

Validation of the Polish Version of the Penn Alcohol Craving Scale (PACS)

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Summary

Aim. The conducted studies were aimed at making a Polish adaptation of the Penn Alcohol Craving Scale (PACS) by B. Flannery and co-workers. The Scale is a self-assessment method, it comprises 5 statements, and is designed to assess alcohol craving experienced by a patient in a week prior to the examination.

Methods. 550 patients with diagnosed alcohol dependence syndrome were examined, and the final analysis included results of 510 persons. The examined group consisted of 396 men and 114 women. The study was made in the 3rd week of their alcohol treatment. There were used: the PENN Craving Scale, the Alcohol Dependence Development Scale (SRUA) (the part in which craving is dealt with), a clinical interview with specially prepared questions

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about alcohol craving experienced last month and last week, and the Yale-Brown Obsessive Compulsive Intense Drinking Scale.

Results. The Polish version of the Penn Scale is characterised by very good psychometric properties – it is a reliable and valid tool. The exploratory and confirmatory factor analyses have proved the existence of one factor. The internal consistency, assessed on the basis of Cronbach's alpha, equalled 0.89. The method displays statistically significant (majority $p < 0.0010$) relationships with levels of craving experienced last year, last month, and last week before the examination, and also with total score on the Yale-Brown Scale.

Conclusions. The effects of the conducted adaptation works on the Penn Scale speak for recommending the method for scientific research and use in therapeutic practice.

Key words: alcohol craving, alcohol dependence, the Penn Alcohol Craving Scale

Introduction

International Classification of Diseases and Health Problems (ICD-10) [1] includes alcohol craving among diagnostic criteria of alcohol dependence; this symptom is also contained in DSM-5 [2].

Craving is defined as a strong desire or the feeling of compulsion to drink [1], the need of feeling effects of drinking, or a compulsion to seek and take alcohol. It is also described as compulsive thinking about alcohol or a tendency to drink it [3–5]. There are many concepts that attempt at explaining the phenomenon of alcohol craving, which is perceived by researchers and practitioners as a significant factor that exerts an impact upon development and maintaining of dependence and contributes to relapses in taking addictive substances after a period of maintaining abstinence [6–10].

Numerous studies indicate relationships between craving and variables that are significant for maintaining abstinence and continuing treatment. Among others, it has been proved that experiencing alcohol craving is positively correlated with mood disorders (mainly depression and anxiety), the depth of dependence, intensity of previous drinking, intensity of abstinence symptoms, and lack of readiness to change drinking-related behaviours, and negatively correlated with age (elder persons experienced a weaker craving) [11–14]. Craving appeared to be significantly related to intensity of negative affect and it mediated in relations between depression symptoms and using alcohol [15, 16]. The level of craving experienced in the course of treatment was significantly higher in the addicted who had a relapse into drinking during treatment, as compared to those with no relapse [11], and in alcoholics with posttraumatic stress symptoms [17]. Flannery et al. [18] have evidenced that intensity of alcohol craving is a better predictor of breaking abstinence by alcoholics under treatment than intensity of their drinking before the therapy. Moreover, significant relations between alcohol craving and another acknowledged factor of dependence development and relapse risk, i.e. impulsivity [19], and also with psychopathological symptoms measured with SCL-90, especially somatisation and obsessions, [17] have been found. Evren et al. have evidenced another positive relation between alcohol craving and the temperamental dimension of novelty seeking that was distinguished in the psychobiological theory of personality by Robert Cloninger. Craving is experienced more often and perceived

as stronger among persons who get bored easily, are excitable and violent, and lose self-control easily [20].

In clinical practice symptoms of alcohol craving are often not recognised by a patient (and it happens that they are not recognised by therapists as well). Thus it may be advisable to use psychometric tools that are aimed at its measurement. These methods refer to the phenomenon of craving using varied perspectives and theoretical approaches. They are described extensively in the world literature. However, due to the lack of their validation and adaptation to Polish conditions, they have not been widely available in Poland. An exception there is the Obsessive Compulsive Drinking Scale (OCDS) by Anton et al. [21], which was translated and used by Habrat and Załoga [22], and which similarly to the Yale–Brown Obsessive Compulsive Scale Modified to Reflect Obsessions and Compulsions Related to Heavy Drinking by Modell et al. [23] refers to craving in a way similar to obsessive-compulsive disorders. The Craving Typologies Questionnaire (CTQ) by Martinotti et al., based upon the ‘three-pathway’ model by Verheul et al. [24], measures craving related to the need of reward and feeling relief, and also its obsessive-compulsive aspects [25]. While using the Alcohol Craving Questionnaire (ACQ) by Singleton, one may analyse compulsive components of alcohol craving and expecting relief in a situation of drinking [26]. The Alcohol Craving Experience Questionnaire (ACE) by Statham et al. is designed to measure sensory aspects of craving (among others, accompanying images of alcohol taste and smell), its intensity, and the occurrence of obsessive thoughts that regard drinking [27]. Whereas, beliefs about craving and possibilities of controlling and bearing it when it occurs are measured with the Craving Beliefs Questionnaire by Wright [28].

Another tool for examining craving, the Alcohol Urge Questionnaire (AUQ) by Bohn et al. [29] is focused – as it is the case with the validated Penn Alcohol Craving Scale (PACS) by Flannery et al. [30] – upon frequency and period of craving, and on possibilities of avoiding drinking in situations in which alcohol is present.

Aim

The study is aimed at making psychometrical characteristics of the Penn Alcohol Craving Scale (PACS) [30] and presenting the process of validation of its Polish version. The scale was chosen to be validated because of its popularity facilitating its application in multicultural studies and its good psychometric properties [18, 29, 30].

Material

The studies were carried out between June and October 2014 in five inpatients and outpatients clinics in Poland that provide treatment for alcohol-addicted persons. The examined group comprised 550 patients with alcohol dependence syndrome (F10.2) diagnosed according to the criteria in ICD-10. After deleting incomplete questionnaires, there were scores for 510 persons submitted to analysis. The analysed group included 396 men and 114 women. In order to avoid risk of craving related to abstinence syndrome, the examination of all the patients was made in the 3rd week of

their treatment. The research was approved by the Committee for Bioethics of Scientific Research at the University of Lodz (5/KBBN-UŁ/I/2014). The analyses of the results were performed using the Statistica 6.0 PL for Windows.

Method

Socio-demographic and clinical variables were examined using a survey in which there were contained questions about age, sex, education, being in a relationship, having children, years of drinking, age when drinking was started, number of therapies, dependence on other psychoactive substances (nicotine, drugs), health problems (somatic and mental ones), and occurrence of suicidal thoughts and tendencies.

Alcohol craving was examined using the Penn Alcohol Craving Scale (PACS), which consists of five test items [18, 29, 30]. Three questions regard frequency, intensity, and period of craving, one question measures capability of resisting the temptation in a situation when drinking is possible, and another one assesses a degree of overall alcohol craving during the previous week. Answers are given using the scale from 0 to 6. The method has good psychometric properties – Cronbach's alpha equals 0.91, there were obtained correlation coefficients in test-retest method at the significance level $p < 0.01$, also correlations with some other methods of examining craving were significant $p < 0.01$. The tool is often used in foreign studies on alcohol craving, it has been also adapted in some countries – recently, there have been prepared Portuguese and Korean versions, also with very good psychometric properties, there exists a Russian version as well [31–33]. It has been evidenced that a degree of alcohol craving measured with PACS renders it possible to predict a risk of relapse during treatment better than other methods [18]. The way of computing results in the Penn Alcohol Craving Scale consists in adding up scores obtained in the five test items. The received results are contained in the range 0–30. According to the instruction, the scale may be used to examine adults and youth above the age of 16 [33].

In order to check external validity of the adapted method for examining craving the following tools were used:

- The Alcohol Dependence Development Scale (SRUA) (the part in which craving is dealt with) by Bętkowska-Korpała and Kasprzak [34]. A therapist marked intensity of alcohol craving or compulsive drinking that occurred in an examined patient during the previous year;
- A clinical interview with specially prepared questions about experiencing alcohol craving. In the course of the interview therapists asked their patients about subjectively perceived urge to drink, accompanying somatic complaints and obsessive thoughts about drinking that occurred last month. Similar questions were asked in regard to the last week before the examination. Answers were noted on specially prepared scales (from 0 – no craving, to 10 – an extremely strong craving);
- The Yale–Brown Obsessive Compulsive Scale Modified to Reflect Obsessions and Compulsions Related to Heavy Drinking by Modell et al. [23] – the

other method for examining craving that has been adapted to Polish conditions within the research project carried out by the current authors.

Results

Initial adaptation works

At the first stage two translators (one of them is a psychologist and an English philologist simultaneously) made translations from English into Polish. Next, two other translators (one of them is a sworn translator) made back-translation. After comparing the obtained versions, the final version of the tool was decided. Then a pilot study was conducted to check comprehensibility of the test items – to achieve this, there were examined 20 alcohol-addicted persons, members of Anonymous Alcoholics, aged above 55, with elementary education. After completing the scales, these persons were asked to point to the items that they found incomprehensible. None of the test items was defined as incomprehensible by more than 5% of the examinees.

Computations were started with finding basic data regarding distribution of the results. The results are presented in Table 1.

Table 1. **Distribution of results obtained in the Penn Alcohol Craving Scale (n = 510)**

Tool	M	Min.	Max.	SD	Skewness	Kurtosis	K-S*	S-W**
Penn Scale	6.97	0	29	6.16	0.88	0.24	d = 0.13 ¹	0.91 ²

Source: own study. * Result obtained in the Kolmogorov-Smirnov test with the Lilliefors amendment; ** Result obtained in the Shapiro-Wilk test; ¹ p < 0.01; ² p < 0.001

The indicators of skewness and kurtosis in the adapted methods were satisfying; they did not exceed the level of 1. Yet, the results obtained using the Kolmogorov-Smirnov test with the Lilliefors amendment and the Shapiro-Wilk test indicate lack of conformity of the test scores to the normal distribution (p < 0.01, p < 0.001). Thus, in further statistical analyses nonparametric tests were used.

Factor structure of the Penn Alcohol Craving Scale

In order to verify the internal structure of the tool, there were used both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). In case of confirmatory analysis the asymptotically distribution free method (ADF) was the selected type of estimation. To make indispensable calculations, the data from the whole sample (n = 510) were divided randomly to two equal subsets (n = 255). In the first subset there was made the exploratory analysis, in the second one – the confirmatory analysis.

Before starting the analyses, the accuracy of selection was checked using the Kaiser-Meyer-Olkin Measure of Sampling Adequacy. Its value (KMO = 0.900) indicated that there were strong bases for applying factor analysis. The Bartlett's indicator of sphericity equalled 2227.1078 (p < 0.0001) and thus it also signalled that the correlation matrix was not a unit matrix, which confirmed the sense of using factor analysis.

The applied factor analyses indicate that the Polish version of the Penn Alcohol Craving Scale is characterised by very good validity – the exploratory factor analysis has made it possible to distinguish (as it was in the original version) one factor which explains 70% of results variance. Factor loadings are fully satisfactory. In the confirmatory analysis one-factor model has achieved very good fit parameters: $\chi^2 = 10.861$, $df = 5$, $p = 0.054$, $RMSEA = 0.05$, $GFI = 0.978$, $AGFI = 0.933$.

Results of EFA and CFA are presented in Table 2.

Table 2. Results of exploratory and confirmatory factor analysis – the Penn Alcohol Craving Scale

Items	Exploratory Analysis Factor loadings	Confirmatory Analysis Parameter estimation*
1. During the past week <i>how often</i> have you thought about drinking or about how good a drink would make you feel?	0.875	1.126
2. At its most severe point, <i>how strong</i> was your craving during the past week?	0.895	1.466
3. During the past week <i>how much time</i> have you spent thinking about drinking or about how good a drink would make you feel?	0.812	0.995
4. During the past week <i>how difficult would it have been to resist</i> taking a drink if you had known a bottle were in your house?	0.685	1.040
5. Keeping in mind your responses to the previous questions, please rate your overall <i>average alcohol craving</i> for the past week.	0.895	1.201
Eigenvalue	3.500	
Explained variance	0.700	

Source: own study. *all pathways significant $p < 0.0001$

Reliability

Reliability of the tool was computed by estimating internal consistency and calculating the discriminant power of the questions. The internal consistency for the Penn Alcohol Craving Scale, based upon Cronbach's alpha, is 0.89. As the obtained coefficient exceeds the recommended value of 0.7, it may be stated that the method is characterised by thoroughly satisfying reliability.

The next step consisted in the analysis of the discriminant power of the questionnaire items. The results are presented in Table 3.

Table 3. Discriminant power of the Penn Alcohol Craving Scale items

Item number	Discriminant power coefficients	Alpha with the item deleted
1.	0.77	0.85
2.	0.81	0.84
3.	0.71	0.86
4.	0.58	0.88
5.	0.79	0.84

The discriminant power of the analysed Penn Alcohol Craving Scale items is satisfactory: correlation between the statements and the total score equalled from 0.58 for item 4 ($p < 0.001$), to 0.81 for item 2 ($p < 0.001$). The Cronbach's alpha coefficient does not rise after deleting any of the items.

External validity

External validity of the adapted method was estimated by means of analysing relations between its scores and results obtained in the Alcohol Dependence Development Scale (SRUA) by Bętkowska-Korpała and Kasprzak (the part in which craving is dealt with) [34], a clinical interview with questions about alcohol craving experienced last month and last week, and the Yale-Brown Obsessive Compulsive Intense Drinking Scale [23]. Correlation results (Spearman's rho) are presented in Table 4.

Table 4. Correlation coefficient for the Penn Alcohol Craving Scale and results of the SRUA Scale, the clinical interview, and the Yale-Brown Scale

Tool	A	B	C	D	E	F	G	H
Penn Scale	0.16**	0.42***	0.39***	0.46***	0.48***	0.47***	0.49***	0.46***

Source: own study. ** a significant correlation; $p < 0.01$; *** $p < 0.001$; A – the SRUA Scale; B – the strength of craving last month; C – somatic complaints that accompanied craving last month; D – obsessive thoughts about alcohol last month; E – the strength of craving last week; F – somatic complaints that accompanied craving last week; G – obsessive thoughts about alcohol last week; H – total score on the Yale-Brown Scale

As indicated in Table 4, the adapted method is characterised by satisfying external validity – there were obtained significant (at the levels of $p < 0.01$ and $p < 0.001$) correlation coefficients between its results and the occurrence of alcohol craving last year (the SRUA Scale), and also last month and last week. Correlation coefficient for the Penn Alcohol Craving Scale results and scores on the Yale-Brown Scale is significant at the level of $p < 0.001$. Moreover, it is worth observing that the highest correlation coefficients were obtained for alcohol craving last week estimated by therapists on the basis of the clinical interview and the Penn Alcohol Craving Scale, which measures alcohol craving just last week.

Scores on the Penn Alcohol Craving Scale and socio-demographic and clinical variables

The adapted method was used to compare women and men and no statistically significant differences were found. Results of the Mann-Whitney U test are presented in Table 5. In order to allow for easier comparisons and use of the results in some future studies, rank sums have been replaced with means and standard deviations.

Table 5. Comparison of the Penn Alcohol Craving Scale scores in addicted women and men

Tool	Men n = 396		Women n = 114		U*	Z	p
	M	SD	M	SD			
Penn Scale	6.93	6.06	7.06	6.54	22492.50	0.05	0.95

Source: own study. *results of the Mann-Whitney U test

Correlation coefficients (Spearman's rho) were also calculated for the Penn Alcohol Craving Scale and socio-demographic and clinical variables (come down to the zero-one position) – the results are presented in Tables 6 and 7.

Table 6. Correlation coefficients for the Penn Alcohol Craving Scale and the selected socio-demographic variables

Tool	A	B	C	D	E	F	G
PennScale	-0.17**	-0.12*	0.07	-0.12*	-0.06	0.03	-0.06

Source: own study. * a significant correlation $p < 0.05$; ** $p < 0.01$; A – age; B – education; C – marital status; D – having children; E – living alone or with loved ones; F – sources of living; G – smoking

Table 7. Correlation coefficients for the Penn Alcohol Craving Scale and the selected clinical variables

Tool	A	B	C	D	E	F
Penn Scale	0.21**	-0.14*	0.07	-0.08	-0.12*	-0.10*

Source: own study. * a significant correlation $p < 0.05$; ** $p < 0.01$; A – suicidal thoughts; B – age when drinking was started; C – period of treatment; D – addiction in one's family; E – mental disorders; F – somatic diseases

Among statistically significant dependencies one may notice the relationship of the Penn Alcohol Craving Scale scores with age (the younger patients the stronger craving), education (the lower education level the stronger craving), having children (patients who have children experience a weaker craving), age when chronic drinking was started (the earlier age the stronger craving), and mental and somatic disorders (persons with such disorders experience a stronger craving). Yet the relationships are weak, though statistically significant. It may be important that there is a relationship between craving measured with the Penn Alcohol Craving Scale and suicidal thoughts – experiencing such thoughts is accompanied by a stronger alcohol craving.

A way of computing results

As already mentioned, computing results in the Penn Alcohol Craving Scale consists in adding up results obtained in the five test items. The results' distribution was not normal, so it was not possible to prepare sten norms, and thus the range of variability was divided by estimating values of tertiles. The following ranges were obtained for the Penn Alcohol Craving Scale: 0–3 – low intensity of craving, 4–9 – average, above 10 – high. It is worth noticing that on the basis of some studies conducted by the authors of the method, scores above 10 on this scale indicate a high risk of relapse in drinking [18, 30].

Discussion

The Penn Alcohol Craving Scale is a frequently used, short tool for examining alcohol craving. It is applied both in studies on psychological and biological factors that are related to experiencing craving, completing a therapy, and maintaining abstinence, and also in case of comparing varied tools for examining craving and using medicines that support the process of addiction treatment [30, 35–38]. It was used as the only tool for examining craving in the recently conducted research that justified the necessity of including craving as a symptom of addiction in the DSM-5 classification (in the previous versions of DSM craving was not enumerated) [39]. It was also used in the randomised studies in which influences of naltrexone and acamprosate upon reduction of alcohol craving were compared [40]. Its popularity is additionally evidenced by the fact that it has been recently adapted to examine craving in the course of opiate addiction [41].

The Polish version of the tool is characterised by good psychometric properties that are comparable to the original ones – the Cronbach's alpha coefficient equals 0.89 (in the original version 0.91, and in the Korean and Portuguese versions 0.91 and 0.92, respectively [31, 32]). The factor analysis has led to distinguish one factor that explains a high (70%) percentage of the results' variance. External validity of the scale is thoroughly satisfying as well. Due to the correlational character of the research, absolute reliability (test-retest) has not been calculated and it is worth checking in some future studies.

In the Polish version of the tool, a score above 10 points indicates a high intensity of the experienced craving. It is worth emphasising once more that this is the result indicated by the authors of the method as diagnostic for the risk of breaking abstinence and discontinuing a therapy [18, 30]. Thus, it seems highly advisable to make some further studies on the predictive value of the Penn Alcohol Craving Scale scores for the course and effects of detox treatment in our country. Some further analyses are also demanded for the relationship between alcohol craving and suicidal thoughts; this relation has been found in the presented study and it has a potentially high applicative value. It is worth noticing that in the researches in which the Obsessive-Compulsive Drinking Scale by Anton et al. was used, there were found relations between alcohol craving and negative mood and depression [15, 16, 42].

The Penn Alcohol Craving Scale may be recommended to both researchers who study alcohol craving and practitioners who work with patients with craving experiences. The method is also easy for use both for a patient who fills it in and for a researcher, which presents its unquestionable merit.

Conclusions

The performed adaptation of the Penn Alcohol Craving Scale indicates its very good psychometric properties. The method may be recommended both to researchers and to addiction therapists who could use it to diagnose their patients. Moreover, it may be useful in classes regarding coping with craving and in planning a therapy.

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