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Nicotine craving questionnaire (CCN): psychometric properties on Mexican population

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Original article

SUMMARY

Smoker's craving is one of the most important problems in tobacco cessation treatment. The aim of this study was to elaborate a self report questionnaire to assess smoking urge. Development process was carried out in two parts: construction of items using a natural modified semantic networks method. It was administered to 42 smokers; after that, the first version of the questionnaire was answered by 222 smokers. Internal consistency was obtained and an analysis of discrimination was conducted on the items; then, a factorial analysis with varimax rotation using principal components method was carried out, resulting in 12 items on three factors that explain 76% of the variance and 0.92 Chronbach's alpha.

Key words: Tobacco craving, craving measurement, reliability, validity.

RESUMEN

El *craving* en fumadores es uno de los problemas principales del tratamiento del tabaquismo. El presente trabajo tuvo como objetivo la elaboración de un cuestionario de autorreporte del deseo de fumar. El proceso de desarrollo se llevó a cabo en dos etapas: construcción de reactivos por medio del método de redes semánticas naturales modificadas, el cual se aplicó a 42 fumadores; posteriormente se aplicó la primera versión del cuestionario a 222 fumadores. Se obtuvo la consistencia interna y se realizó un análisis de discriminación de reactivos; posteriormente se realizó un análisis factorial con rotación ortogonal con un método de componentes principales. Los resultados arrojaron 12 reactivos en tres factores, que explican 76% de la varianza total y un alfa de Chronbach=0.92.

Palabras clave: *Craving* por fumar, medición del *craving*, confiabilidad, validez.

INTRODUCTION

Cigarette smoking is a major public health problem.[1] According to the most recent survey on addictions in Mexico,[2] there are about 14 million smokers in this country.

Smoking is frequently associated to lung disease, mouth and throat cancer; chronic obstructive pulmonary disease, chronic bronchitis, cataracts; premature birth and low birthweight, and most important, nicotine addiction.

One of the factors to take into account in developing effective treatments is intense smoking desire. This is one of the most important problems in tobacco cessation treatment[3-7] since it is a common phenomenon when abstinence is reached.[8,9] This phenomenon has been named "craving", which is a common English word, but it does not have an equivalent meaning word in Spanish.

Despite the fact that the importance of craving on addiction process has been criticized,[10,11] in recent years the interest on the topic has increased.[12,13] It has been found to be a relapse predictor,[14,15] it can help taking a decision on type and intensity of the treatment, and the moment of discharging a patient,[16] as well as to assess effectiveness of a treatment (particularly those based on cue exposure),[17] and to develop psychological theories on addiction.[18]

Many issues to measure craving have appeared: related to definition of the construct, temporality and stability.[12,19] Due to these difficulties many methods have been developed to assess craving: single item measure, free response procedures, physiological measures, drug dreams, attentional bias of drug cues and multi-item self-report questionnaires.[12] Multi-item questionnaires have been used more frequently because they have shown a high degree of face validity and are easy to construct and administer.[19]

Among multidimensional questionnaires to assess craving in smokers we find the Questionnaire of Smoking Urges[20] and the Tobacco Craving Questionnaire,[21] both based on Tiffany's Theoretical Model.[22,23]

Tiffany's model[20,22,23] affirms that there are four dimensions of craving: 1. desire to smoke; 2. anticipation of positive outcomes from smoking; 3. anticipation of relief from

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nicotine withdrawal-associated negative affect; 4. intention to smoke. This theoretical frame represents the basis of the Questionnaire of Smoking Urges,[20] the difference lies in the assessed time period (last week).

Despite the fact that the Questionnaire of Smoking Urges[20] and the Tobacco Craving Questionnaire[21] have shown strong validity and reliability levels, as well as specificity on its measures, they were built just for American population.

In Spain, a brief Spanish version of the Questionnaire of Smoking Urges[24] was developed, but it only assesses craving at the moment of the application and applies only to Spaniard population.

In Mexico, there is a questionnaire that measures cocaine craving according to Tiffany's model.[25] It was adapted from Tiffany's Cocaine Craving Questionnaire[26] and showed good psychometric properties. However, there is an important lack of tests measuring nicotine craving.

A valid and reliable craving measure in tobacco smokers built for Mexican population would result in a valuable clinical tool that would help to improve decisions on treatment and offer important data on craving clinical research.

Taking into account that we are looking for a stable measure and that Tiffany's measures have shown it, we chose Tiffany's theoretical concepts[22,23] on craving.

The aim of this study was to develop a questionnaire to assess craving on Mexican smokers using Tiffany's Theoretical concepts[22,23] on craving and assess its psychometric properties.

METHOD

The process of questionnaire development was carried out in two stages; the first stage aimed to construct the items that were tested during the second stage, in which the best suitable combination according to their psychometric properties was chosen.

Participants

Each stage used different samples; both of them were open population. In stage 1 participants were 42 daily smokers unwilling to quit, who volunteered (non-probabilistic incidental sampling) to answer the preliminary questionnaire, local residents, older than 18 years (table 1).

In the second stage inclusion criteria were: older than 18 years, unwilling to quit daily smokers. Exclusion criteria consisted on inability to finish the questionnaire (10 or more unanswered items) (table 1).

Instruments

Preliminary questionnaire used in first stage was based on Natural Semantic Modified Networks method[27] following Sayette's et al.[19] recommendation: items must have common meaning according to target population. It was integrated with seven stimuli, six stand for the four dimension following Tiffany[22,23] and Tifanny & Drobes[20] theoretical model of craving, and a distractor stimuli.

Questionnaire used on stage two included 46 items, all of them in affirmative sense, 10 negative, 36 positive. It used a Likert type scale, anchored from 1 (completely disagree) to 5 (completely agree). Questionnaire instructions explicitly mentioned that answers should be based on last seven days cigarette craving.

Procedures

The procedure to select participants was the same in first and second stage; participants were asked whether or not they were daily smokers (to prevent including a non-smoker or a former smoker); if the answer was affirmative, it was asked if they could spare us a few minutes to answer a questionnaire.

To analyze first stage participant answer's semantic weight was assessed and SSPS 17 to conduct a chi square test in order to establish if there were significant differences on definers affective charge. The item pool was developed using those results. In the second stage, item analysis was conducted using SSPS 17 testing response options determining if every option was chosen through frequencies analysis on items; to conduct discrimination test a sum of all items was done, then quartiles 1 and 3 were obtained in order to use them as group variable (a group where cases were above quartile 3 and another which was under quartile 1) to execute a T Student's independent sample on every item, cut-point to discard an item was $p>.05$; directionality through crosstabs, using previously obtained quartiles 1 and 3 in rows and frequency of each item responses on columns, positive items needed to show a tendency toward higher scores in quartile 3 row and lower toward lower scores negative items were assessed inversely; independence discarding both items if they

Table 1. Demographics

	Stage 1	Stage 2
Sample size	N=42	N=222
Age	Mean= 25.1 SD= 7.1	Mean= 25.15 SD= 7.83
Sex	Men=55% Women=45%	Men=43% Women=57%
Education	52% high school 46% college 2% grad school	84% college students 9% high school 4% junior high 3% grad school 1% elementary
Marital status	81% singles 14% married 2% cohabitation 2% divorced	N/A
Daily smoked cigarettes	N/A	Mean= 4.53 SD= 7.83

Table 2. Factor loadings for a three-factor varimax orthogonal solution and alpha coefficients

Item		Factor Loadings
Factor 1: Anticipación de consecuencias positivas de fumar (Anticipation of positive outcomes from smoking) (α=0.85)		
42	Imaginaba que la ansiedad se apoderaría de mi si no fumo (I thought that anxiety would overpower me if I didn't smoke)	0.812
39	Consideré que estaría feliz hasta que prendiera un cigarro (I considered that I would be happy until I lighted a cigarette)	0.792
31	Supuse que me desesperaría si paso horas sin fumar (I assumed that I would despair if a spent hours without smoking)	0.767
10	Fue complicado soportar los deseos de fumar (It was complicated to handle the desire to smoke)	0.643
	Eigenvalue:	6.690
	Variance (%)	55.810
Factor 2: Deseo de fumar (Desire to smoke) (α=0.90)		
27	Tuve muchas ganas de prender un cigarrillo (I had many urges to light a cigarette)	0.827
26	Las ganas de fumar fueron diarias (Smoking urges were daily)	0.820
28	Mis deseos de fumar fueron constantes (My desires to smoke were constant)	0.804
46	Estos deseos de fumar fueron intensos (That smoking desire was intense)	0.550
	Eigenvalue:	1.450
	Variance (%)	12.130
Factor 3: Anticipación de alivio de retirada de nicotina o de afecto negativo asociado con la retirada (Anticipation of relief from nicotine withdrawal or from withdrawal-associated negative affect) (α=0.87)		
23	En mi mente estuvo la idea "con este cigarro me sentiré desestresado(a)" (I had on my mind: "I'll feel un stressed with this cigarette")	0.879
22	Creí que fumar me haría sentir relajado (a) (I believed that smoking would make me feel relaxed)	0.875
30	Pensé que sentiría placer con este cigarro (I thought that I would feel pleasure with this cigarette)	0.728
34	Creí que prender un cigarro me haría sentir tranquilo (I Believed that turning on a cigarette would make me feel easy)	0.610
	Eigenvalue:	1.010
	Variance (%)	8.480

Note: N=222 and α=.92 for the complete measure.

had a correlation higher than ±0.8; reliability internal consistency using Chronbach's alpha; varimax factorial analysis using principal components method and uniquenesses criteria, plus using test of the hypothesis that 3 factors are sufficient with chi square test trough R language. Items had to pass every test to be included in the final version.

RESULTS

In the first stage, definers obtained by Natural Modified Semantic Networks were transformed into a 46 item pool (some definers that had no relationship with our theoretical construct of craving were deleted), distributed into four dimensions as is stated in theory.

After analysis and testing directionality, discrimination, independence and reliability, 33 remaining items went through a varimax principal components factorial analysis. Sample obtained a MSA rate of 0.915. According to Kaiser[28] it has optimal values to conduct a factorial analysis.

Chi square test was used to assess whether or not the combination fits the most, also has at least three items per factor and eigen value equal or superior to 1.

Test last version was a 12 item, 3 factor questionnaire. Factors represented 76% of the total variance, and a Chronbach's alpha reliability = 0.92, with a Hotelling T Square equal to 14.442 (df_1=11; df_2=211; p<.001). *Factor 1* reliability=0.86; *Factor 2* reliability=0.90; and *Factor 3* reliability=0.87; all of them using Chronbach's alpha. KMO test value was 0.912, that lead us to assume that sample size had enough adequacy, and a value on Bartlett sphericity test equal to 1853.435 (df=66; p<.001); on uniqueness criteria it was obtained a model test Chi square of 46.72 (df=33; p= 0.0572) (table 2).

We can define factor composition as: *Factor 1* "Anticipation of positive outcomes from smoking" (it represents the expectations of a positive effect of smoking, such as pleasure,

Table 3. Interfactor correlation between factors

	Factor 1	Factor 2	Factor 3
Factor 1		0.733	0.561
Factor 2	0.733		0.600
Factor 3	0.561	0.600	

happiness, control of anxiety and negative emotions; items 10, 31, 39 and 42). *Factor 2* "Desire to smoke" (represents somatic signals identified by smoker prior to start smoking: items 26, 27, 28 and 46). In this case, an item (46) had a higher loading in factor 1 than in factor 2, regardless of that it was allocated in factor 2 because it had a significant factor loading (0.550) and a more appropriate semantic content.

Factor 3 "Anticipation of relief from nicotine withdrawal or from withdrawal-associated negative affect" (these are states where smoker expects a sensation of well-being and lower arousal level, such as: relaxation, lack of stress and being at ease; items 22, 23, 30 and 34).

A tridimensional model was built and performed CFA with Maximum Likelihood estimation (figure 1). Interfactor correlation (table 3) ranged from 0.561 to 0.733; the mean correlation between factors was r= 0.631 (SD= 0.090).

DISCUSSION

According to the results, achieving a Chronbach's alpha larger than 0.90 we can consider the questionnaire as a reliable one, regardless of the factorial analysis conducted in items, several analysis are needed for the final version of the questionnaire to go through such as: reapplication after a relaxation training,[29] reapplication after a 1, 6 and 12-hour nicotine privation episode,[20,30,31] reapplication after a craving inductive cue exposure session,[30] convergent validity trough correlation with equal questionnaires[32] and reapplication

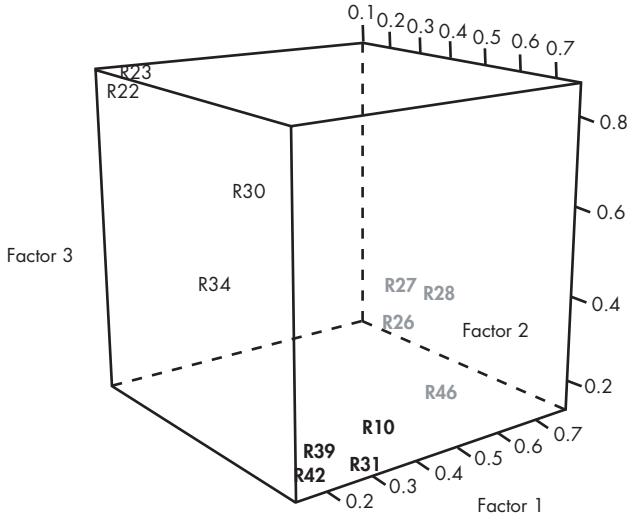

Figure 1. Geometric space of factorial analysis.

comparing score and nicotine blood level;[30] those analysis test convergent, discriminant and criterion validity which is the most critical concern in measuring craving.[19]

There are no equal findings in obtained factorial structure in similar questionnaires. Those have found two[24,33,34] and four[35] factor structure, this could be related to differences in the smoking rate of the sample (light smokers averaging four daily cigarettes), regarding of differences used three-factor model prove to fit uniqueness criteria.

Comparing reliability between this scale and current ones, it was found that it was higher than Shiffman-Jarvick Smoking Withdrawal Questionnaire craving factor[36] (α=0.73 and 0.71), but only showed some marginal differences compared to QSU[20] (Factor 1 α=0.95; Factor 2 α=0.93), Brief QSU-Spanish version[24] (Factor 1 α=0.91; Factor 2 α=0.81), QSU-Short form[32] (Factor 1 α=.97; Factor 2 α=0.92), TCQ[21] (α=0.82, 0.70, 0.75 and 0.48 for each factor) and TCQ-short form[33] (α=0.90, 0.89, 0.78 and 0.68 for each factor) so that lead us to the assumption that obtained internal consistency is fair enough.

The main limitation of the study was related to smoking pattern of the participants, it can be considered too low compared to the samples in similar studies; also the lack of criterion validation is another of its limitations. On the other hand, it represents the initial stage of a deeper analysis in order to assess and conceptualize craving across many substances in Mexico.

Results suggest that this measure of craving has good psychometric properties, but need further testing in different populations (particularly in smoking cessation treatment samples) and using the previously mentioned methods to prove its usefulness in clinical settings.

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