a SRMSR cutoff value $\leq .06$ resulted in rejection rates of 93 to 100% of latent structure and factor loadings misspecified models. Although this SRMSR also resulted in high rejection rates of true population models (20 to 28%), a CFI cutoff value $\geq .90$ produced very low rejection rates of correct models (2.5 to 5%). Thus, to increase the probability of rejecting misspecified models while decreasing the probability of rejecting true models, we considered valid those models with SRMSR values $\leq .06$ if their CFI value was $\geq .90$.

The results of the CFA supported the four-factor model. Fit indices suggested an excellent fit, $\chi^2(48, n=183)=57.48, p=.16,$

SRMSR=.06, CFI=.98. Item loadings for the two factors ranged from .35 to .90 (see Table 1). The highest modification indices of the factor loading matrix had values of 7.01 and 9.23, all other values were below 4.5. The interfactor correlations ranged from .16 to .69, with the highest interfactor correlations being between Factor 1 and Factors 2 ($r=.68$) and 4 ($r=.69$). All other interfactor correlations were below $r=.42$ (Factor 2 and 4). The overall mean correlation between factors was $r=.38$ ($SD=.25$). To examine the discriminant validity of both multifactor models, we also examined confidence intervals around the factor correlations (± 2 standard errors) to see if any contained 1.0 (Anderson & Gerbing, 1988). None of these confidence intervals contained 1.0, which can be interpreted as support for the discriminant validity of the model. Reliability coefficients were high for the scores of the full measure ($\alpha=.89$), but moderate for the scores of each of the three-item scales (see Table 1).

Construct validity

To further examine the construct validity of the four-factor model of the Brief CCQ-G, multiple analyses of variance (MANOVAs) were used to test for differences between subgroups of participants on scale scores derived from the four factors. In the subsample from Barcelona we compared successful abstainers from unsuccessful abstainers one week after the completion of the CCQ-G (abstinence was verified by urinalyses). To the extent that craving may influence consumption, we hypothesized that individuals who failed to maintain abstinence would report higher levels of craving than successful abstainers. In the subsample from Andalucía, participants were divided by type of treatment (outpatient and therapeutic community). We hypothesized that therapeutic community participants would report the most severe histories of cocaine use, and consequently greater levels of cocaine cravings.

Barcelona. A MANOVA was performed on four dependent variables: the four factor-derived scales of the Brief CCQ-G. The independent variable was abstinence status (abstinent and user). The combined dependent variables were significantly affected by abstinence status, Wilk's Lambda = .832, $F(4, 66)=3.40, p=.01$. The results reflected a modest association between the dependent variables and cocaine-use status, partial $\eta^2=.17$. Univariate analyses of variance (ANOVAs) were conducted to investigate the impact of cocaine use on each of the individual dependent variables. The alpha level for statistical significance was adjusted

Table 2
MANOVAs between subgroups of participants on scale scores derived from the four factors

	Factor 1		Factor 2		Factor 3		Factor 4	
	f	p	f	p	f	p	f	p
Community papacients (N= 112) Vs Outpacients (N= 83)	F(1,110)= 19,04	<,000	F(1,110)= 1,88	=,173	F(1,110)= 7,72	= ,006	F(1,110)= 14,84	<,000
Abstinites (N= 47) Vs Users (N= 24)	F(1,69)= 12,76	=,001	F(1,69)= ,559	=,457	F(1,69)= 1,06	=,307	F(1,69)= 1,22	= ,272

using the Bonferroni method ($\alpha = .05 / 4 = .0125$). These analyses yielded only one statistically significant effect; current users reported higher levels of Factor 1 cravings (irresistible and overwhelming desires for cocaine) than abstainers, $F(1, 69) = 12.76, p < .001, \text{partial } \eta^2 = .24$ (see Table 2).

Andalucía. For the sample from Andalucía, a MANOVA compared between group differences for therapeutic community and outpatient participants on the four factor-derived scales of the Brief CCQ-G. The combined dependent variables were significantly affected by group classification, Wilk's Lambda = .809, $F(4, 107) = 6.303, p < .001$. The results reflected a modest association between the dependent variables and group, partial $\eta^2 = .19$. Individual ANOVAs were conducted to assess between group effects on each of the four factors. Unique contributions to between group differences were found for Factor 1 (intense and overwhelming desires to use), $F(1, 110) = 19.04, p < .001, \eta^2 = .15$, Factor 3 (reported lack of positive reinforcement expectancies and no intention to use), $F(1, 110) = 7.75, p < .001, \eta^2 = .07$, and Factor 4 (expectancy of experiencing cocaine's stimulating effects), $F(1, 110) = 14.84, p < .001, \eta^2 = .16$. In all cases, therapeutic community participants reported greater levels of craving than outpatient participants (see Table 2).

Discussion

The main objective of the study was to develop a brief version of the CCQ-G (Tiffany et al., 1993) for use with Spanish speaking populations. Using the findings reported by Tiffany et al. (1993), we tested a 12-item instrument with a hypothesized four-factor structure. The content of the items associated with each of the factors of the new instrument is equivalent to the content of the factors of the original instrument. The items loading on Factor 1 express highly intense and overwhelming desires for cocaine. Items from Factor 2 speak of a perceived lack of self-control over cocaine use. All items in Factor 3 are negatively keyed and articulate a lack of positive-reinforcement expectancies from cocaine, as well as no intention to use cocaine (thus, high craving on this factor is defined as low denial of desire, expectation or intention to use). Factor 4 items indicate stimulating expectancies from cocaine use.

The results of the CFA suggest that the four-factor structure of the instrument is tenable, as we obtained excellent fit indices and medium to high item-factor loadings with low modification indices (i.e., the items loaded poorly on their non-assigned factors). Moreover, the average interfactor correlation was relatively low and none of the confidence intervals around the factor correlations contained 1.0 (Anderson & Gerbing, 1988), supporting the factors' discriminant validity. The finding of two high inter-factor correlations ($r \approx .68$) is not surprising because it suggests the presence of a higher-order unifying factor (cocaine craving), a finding also reported by Tiffany et al. (1993).

To test the construct validity of the four-factor instrument, we examined the extent to which the four-factor derived scales were affected by different groups of participants. In the subsample from Barcelona, recent cocaine users (as verified by urinalysis) reported more cravings than participants who were successful cocaine abstainers. The difference between the groups was due largely to Factor 1 cravings, as abstainers and users did not differ significantly on any other factor scales. This finding supports the construct validity of the instrument, insofar as we expected that

cocaine users in treatment who had difficulties maintaining cocaine abstinence would be more likely to report high cravings than cocaine users who were able to remain abstinent. Moreover, given that the effect was found in only one of the four scales supports the notion that the factors may measure distinct dimensions of craving.

In the sample from Andalucía, we found that cocaine users receiving treatment in therapeutic communities had more severe histories of substance use than outpatient cocaine users. That is, therapeutic community participants reported more years of cocaine use, greater number of failed cocaine-cessation attempts, and greater average consumption of cocaine during periods of use. Given their more severe histories of cocaine use, we predicted that therapeutic community participants would report higher levels of craving than outpatient participants. The results showed that, in comparison to outpatient participants, therapeutic community participants reported greater intense and overwhelming desires to use cocaine, lower denial of positive cocaine expectancies and of intentions to use, and higher cocaine stimulation expectancies. These results support the construct validity of the CCQ-G, insofar as participants who reported more severe histories of substance abuse and cocaine abuse also reported higher cocaine cravings (see also Tiffany et al., 1993).

Overall, the findings are congruent with a multidimensional conceptualization of drug-craving (Tiffany, 1995; Tejero, Trujols, & Siñol, 2003), and suggest that craving is positively associated with difficulties achieving and maintaining abstinence (sample from Barcelona) and severity of drug-use history (sample from Andalucía).

A potential limitation of the results is that of the heterogeneity of both the sample and the experimental procedures across the two subsamples, which present a threat to the internal validity of the findings. However, the fact that we replicated the four-factor structure of the CCQ-G by grouping data from two separate samples, as well as the finding that there were significant differences across naturally occurring groups within each subsample, can also be interpreted as a strength in that the heterogeneity of the sample increases the generalizability of the findings. On the other hand, the shortage of women in the sample is a limitation in the generalization of the results (López & Becoña, 2006). Complementary studies, which incorporate a bigger number of women, is advised.

Given that the CCQ-G was developed and tested with a sample of cocaine users from the U.S., the replication of its four-factor structure is interpreted as evidence of the etic or cross-cultural validity of the craving construct. The present data are congruent with previous findings that suggest that drug-use expectancies and drug cravings are constructs that replicate well across Spanish and U.S. American samples (Cepeda-Benito, Henry, Glaves, & Fernández, 2004; Cepeda-Benito et al., 2000; Cepeda-Benito & Reig-Ferrer, 2004).

The present study presents a potentially useful tool for the investigation of cocaine-related phenomena with Spanish speakers. Although we believe that most Spanish speaking individuals will understand the items without major problems, Spanish-speaking users from outside of Spain may express themselves differently (Delva et al., 2005). Thus clinicians and researchers should pre-test the instrument with their populations of interest and, if necessary, adjust the wording of the items. Moreover, it would probably be useful to conduct future research validating the instrument with Spanish speakers in other countries.

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