

An Adaptation and Validation of Cocaine Craving Questionnaire for Malaysians Who Use Amphetamine-Type Stimulants

Suzaily Wahab¹, Amirul Danial Azmi¹, Ashwin Thind², Nor Fazreana Athira Ismail Zulkarnain¹, Mohammad Affieq Aiman Mohammad Azhar¹

¹Department of Psychiatry, Universiti Kebangsaan Malaysia Medical Centre, Cheras, Kuala Lumpur, Malaysia; ²PENGASIH Kuala Lumpur (Main HQ), PENGASIH Malaysia Association, Kuala Lumpur, Wilayah Persekutuan Kuala Lumpur, Malaysia

Correspondence: Suzaily Wahab, Email suzaily@ppukm.ukm.edu.my

Introduction: Cases of amphetamine-type stimulants (ATS) use have been increasing over the past decade. Cravings are considered a causal factor for recurrent relapses in ATS use cases. The absence of questionnaires measuring cravings for ATS in the local population necessitates the creation of one, especially considering the rising number of cases.

Objective: This study aimed to adapt and validate the Cocaine Cravings Questionnaire into a questionnaire suitable for measuring cravings for ATS in the local population.

Methodology: The original questionnaire was adapted by substituting “cocaine” with “ATS”. The process involved a back-to-back translation, followed by a round of face and content validation. The participants included people who use drugs (PWUD) with a history of ATS use recruited from rehabilitation centers in Malaysia. A set of questionnaires consisting of demographic items and the adapted ATS Cravings Questionnaire (ATS-CQ) were given.

Results: This cross-sectional study recruited a total of 205 PWUD, mostly single men, with a mean age of 33.32 (s.d.=13.14). The mean age of ATS initiation was 22.89 (s.d.=9.39), with a median duration of ATS use of 60 months (IQR=24.00, 120.00). The adapted questionnaire received a good score for content validation. Unlike the original, this adapted version was found to have only three factors showing good internal consistency, ranging from 0.707 to 0.918 for all three factors. Test-retest reliability also showed good results, with an interclass correlation coefficient of 0.875 (95% CI=0.835, 0.905).

Conclusion: The translated ATS-CQ has been finalized and deemed valid and reliable for use among Malaysian substance users to measure ATS cravings.

Keywords: substance use, craving, addiction, psychometric

Introduction

Cravings, by definition, are impulsive and difficult-to-repress urges to use substances. The term has been defined and redefined by several studies and theories. Generally, however, cravings can be described as the “conscious experience of a desire to take a drug”, as stated by Drummond (2001).¹ It represents an emotional-motivational response leading to drug-seeking behavior.² Theoretically, craving is an essential component of substance dependence. It is theorized that substance craving acts as a major causal factor for continued substance use and relapse among individuals attempting to achieve abstinence.³

In the latest iteration of the Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-5), “cravings and urges to use the substance” were added as new criteria for diagnosing substance use disorder (SUD).⁴ This addition was significant as it notably enhances the diagnosis of SUD. Cravings, as a diagnostic criterion, plays a crucial role in improving the accuracy of diagnosing SUD when using DSM-5. Regardless of whether cravings are moderate or severe, they predict subsequent use of tobacco, alcohol, cocaine, cannabis, opioids, and heroin, with odds ratios ranging from 4.2 to 234.3.⁵ However, substance craving also poses challenges for successful treatment, significantly increasing the risk of

relapse among those undergoing treatment.⁶ A local study found that levels of substance craving remained moderate to high among individuals who were incarcerated and were correlated with higher risks of relapse.⁷

The cocaine craving questionnaire (CCQ) is a 45-item self-rated questionnaire developed by Tiffany et al (1993) that measures current cravings (CCQ-Now) and general cravings (CCQ-Gen, average cravings over the period of one week) toward cocaine. The questionnaire is divided into five factors: “Desire to Use Cocaine”, “Intention and Planning to Use Cocaine”, “Anticipation of Positive Outcome”, “Anticipation of Relief from Withdrawal or Dysphoria”, and “Lack of Control Over Use”. However, the CCQ-Now only comprises 41 items distributed across four factors, with an alpha value of 0.93.⁸

Amphetamine-type stimulants (ATS) are psychostimulants derived from amphetamines. These substances act on the central nervous system by eliciting an increased concentration of dopamine. There has been a rampant increase in ATS-related hospital visits, with ATS overdose-involved cases rising by 20.5% in 2017 compared to 2016 in the United States.⁹ This increase is possibly due to the global increase in the supply of ATS. According to the United Nations Office on Drugs and Crime (UNODC), global seizures of ATS have increased sevenfold from 2009 to 2018.¹⁰ This trend is also observed locally, where there has been a shift from opiate seizures to ATS seizures over the past decade. The number of individuals caught using ATS increased by almost 25%, whereas opiate users decreased by 75% in 2020 compared to 2016.¹¹

Substance use among youths is exhibiting a concerning trend, with the age of first initiation showing a downward trajectory locally. Interviews conducted among affected youths have indicated that children are initiating substance use as young as 12 years old.¹² A recent large-scale health and morbidity survey conducted by the Ministry of Health Malaysia reported that as many as 100,000 adolescents have experimented with substances, and approximately 60% of them are currently still using.¹³ According to Wahab et al (2021), among juvenile offenders with a history of substance use, the prevalence of amphetamine-type stimulant and cocaine use was 55.2% and 10.4%, respectively.¹⁴

Furthermore, psychostimulant use among youths has been associated with significantly worse outcomes, especially when initiated at a younger age. Issues such as a higher likelihood of conduct disorder diagnosis and impaired cognitive functioning are more common among these affected youths.¹⁵ A local study has also found that methamphetamine-induced psychosis tends to occur more frequently in the younger population.¹⁶ Additionally, other issues, such as risky sexual behavior and adolescent pregnancy, are more prevalent among youths who use methamphetamine.¹⁷ Thus, managing these cases becomes significantly more challenging, especially considering the teratogenic effects of certain medications used in treating methamphetamine-related problems.¹⁸

Given the similarities between cocaine and ATS as psychostimulants, researchers have endeavored to adapt and validate the CCQ for ATS use among Malaysian youth. This is particularly significant due to the lack of locally validated self-administered questionnaires addressing cravings for ATS. The objective of this study was to adapt, translate, and validate the CCQ-Now into the Malay language for use in assessing ATS cravings among Malaysian youths.

Methodology

Ethics Approval

The study obtained ethics approval from the Universiti Kebangsaan Malaysia (UKM) research ethics committee before commencing data collection. All respondents were informed about the study and provided written consent to participate. For respondents under the age of 18, written consent was obtained from their guardians. This study adheres to the principles outlined in the Declaration of Helsinki.

The recruitment and data collection began on January 3rd, 2022, and concluded on March 4th, 2022.

Translation

Before the translation process, all items were reworded to pertain to ATS instead of cocaine. Additionally, a list of common ATS used locally (including local street names) was provided before presenting the questions to the study participants.

The translation process followed the guidelines for cross-cultural adaptation of questionnaires by Guillemín et al (1993).¹⁹ Medical practitioners who were familiar with the terms used in the questionnaire and proficient in both English and Malay were recruited to conduct a back-to-back translation. This process involved translating the original English set of items into Malay, followed by a blinded translation of the Malay set back into English. Subsequently, a review

committee consisting of the researchers and translators was formed. The back-translated items were reviewed for any inconsistencies against the original questionnaire.

Item 33, “I want ATS so bad I can almost taste it”, had to be reworded during the translation process into Malay because the initial translation did not retain the intended meaning of the phrase. However, the remainder of the questionnaire was translated well into Malay.

Face and Content Validation

A panel of six subject matter experts, comprising a mix of psychiatrists and psychologists, was invited to review and provide their opinions on the items and language used in the questionnaire. Each expert rated each item based on its relevance to measuring cravings for ATS, using a rating scale ranging from one for “Completely Irrelevant” to four for “Completely Relevant”. The proportion of experts giving a rating of three or four was calculated for each item. A content validity index score above 0.83 indicates that the items are valid for this questionnaire.²⁰ Additionally, the expert panelists were asked for their subjective opinions on the use of the Malay language. Comments and suggestions to change the wording were collected and reviewed jointly by the panel and researchers.

Sample Recruitment

Due to the nature of the questionnaire, only individuals with a history of ATS use were recruited. They were selected through convenient sampling from various treatment centers for substance use disorder. These centers are privately owned and specialize in treating substance use disorders, located in Kuala Lumpur, Malaysia. The inclusion criteria for participants were active users of any type of ATS (with a history of use within the past year), proficiency in reading and writing in the Malay language, and were not actively experiencing any stimulant-induced psychiatric symptoms.

The total number of samples recruited adhered to the recommendations by Suhr (2006), which suggested a minimum of five samples for every item (5:1). Since the ATS cravings questionnaire was adapted from a 41-item CCQ-Now, the minimum required sample size was calculated to be 205 respondents.²¹

Test-Retest and Internal Reliability

The test-retest reliability was conducted one week after the initial test. This involved measuring the intraclass correlation coefficient (ICC). The internal reliability was assessed using the first test completed by the respondents, and it was measured by calculating Cronbach’s alpha value.²²

Construct Validity

Exploratory factor analysis (EFA) was conducted using maximum likelihood extraction with oblique rotation and Kaiser normalization. Kaiser-Meyer-Olkin (KMO) and Bartlett’s test were performed to assess the partial correlation between factors. Items with inter-item correlation scores greater than 0.8 and communalities scores less than 0.2 were systematically removed. The number of factors retained was determined by examining a scree plot and conducting EFA for various factors.²³

Statistical Analysis

Descriptive analyses were performed for the baseline characteristics of the respondents. The current age and age of initiation of ATS were reported using the mean, while the duration of ATS use was reported using the median. Validity and reliability testing were assessed using EFA, ICC, and calculation of the alpha coefficient. Univariate analysis was conducted to determine the association between sociodemographic factors and the scores achieved for each factor.

All statistical analyses were conducted using the International Business Machines (IBM) Statistical Package for Social Sciences (SPSS) version 25.

Results

Sociodemographic Characteristics

All 205 recruited respondents completed the questionnaire for both the first and second tests. The majority of them were Malay (n=198, 96.6%) and male (n=195, 95.1%). The mean age of the respondents was 33.32 years, with ages ranging from 15 to 67 years old. Additionally, 151 respondents (73.7%) had completed secondary education. Only 23 out of the 122 employed respondents (18.85%) earned more than the national median monthly wage of RM2,600.00.²⁴

A breakdown of all the sociodemographic characteristics is presented in Table 1.

Face and Content Validation

Six bilingual subject matter experts were recruited to review the content and language usage of the questionnaire. The average item content validation index (S-CVI/Ave) was calculated to be 0.92, which exceeds the recommended value of

Table 1 Sociodemographic Characteristics

Variables	Frequency, N (%)
Age (\bar{x} , s.d.)	33.32 (13.14)
Below 18	12 (5.9)
18 and above	193 (94.1)
Gender	
Male	195 (95.1)
Female	10 (4.9)
Education level (completed)	
Primary education	27 (13.2)
Secondary education	151 (73.7)
Tertiary education	27 (13.2)
Marriage status	
Single	137 (66.8)
Married	47 (22.9)
Divorced	7 (3.4)
Widowed	14 (6.8)
Estimated monthly income	
Unemployed	83 (40.5)
Lower than RM2,600.00 ^a	99 (48.3)
Higher than RM2,600.00 ^a	23 (11.2)
Age of First Use ATS (\bar{x} , s.d.)	22.89 (9.39)
Below 18 (Adolescents)	69 (33.7)
18–24 (Youth)	57 (27.8)
25 and above (Adult)	79 (38.5)
Months of ATS use (median, IQR)	60.00 (24.00, 120.00)
Used ATS in the last 12 months	
No	64 (31.2)
Yes	141 (68.8)
History of prior inpatient rehabilitation programs	
No	113 (55.1)
Yes	92 (44.9)
History of using other substances (other than ATS)	
No	120 (58.5)
Yes	85 (41.5)
History of intravenous drug use	
No	175 (85.4)
Yes	30 (14.6)

Note: ^aMedian income of RM2,600.00 is the Malaysian national median monthly income.²⁴

0.83. This indicates that, from a content perspective, the items in this questionnaire are deemed relevant for measuring ATS cravings.²⁰ Additionally, the expert panels provided several suggestions for improving the understandability of the questionnaire by enhancing the use of the Malay language.

Construct Validity and Internal Reliability

The KMO test yielded a score of 0.904, indicating sampling adequacy, while Bartlett's test was significant at $p < 0.001$, indicating that correlations between items were sufficiently large for factor analysis. Following these tests, two items were removed due to low communalities. The scree plot suggested a two-factor model. Subsequently, exploratory factor analysis (EFA) was conducted on two-, three-, and four-factor models, as suggested by Costello & Osborne (2005). The four-factor model was based on the original study by Tiffany et al.⁸ The factor structure that best satisfied the criteria for a clean structure—item loadings > 0.3 , item cross-loadings ratio $< 75\%$, no factors with less than three items, and at least five strongly loaded items—was selected.^{23,25}

This study found that a three-factor model fits the best as it satisfies all the characteristics stated above. Tables 2 and 3 showcase the results of the factor analysis.

Finalized Questionnaire with Reliability Testing Scores

After conducting the exploratory factor analysis, each factor and its corresponding items were carefully reviewed. Items were then removed to ensure substantive meaning within each factor. This process resulted in a finalized version of the questionnaire consisting of 27 items organized into three factors: (1) Anticipation of positive outcome and relief from withdrawals, (2) Desire to use, and (3) Plan to use and lack of control.

A test-retest was conducted, and all 205 respondents answered both the pre- and post-tests within a one-week period. The questionnaire achieved a Cronbach's alpha coefficient of more than 0.7 for all factors and a score above 0.75 for the intraclass correlation coefficient (ICC), indicating a reliable scale.^{26,27} Table 4 summarizes the finalized questionnaire along with the internal and test-retest reliability scores.

Table 2 Description of Different Factor Models

Factor Structure	Description
Two-factor model	34 items explaining 44.86% of total variance. No sensible explanation for factor structure. Factor 2 consists of reverse coded items only. All factors have at least at least 5 items loaded strongly (> 0.5).
Three-factor model	35 items explaining 49.25% of total variance. Sensible explanation for factor structure. All factors have at least at least 5 items loaded strongly (> 0.5).
Four-factor model	36 items explaining 52.91% of total variance. Sensible explanation for factor structure. Three of four factors have at least 5 items loaded strongly (> 0.5).

Table 3 Exploratory Factor Analysis Summary of the Three-Factor Model

Factors	# Items, N	Factor Load, Range	Variance Explained, %
Factor 1	11	0.500–0.836	35.77
Factor 2	13	0.316–0.974	8.93
Factor 3	11	0.352–0.767	4.55

Note: Extraction method: Maximum Likelihood using Promax rotation with Kaiser Normalization.

Table 4 Finalized Amphetamine-Type Stimulant Craving Questionnaire (English) with Factor Structure and Reliability Scores

Factor	Item*	Cronbach's Alpha	ICC (95% CI)
Anticipation of Positive Outcome & Relief from Withdrawals	Q1 – If I use ATS, I can ... Q7 – Using ATS will make me less ... Q10 – Using ATS now will make ... Q12 – I will feel more ... Q23 – I will be less ... Q24 – If I use ATS now, I will not ... Q31 – Using ATS now will ... Q38 – Using ATS now will make ...	0.774	0.901 (0.869, 0.925)
Desire to Use	Q4 – I am thinking of ways ... Q6 – If I am offered ATS, I will ... Q9 – I want to use. Q11 – If I had ATS in front of me now ... Q15 – I will do almost anything ... Q20 – I desire ... Q25 – I only want ... Q28 – It is hard for me ... Q30 – I will use ATS ... Q35 – I will use ATS ... Q37 – I will not be able to stop myself ...	0.913	0.922 (0.897, 0.940)
Planning & Lack of Control to Use	Q2 – For now, I do not have ... Q13 – Even if I do have the chance, I will ... Q17 – Even though I could, I will not ... Q19 – I think I am able ... Q22 – Starting from now, I can ... Q36 – I do not have an ... Q41 – If I do have ATS with me now, I ...	0.792	0.791 (0.724, 0.841)

Note: *Items are translated from Malay solely for the purpose of publication and have not been validated.

Association Between Respondent's Sociodemographic Factors with Total Score

Several sociodemographic factors were tested for associations with the factor structure to understand the differences in the effects of these factors on the total score. Current age, age of substance initiation, use of ATS within the past year, and history of previous rehabilitation program admission were found to significantly affect the total score. Table 5 illustrates the results of the univariate analysis of sociodemographic factors on the factor structure.

The duration of ATS use was also significantly associated with all factors – Factor 1 ($\rho=0.288$, p -value < 0.001), Factor 2 ($\rho=0.275$, p -value < 0.001), and Factor 3 ($\rho=0.152$, p -value < 0.05).

Discussion

The study aimed to adapt, translate, and validate the Cocaine Cravings Questionnaire (CCQ) developed by Tiffany et al (1993) into a Malay Amphetamine-type Stimulant Cravings Questionnaire (ATSCQ-M) for use among the Malaysian population. This study reports the psychometric properties of the ATSCQ-M to measure desire, intention of use, reduction of withdrawal symptoms, and anticipation of a positive outcome from usage.⁸ The respondents in this study were predominantly men, single, completed secondary education, and were lower-income earners, which were demographically similar to a substance prevalence study done in Malaysia.²⁸ Furthermore, the mean age of the study samples (33.32 years old) was also similar to the average age group of individuals who use ATS locally and globally. Worryingly, more than half (61.5%) initiated ATS use either in their adolescence or youth. Being at the age where one is in school or has just started their career, one would wonder if these stimulants

Table 5 Univariate Analysis of Sociodemographic Factors

Variable	Factor 1		Factor 2		Factor 3	
	\bar{x} (sd)	F-Score	\bar{x} (sd)	F-score	\bar{x} (sd)	F-Score
Age group		15.85*		19.61*		2.20
Adolescent & youth	24.76 (10.00)		19.40 (9.81)		17.98 (10.28)	
Young adult	29.84 (10.38)		28.30 (14.72)		19.51 (9.36)	
Middle to late adult	34.53 (9.45)		33.31 (13.10)		21.29 (7.41)	
Age of substance initiation		15.68*		15.56*		1.76
Adolescent	24.43 (9.52)		20.36 (10.12)		18.38 (9.98)	
Youth	32.58 (10.35)		29.18 (14.71)		19.21 (7.75)	
Adulthood	32.75 (10.04)		32.06 (14.05)		21.10 (9.11)	
Prior rehab admission		0.15		3.08		6.54**
Yes	29.59 (11.06)		25.43 (13.52)		17.88 (8.21)	
No	30.16 (10.32)		28.86 (14.19)		21.11 (9.56)	
Used ATS in past year		4.57**		1.79		6.52**
Yes	30.96 (10.53)		28.20 (14.05)		20.74 (9.07)	
No	27.56 (10.62)		25.39 (13.70)		17.28 (8.79)	

Notes: *p-value < 0.001, **p-value < 0.05.

were used for their nootropic effects. Unaware of the potential psychosocial harm it may bring to them, these adolescents and youths may look towards stimulants as a way to improve their cognitive and physical prowess.²⁹

The adaptation, translation, and validation of a questionnaire into another language require careful consideration not just to ensure content validity but also to ensure that the translated version uses language easily understandable by the intended population.³⁰ The face and content validation carried out in this study involved recruiting bilingual subject matter experts with experience in treating people with substance use disorders to ensure that the items retained similar meaning and clarity. Additionally, common street names of ATS, such as “ice”, “pil kuda”, “batu”, and “pil goyang”, were provided to the respondents prior to answering the questionnaire, which may further improve the clarity of the questions asked and reduce errors in measurements.³¹

This study explored several factor structures with differing numbers of factors based on the scree plot and the original CCQ-Now. A three-factor model was found to fit the population most accurately. This was unlike the original CCQ-Now, which reported four factors.⁸ This difference could be attributed to the fact that the samples in this study were recruited from those currently undergoing treatment in rehabilitation centers. This was also noted by Tiffany et al (1993), whereby the factor structure may differ depending on the sample’s intervention status. Other translation studies also reported a differing number of factors.⁸ The Mexican translation of CCQ found a three-factor model, whereas the Italian translation found a five-factor model to fit their population better.^{32,33} Although all studies differ in their factor structures, all factors are derivative of the original five factors from CCQ, which are (1) Desire to use, (2) Intention and planning to use cocaine, (3) Anticipation of Positive Outcome, (4) Anticipation of relief from withdrawal or dysphoria, and (5) Lack of control over use.

In examining the effects of sociodemographic factors on the three constructs of cravings, this study found, upon univariate analysis, that older individuals and those who initiated substance use at an older age scored higher for “anticipation of positive outcome and relief from withdrawals” and “desire to use” whereas those who had never been admitted into a rehabilitation program scored higher for “planning and lack of control to use.” This contrasts with the findings of Bonfiglio et al (2019), where in their study, younger individuals scored significantly higher for almost all factors.³³ This difference could possibly be due to the fact that in our study, the older age groups have been using these substances for a far longer period of time, which may have led to higher scores for both of these factors. Furthermore, cravings in older individuals are less affected by optimism compared to younger individuals.³⁴ Other than that, those who have been admitted to rehabilitation centers before may have been taught ways to cope with their cravings.

Furthermore, it was also found that among those who have used ATS in the past year, they scored significantly higher for “anticipation of positive outcome and relief from withdrawals” and “planning and lack of control to use” than those who had not used. Similar findings were observed in a recent study where those who had used it within the past month

were 6.8 times more likely to report having cravings than those who had not used it among treatment-seeking patients for substance use disorder.³⁵ This may be attributed to the fact that those who have remained abstinent for longer periods of time have better control over their emotional symptoms and are better able to cope with their cravings.

A limitation of this study is the relatively low number of respondents, as it was challenging to recruit current active users of ATS. It would have been preferable to have a 10-to-1 respondents-to-item ratio, as suggested by Bujang et al (2022).²² Another limitation is the inability to proceed with criterion validity due to the lack of an already validated Malay questionnaire measuring cravings. Furthermore, face validity among groups of individuals who use substances and experts would have been beneficial for measuring the acceptance of the questionnaire, as their lived experience may guide the formation of more acceptable items. Lastly, the lack of diversity in recruiting women and non-Malays warrants a need for pre-testing among individuals outside of these criteria.

In addition to the suggestions above, it would also be beneficial to investigate the possible use of a shorter version of the questionnaire within the population in a future study. A shorter questionnaire may help reduce respondent fatigue, especially in studies that use more than one type of questionnaire. Other studies have concluded that a brief version of the craving questionnaire is just as reliable in measuring levels of substance cravings as the full-length counterpart.³⁶

Conclusion and Recommendation

The psychometric properties of the ATSCQ-M reported are indicative of a valid and reliable questionnaire that can be used to measure levels of cravings in the local population who use ATS. In addition to using easy-to-read sentences, the questionnaire also provides examples of ATS using common local street names to help study participants understand the items more easily. This questionnaire may serve as an assessment tool that can be used to facilitate the preparation of treatment programs for people with ATS use disorder. Furthermore, as cravings may predict relapse, this tool may also prove beneficial for healthcare providers to gauge the risk of relapse among individuals receiving treatment.

Furthermore, this tool may not be confined to measuring the level of cravings for ATS alone but may also be usable for new psychoactive substances (synthetic stimulants) as they may manifest with similar presentations.³⁷ In view of the rising prevalence of new psychoactive substances, this tool would prove useful for healthcare providers in the treatment of not just individuals who use ATS but also those who use new psychoactive substances (synthetic stimulants).

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors have no competing interests to declare in this work.

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