# Craving for benzodiazepines : the development of the benzodiazepine craving questionnaire

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# Chapter 2

# Development and psychometric evaluation of the Benzodiazepine Craving Questionnaire

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## ABSTRACT

*Aim* – To assess the scalability, reliability and validity of a newly constructed self-report questionnaire on craving for benzodiazepines (BZs), the Benzodiazepine Craving Questionnaire (BCQ).
*Setting and participants* – The BCQ was administered once to a sample of 113 long-term and 80 former long-term general practice BZ users participating in a large BZ reduction trial in general practice.
*Measurements* – (1) Unidimensionality of the BCQ was tested by means of the Rasch model. (2) The Rasch-homogeneous BCQ items were assessed for subject and item discriminability. (3) Discriminative and construct validity were assessed.
*Findings* – The BCQ met the requirements for Rasch homogeneity, i.e. BZ craving as assessed by the scale can be regarded as a unidimensional construct. Subject and item discriminability were good. Construct validity was modest. Highest significant associations were found with POMS depression (Kendall's tau-c = 0.15) and Dutch Shortened MMPI negativism (Kendall's tau-c = 0.14). Discriminative validity was satisfactory. Highest discriminative power was found for a subset of eight items (Mann–Whitney $U$ $z$ = -3.6, $p$ = 0.000). The first signs of craving are represented by the acknowledgement of expectations of positive outcome, whereas high craving is characterized by direct intention to use.
*Conclusions* – The BCQ proved to be a reliable and psychometrically sound self-report instrument to assess BZ craving in a general practice sample of long-term BZ users.

# INTRODUCTION

Benzodiazepines (BZs) are among the most widely prescribed drugs in the western world[1] and there have been many reports on their liability to cause dependence (e.g. among Dutch general practitioner (GP) patients[2,3]). Craving is regarded as an important aspect of dependence. It is posited frequently as having an influence on relapse and ongoing substance abuse.[4,5] Although it is still an ill-defined concept with little consensus about its definition and theory, its causes and consequences and its measurement,[6-8] craving is likely to be experienced by most (if not all) individuals with substance dependence.[9] Nevertheless, BZ craving research is scarce.

In a study by Lucki, Volpicelli & Schweizer patients who had discontinued their BZ use, including the long-term users, expressed little or no craving for the drug.[10] Contrasting findings were reported by Linden, Bar & Geiselmann who argued that the refusal of about two-thirds of their general practice patients with long-term low-dose BZ dependence to accept a short drug-free intermission, provided evidence for drug seeking or craving behaviour.[11] Apparently, these authors regarded craving to be the equivalent of drug insistence. Kan et al. suggested that about 84% of their general practice patients using BZs experienced craving, as operationalised by four items of the SCAN (Schedules for Clinical Assessment in Neuropsychiatry).[2] Although the SCAN items were adapted for BZs, the validity of this approach has never been tested.

As craving is generally regarded as a subjective phenomenon, its assessment in other substances of abuse is mainly based on self-reports. Most instruments to assess self-reported craving are limited to questionnaires of unknown validity and reliability. Some use only one or two items to evaluate craving and approach craving as a unidimensional construct.[12] Tiffany & Drobes took a different approach when they developed the Questionnaire on Smoking Urges (QSU).[13] This is a self-report instrument directed at four different conceptual areas relevant to (cigarette) craving, in order to cover current craving theories as widely as possible: desire to use, anticipation of positive outcome, relief of withdrawal or (withdrawal-associated) negative affect and intention to use. The data obtained with the QSU showed multi-dimensional features of craving among smokers. A two-factor solution apparently best described the item structure. However, the two factor scales were fairly highly correlated, with high reliability coefficients for both factors.[13,14]

Studies illustrate that craving above all is a socially defined construct. In the absence of a unique objective referent for craving in the real world, the development of craving instruments should in our opinion focus on its usefulness as the second best option. Until now BZ withdrawal studies have not shown any consistent predictors for achieving and maintaining complete abstinence.[15,16] As the role of craving in BZ withdrawal has never been evaluated, a reliable and valid instrument to measure BZ craving is needed to gain more insight into its role. It is not clear whether a multi-dimensional measure will have better predictive validity than a unidimensional scale. Nor is it clear which measure would be able to differentiate better between patients in terms of tailoring of treatment.

The present study describes the development of the multi-item Benzodiazepine Craving Questionnaire (BCQ) to assess the extent of BZ craving, based on assumptions pertaining to the QSU developed by Tiffany & Drobes, including multi-dimensionality.[13] The research questions of this study were: (1) can BZ craving be usefully construed as a multi-dimensional concept? (2) Is the BCQ a reliable and psychometrically sound instrument to assess craving for BZs? Furthermore, initial indications of validity were explored.

# METHODS

## Setting

Patients from a large study on the efficacy of a two-part treatment intervention that aimed to reduce long-term BZ use in general practice in the Netherlands received a number of questionnaires, including the BCQ.[17] The study started in 1998. Patients' responses to the BCQ formed the basis of present study.

## Subjects and procedure

We identified long-term BZ users by means of a computerised search for BZ prescriptions at 30 general practices with 55 GPs. Long-term users were selected on the basis of the following two criteria: (1) having received BZ prescriptions for at least 3 months, and (2) having received prescriptions in an amount sufficient for at least 60 days in the 3 months prior to this study.

Exclusion criteria were: current psychiatric treatment, current treatment for drug or alcohol dependence, psychosis in medical history, epilepsy, insufficient mastery of the Dutch language, or suffering from a terminal illness. Patients could also be excluded specifically on the GP's request because of severe comorbidity or for psychosocial reasons.

When patients met the definition of long-term use, their GP sent them a letter with the advice to quit their BZ use gradually.[17,18] Three months later they were invited to consult their GP to evaluate their current use status and the preceding period. The GP asked respondents to participate in the study. After full explanation of the study procedures, written informed consent was obtained from all participants.

A total of 317 patients enrolled in the study, of whom 28 dropped-out before the first assessment. The remaining 289 patients participated in the baseline interview; about 42% had quit their use since receiving the letter from their GP. Due to a delay in the development of the questionnaire, not all the patients could be given the BCQ at baseline. However, analysis showed that there were no significant differences between the patients who received the BCQ at baseline (BCQ group, $n$ = 193) and the patients who had not received the BCQ at baseline ($n$ = 82), or had received the BCQ, but had missing BCQ values ($n$ = 14).

## Measures

During the baseline interview data were gathered on BZ use and socio-demographic characteristics. In addition to the BCQ, the following questionnaires were administered: an 18-item self-report questionnaire to measure the extent of problem drinking (alcohol users only);[19] the Benzodiazepine Withdrawal Symptom Questionnaire (BWSQ2), a 20-item self-report questionnaire to assess BZ withdrawal symptoms during discontinuation;[20,21] the Benzodiazepine Dependence Self-Report Questionnaire (Bendep-SRQ), a 20-item self-report questionnaire, consisting of four Rasch homogeneous scales, to measure the severity of BZ dependence;[22] the Dutch Shortened MMPI (NVM) to assess personality traits;[23] the Profile of Mood States Dutch shortened version (POMS), a 32-item self-report questionnaire to measure five short-term changeable mood states;[24] and the General Health Questionnaire 12-item version (GHQ-12) to assess psychological well-being (sum score according to Goldberg).[25] All questionnaires show good reliability and validity. The BCQ was developed by our research group. Interviews were conducted by specially trained interviewers at the patients' homes.

## BCQ

### *Item formulation*

Items for the BCQ were generated to represent four distinct conceptualizations of drug urges, in line with Tiffany & Drobes[13]: (1) desire to use; (2) anticipation of positive outcome from BZ use; (3) anticipation of relief from withdrawal or withdrawal-associated negative affect; and (4) intention to use. A fifth category, 'lack of control over use', was derived from the Cocaine Craving Questionnaire (CCQ).[26] The QSU and CCQ are assumed to have satisfactory psychometric properties.[26]

The 50 items (32 from the QSU and 18 from the CCQ) were translated into Dutch and back into English to ensure correct translation. To obtain a good face validity, the items were judged by eight experts in the field of BZ research. Some adaptations were made to achieve clearer comprehension in Dutch and better application to BZ use. In the next phase, eight BZ users were asked to fill in the resulting questionnaire and comment on comprehensibility, ambiguity and recognition. Some items were altered subsequently or removed. The remaining 48 items constituted the initial BCQ. The order of statements in the BCQ was determined at random.

### *Format*

At the top of the BCQ the interviewer noted the current date, current time and time and date of the patient's last BZ consumption. In the second section, patients completed the BCQ according to their current feeling, by indicating the extent to which they agreed or disagreed with each item on a seven-point Likert-type scale. The end points of the scale were labelled 'strongly disagree' (1) and 'strongly agree' (7).

## Data analyses

All data analyses were conducted using SPSS 10.0.5 with the exception of the Rasch analyses, which were conducted using the Rasch Scaling Program (RSP).[27] Initial factor analyses were used to explore dimensionality. These were followed by Rasch analyses to test more strict assumptions.

### *Factor analysis*

We performed exploratory factor analysis on our data using principle axis extraction for factor determination with the promax rotation method (power = 3), in line with Tiffany & Drobes.[13] To test the goodness-of-fit of the factor structure, we also performed a maximum likelihood factor analysis. We did not expect the five conceptualizations of craving to emerge as distinct factors in the factor analysis, because they have not done so in previous research.[13,26,28,29]

### *Rasch analysis*

One important reason for using the Rasch model is that it is the only one in which a subject's sum score is a 'sufficient statistic' for the underlying unidimensional latent trait,[30] i.e. the sum score reflects all information that is contained in the item scores. Although in factor analysis sum scores are also used, different information is contained in the item scores, thereby obscuring the associations under investigation (e.g. population characteristics are well-known confounders of factor structures).

Furthermore, in questionnaire research continuous single peaked item characteristic curves (ICCs) may occur occasionally, which do not justify the use of sum scores.[31] Rasch homogeneity requires continuous strictly monotone increasing ICCs, a requirement which is accounted for in Rasch analysis.

A third assumption tested in Rasch analysis is local stochastic independence. The two questions 'Do you crave?' and 'Does it feel bad?', for example, are not local stochastic-independent, the latter depending on the former. In Rasch analysis, people who admit to an item indicating serious craving problems will also admit to the preceding 'less serious' items, so subjects can be ranked according to craving severity. This is another advantage over factor analysis.

Glas developed two statistical tests for the dichotomous Rasch model, known as R1 and R2.[32] The statistics R1 and R2 are especially sensitive to the property of equi-discriminability (R1) and to uni-dimensionality and local stochastic independence (R2). If R1 is not significant ($p > 0.01$), the null hypothesis that all the items have equal discriminative power cannot be rejected and equi-discriminability can be assumed. The same applies to R2. Rasch homogeneity is accepted if both R1 and R2 hold true. The respective values of R1 and R2 are dependent on the method that is used to estimate the subject and item parameters. In this paper the method of Conditional Maximum Likelihood (CML) was used.

### *Scale discriminability/reliability*

In order to estimate the reliability of the BCQ, subject discriminability and item discriminability were assessed. To test subject discriminability (internal consistency) the Kuder–Richardson-20 coefficient (KR-20) was computed. The KR-20 is the equivalent of Cronbach's alpha for dichotomous items. The size of the KR-20 reflects the reliability of the scale.

Item discriminability was tested by Cochran's *Q*-test. The item discriminability coefficient (IDC, described first by Kan et al.[22]) was computed to show the extent to which the differences between items are systematic.

### *Validity*

In order to determine the validity of the BCQ, construct and discriminative validity were assessed. To establish construct validity sum scores of the BCQ were associated with BWSQ2, Dutch Shortened MMPI, Bendep-SRQ, GHQ-12, POMS and nicotine, alcohol and coffee consumption.

The discriminative validity was investigated by assessing associations of the BCQ with current use of or abstinence from BZs.

## RESULTS

### Socio-demographic features and pattern of BZ use

Table 1 shows the socio-demographic characteristics and mean values for BZ dose and duration of use in the total BCQ sample.

The majority of patients were elderly, female, married, had a secondary education level and were living on a pension. Compared to the men in our population, the women were significantly more often ($\chi^2$, $p < 0.05$) divorced or widowed, living alone, living on their partner's income or on a pension and more often had a primary education level. Men used alcohol more often ($\chi^2$, $p = 0.02$), on average consumed more units per day (Mann–Whitney *U*, $p = 0.003$) and were more often classified as problem drinkers ($\chi^2$, $p = 0.004$).

On average, BZ dosage did not exceed the therapeutic dosage recommended by the World Health Organization (WHO). Patients had been using BZs from a duration of 4 months up to a maximum of 33 years and 99.5% of the patients for a duration of 6 months or longer. Concerning BZ dependence, based on the Bendep-SRQ subscale scores,[33] the average severity of BZ dependence in our population was low. At the time of the interview, 41.5% of the total BCQ group ($n = 80$) had quit their use in the 3 months after receiving the letter from their GP.

**Table 1 Subject characteristics of the BCQ sample**

| | Total BCQ sample | (n = 193) |
|---|---|---|
| | n/mean | %/SD |
| **Background characteristics** | | |
| Age, mean (SD) years | 62.9 | 12.0 |
| Female | 131 | 67.9% |
| Marital status | | |
| No relationship | 13 | 6.7% |
| Steady relationship (incl. married) | 127 | 65.8% |
| Divorced | 10 | 5.2% |
| Widowed | 43 | 22.3% |
| Living alone | 61 | 31.6% |
| Highest level of education | | |
| Primary level | 61 | 31.6% |
| Secondary level | 123 | 63.7% |
| Advanced | 9 | 4.7% |
| Financial income | | |
| Income by profession | 27 | 14.0% |
| Unemployment benefit | 9 | 4.7% |
| Disability benefit | 27 | 14.0% |
| Pension | 90 | 46.6% |
| Partner's income | 26 | 13.5% |
| Otherwise | 14 | 7.3% |
| Smoking | | |
| Smoking (cigarettes/cigars/pipe) | 80 | 41.5% |
| Mean (SD) cigarettes/day among cigarette smokers (*n* = 79) | 16.5 | 10.9 |
| Alcohol use | | |
| Drinking alcohol | 98 | 50.8% |
| Mean (SD) units/week among drinkers | 9.6 | 8.4 |
| Problem drinkers among drinkers[a] | 16 | 16.3% |
| Coffee use | | |
| Coffee users | 130 | 67.4% |
| Mean (SD) units/day among coffee users | 4.4 | 2.8 |
| **Benzodiazepine use** | | |
| Quit after letter with advice to quit BZ use | 80 | 41.5% |
| Daily dosage, mean (SD) in mg diazepam equivalents | 6.9 | 8.1 |
| Quartiles | 2.9 - 5.0 - 7.8 | |
| Duration of use, mean (SD) in months[b] | 129.9 | 108.2 |
| Quartiles | 48.0 - 96.0 – 186.0 | |
| Benzodiazepine dependence[c], mean (SD) total score | | |
| Problematic use (*n* = 191) | 1.2 | 1.2 |
| Preoccupation (*n* = 192) | 1.4 | 1.6 |
| Compliance (*n* = 192) | 0.3 | 0.7 |
| Withdrawal (*n* = 178) | 1.1 | 1.6 |

[a] Score ≥ 3 on Cornel Questionnaire[19]

[b] Based on patients who quit and did not quit in the previous three months.

[c] Based on the Bendep-SRQ[33]

## Scalability

Visual inspection of the data and feedback from the interviewers indicated that many patients misinterpreted the reverse-keyed items as the opposite of their intended meaning, or simply did not understand these items. These items were left out of the analyses; 32 items remained.

### *Factor analysis*

Principal axis factor analysis with the promax rotation method as conducted by Tiffany & Drobes[13] on the QSU data revealed six factors with eigen values greater than 1. The first factor accounted for 47.8% of the item variance and the remainder for a total of 19.6%, which suggested one main factor in our data. Kaiser–Meyer–Olkin measure of sampling adequacy was high (0.92), which indicated that our data were suitable for factor analysis. However, when we tried to confirm these one and six factor solutions with the aid of the maximum likelihood factor analysis, no factor solution with a non-significant goodness-of-fit test was found: all $\chi^2$ df ratios were greater than 2. Goodness-of-fit was also significant for maximum likelihood factor analysis with eigen values greater than 1. These findings appeared to be caused by skewed data. Consequently, further interpretation of factor analysis data was not considered appropriate.

### *Rasch analysis*

Data inspection showed that six patients had given mainly the same answer to all the items. They were omitted from the analyses, which left 187 patients. All items of the BCQ were dichotomized between option four and option five of the seven-point Likert scale. This procedure resulted in 59 subjects for Rasch analysis with non-zero variance. Investigating the dimensionality, initial analyses showed that several items made large contributions to R1 or R2, which disrupted the unidimensionality and local stochastic independence. These items were excluded from further Rasch analyses; final outcomes are shown in Table 2 for 20 items. The R1 and Q2 statistics were non-significant for all 20 items. (The Q2 statistic was used as an estimation of R2 due to the large number of items.) The results demonstrated that this 20-item BCQ meets the requirements for the Rasch model and can thus be considered a Rasch homogeneous scale. The English translation of the complete 20-item version of the BCQ, including the scale values for each item, is presented in the Appendix.

## Reliability

### *Subject discriminability (internal consistency)*

The KR-20 value was very high (0.94), which indicated that the BCQ has substantial differentiating power between patients.

### *Item discriminability*

The high IDC value (0.86) and statistically significant results of Cochran's $Q$-test ($Q = 127.5$, $p < 0.001$) indicated good item discriminability.

**Table 2 Test results of CML Rasch analysis on BCQ items by means of Rasch Scaling Program (RSP)[a]**

| Parameter | Value |
|---|---|
| No. of items in the scale | 20 |
| R1 (test statistic for equi-discriminability) | 12.08 |
| Degrees of freedom for R1 | 19 |
| *p*-value R1 | .8820 |
| No. of subgroups formed by Rasch analysis | 2 |
| Q2 (test statistic for unidimensionality and local stochastic independence) | 132.03 |
| Degrees of freedom for Q2 | approx. 170 |
| *p*-value Q2 | .9861 |
| No. of patients remaining in the analysis | 59 |

[a] Due to rounding-off error in the computational procedure of R2 using the original Rasch scores, the fit of the Rasch model is reported based on inverted Rasch scores (0 = 1 and 1 = 0). This inversion has no effect on the outcomes. The Q2 statistic was used as an estimation of R2 due to the large number of items.

## Validity

### *Discriminative validity*

The mean scores on the BCQ for the total population were low (mean = 1.2, SD = 3.2, median = 0.0). As reflected in Fig. 1a,b, patients who did not quit their BZ use after the letter from their GP ($n$ = 113) scored significantly higher on the BCQ, i.e. experienced more severe craving, than patients who had quit ($n$ = 80) (Mann–Whitney $U$ = 3644.0, $z$ = - 2.7, $p$ = 0.006). Of the former group 40.7% ($n$ = 46) reported craving to some extent, in contrast to 22.5% ($n$ = 18) of the latter group. Patients still using BZ who experienced craving reported using significantly higher daily BZ dosages than patients who did not experience craving (9.3 mg (SD = 11.2) versus 5.2 mg (SD = 4.6) diazepam equivalents, $p$ = 0.038).

With regard to the utility of the questionnaire we found eight items that distinguished bivariately current BZ users from patients who had recently quit their use with $p < 0.05$ (see Appendix items printed in bold). These items formed a reliable scale (KR-20 = 0.87) and yet covaried considerably with the non-discriminating items ($r$ = 0.89). Not surprisingly, discriminative power was higher for these eight items (Mann–Whitney $U$ = 3557.0, $z$ = -3.6, $p$ = 0.000). Apart from this, several individual items from the original 48-item version of the BCQ distinguished current BZ users from patients who had recently quit their use. These items did not constitute a scale; reliability was 0.58. Setting alpha to 0.001, three items remained: 'I could hardly feel better physically if I had taken a BZ' ($\chi^2$ = 15.5, $df$ = 1), 'Starting now, I could go without a BZ for a long time' ($\chi^2$ = 42.1, $df$ = 1), and 'If I took a BZ right now, I would hardly sleep better' ($\chi^2$ = 18.3, $df$ = 1). Patients who had recently quit their use scored higher on the single items than patients still using BZs, reflecting a higher perceived control to do without BZs. Only 'Starting now, I could go without a BZ for a long time' correlated significantly with the eight-item subscale ($r$ = 0.21, $p < 0.01$).

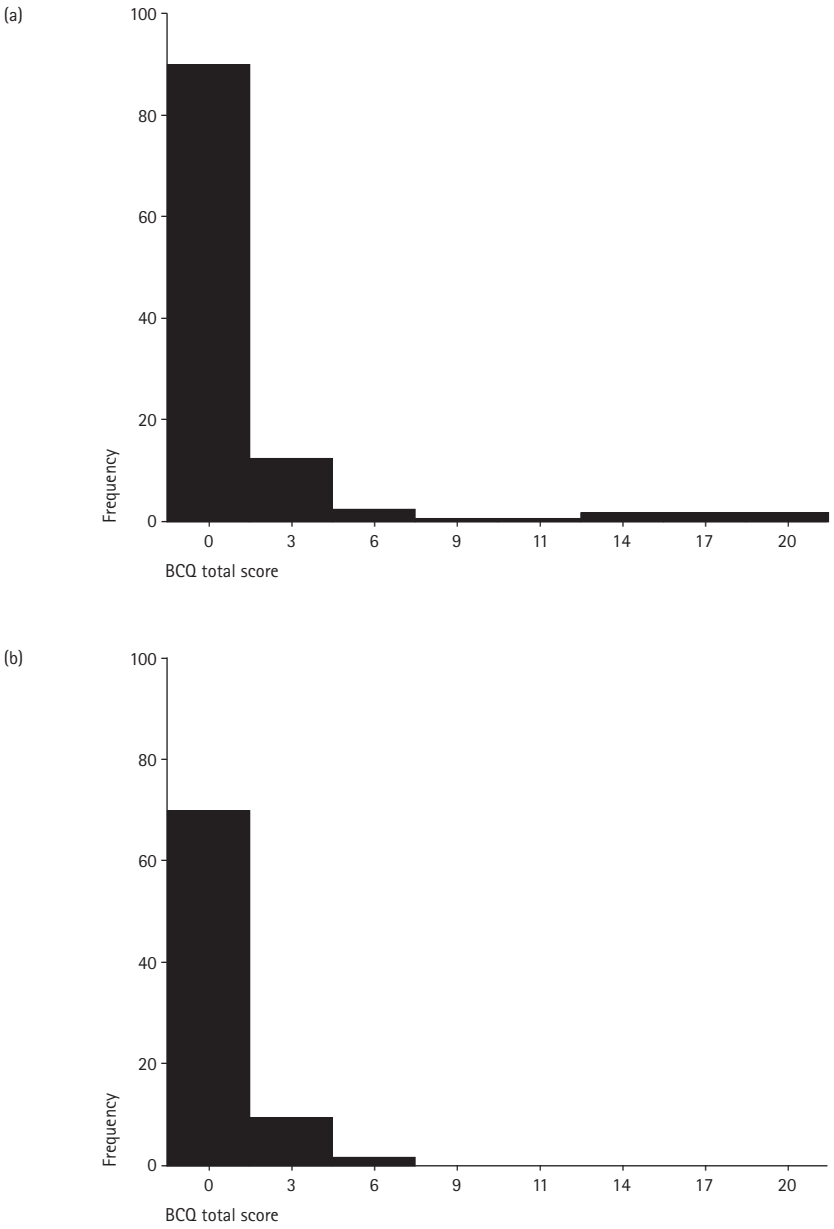


**Figure 1** (a) Histogram of BCQ total scores for patients who had not quit their BZ use (n = 113; mean = 1.7; SD = 4.1; median = 0.0); (b) Histogram of BCQ total scores for patients who quit their BZ use (n = 80; mean = 0.5; SD = 1.0; median = 0.0)

*Construct validity*

In general the associations of the BCQ-scores with measures of related constructs were low (see Table 3). Highest significant associations were found with depression, negativism, GHQ-12 sum score, somatisation, preoccupation and withdrawal symptoms. The subset of eight items discriminating between BZ users and patients who had recently quit their use showed a significant association with anger, an increased association with preoccupation and withdrawal symptoms, and decreased associations with GHQ-12 sum score, negativism and depression. The two single items 'Starting now, I could go without a BZ for a long time' and 'If I took a BZ right now, I would hardly sleep better' were negatively associated with dependence measures (both items) and psychopathology ('..., I could go without a BZ for a long time' only).

**Table 3 Associations between BZ craving and related constructs (Kendall's Tau-c)**

| Scale | A | B | C | D | E |
|---|---|---|---|---|---|
| BWSQ2 sum score | **.11** | **.12** | .02 | **-.20** | .09 |
| Bendep-SRQ | | | | | |
| Problematic use | .08 | .10 | -.11 | **-.24** | **-.22** |
| Preoccupation | **.13** | **.18** | -.11 | **-.36** | **-.23** |
| Lack of Compliance | .04 | .05 | .00 | -.10 | -.04 |
| Dutch Shortened MMPI | | | | | |
| Negativism | **.14** | **.11** | .04 | -.14 | .01 |
| Somatisation | **.13** | **.13** | -.09 | -.17 | -.03 |
| Shyness | .07 | .05 | .04 | -.13 | .04 |
| Psychopathology | .09 | .08 | .01 | **-.21** | .08 |
| Extraversion | .06 | .03 | .04 | .10 | .04 |
| GHQ-12 sum score (Goldberg) | **.13** | **.12** | -.05 | -.19 | -.09 |
| POMS | | | | | |
| Depression | **.15** | **.12** | -.07 | -.19 | .10 |
| Anger | .10 | **.11** | .03 | -.15 | .08 |
| Fatigue | .11 | .08 | .03 | .00 | .15 |
| Vigour | -.05 | .00 | .14 | .06 | -.05 |
| Tension | .11 | .11 | -.05 | -.17 | .08 |
| Coffee use | -.08 | -.08 | .00 | -.00 | -.14 |
| Nicotine use | .01 | .05 | -.09 | -.00 | .02 |
| Alcohol use | -.09 | -.06 | -.07 | -.00 | .04 |

Digits in bold represent $p < 0.01$

A = 20-item BCQ Rasch homogeneous scale. B = 8-item Rasch homogeneous subscale, distinguishing current BZ users from patients who had recently quit their use. C-E = single non-Rasch homogeneous items, distinguishing current BZ users and patients who had recently quit their use. C: 'I could hardly feel better physically if I had taken a BZ'; D: 'Starting now, I could go without a BZ for a long time'; E: 'If I took a BZ right now, I would hardly sleep better'.

## DISCUSSION

To our knowledge, the BCQ is the first multi-item instrument that has been developed to assess BZ craving. In contrast with most existing craving measures for other substances,

the psychometric properties of the BCQ have been assessed in detail. The main findings of our study were:

1 The 20-item BCQ met the criteria for Rasch homogeneity and thus the items could be ranked according to 'craving intensity' on a unidimensional scale. This means that people who admit to an item indicating serious craving problems will also admit to the preceding 'less serious' items, i.e. the BCQ measures the extent to which people crave BZs. The sum score of the BCQ was a sufficient statistic of the underlying dimension, i.e. craving.
2 The BCQ proved to have good reliability. Construct validity, however, did not turn out as we had expected. Given the unidimensionality of the BCQ, it is possible that obsession with respect to the availability of BZs constitutes only a minor part of the craving dimension. Using a subset of items could increase the discriminative validity, maintaining sufficient reliability and validity.

Our finding that craving is a unidimensional construct indicates that craving can be defined as a continuum from (almost) none to very high. Although the 20-item BCQ appeared to be unidimensional, it contains items from the five conceptual craving categories: desire to use, anticipation of positive outcome, relief of withdrawal or (withdrawal-associated) negative affect, intention to use and lack of control. Roughly speaking, the items most commonly admitted to by the respondents were from the categories anticipation of positive outcome and anticipation of relief from withdrawal or negative affect. These items are located at the lower end of the Rasch rank order and reflect a moderate extent of BZ craving. This suggests that all subjects who experience craving expect BZs to modulate their emotions, suggesting cognitive reflection upon its effects. The items admitted to by the patients only with the most severe craving were from the categories intention to use, desire to use and lack of control. This suggests that in addition to the cognitive character high craving is explicitly goal-orientated.

Our study had several limitations. Differences in patients, item sets, language and substance may have contributed to the disparity between the results of the three studies (CCQ, QSU and BCQ). The BCQ sample consisted of long-term BZ users who had either quit their use recently or had failed to do so, but still appeared motivated to quit, as concluded from their willingness to visit their GP. The smokers and cocaine users studied by Tiffany & Drobes[13] and Tiffany et al.[26] were not selected on the intention to quit.

Although the items in the BCQ were similar to those in the QSU and CCQ, translation and modification of the items from the latter questionnaires resulted in a somewhat different item pool. Concerning the item formulation, we do not have an explanation for the misinterpretation of the reverse-keyed items. Sweeney, Pillitteri & Kozlowski explored the effect of item wording on responses to the QSU by Tiffany and colleagues.[34] Some negatively worded statements proved to be especially troublesome for their respondents. However, they could not detect any consistent patterns in their results that would provide an explanation either. Therefore, although the initial purpose of reverse-keyed items was to prevent response tendencies, we suggest for future research to avoid this methodology.

The fact that Tiffany & Drobes[13], Tiffany et al.[26] and Love et al.[12] did not use confirmatory factor analyses to test their factor models means that a unidimensional description of craving may also apply to other substances. They did find, however, that first-order nicotine, cocaine and alcohol craving factors all loaded strongly on single, second-order factors. Further evidence to suggest that craving (its structure) is roughly the same for all substances was reported by Bohn et al.[28] They developed the 49-item Questionnaire of Alcohol Urges (QAU), which was a preliminary version of the eight-item Alcohol Urge Questionnaire (AUQ) and based partly on the CCQ and QSU of Tiffany and colleagues. They found a reasonably good fit with a single-factor structure. The highest loading items of the QAU came from the categories that reflected high craving as measured by the BCQ (desire, lack of control), although used methods are incomparable.

Clearly, good psychometric characteristics may be considered only a basic requirement for usefulness of an instrument. Conclusions with respect to the predictive validity of the BCQ and its use in clinical practice (e.g. the ability to measure changes in craving) and scientific research cannot be made on the basis of the present cross-sectional data. Further research is needed to reveal the utility of the BCQ in terms of its contribution to the understanding of BZ dependence and the effectiveness of interventions. Follow-up data gathered at different stages of BZ reduction in our study may provide more insight in these matters.

As for clinical interpretation of the BCQ scores, the majority of patients hardly experience any craving at all, either while still using or after having quit. A tentative explanation for this low prevalence of craving may be that most BZs act slowly and have long half-lives. Upon cessation of quick- and short-acting stimulants, such as cocaine or nicotine, craving is reported to a much higher extent (e.g. [35-37]). Notwithstanding the above, the most reported (low) craving for BZs does seem to be dominated by outcome expectancies (anticipation of positive outcome and anticipation of relief from withdrawal or negative affect), whereas in a minority of patients who experience high craving it is characterized by lack of control, and intention and desire to use. Possibly, there is a subgroup of BZ users that is more sensitive to the craving inducing effects of BZs than others.

Concerning the discriminative power of the subset of eight items, which stem from the lower and middle regions of craving severity, the power of this study is too low for the high craving items to discriminate between BZ users and patients who had recently quit their use, given the low percentages of affirmative answers. From the construct validity analysis it appears that the subset of eight items refers more to preoccupation and less to negativism and depression. However, this conclusion may be premature with the differences being so small. Although the three single discriminating items do not constitute a scale, they seem to refer to a construct opposite to craving, comparable to behavioural control (e.g. [38]). This is reflected by negative associations with dependence and psychopathology. However, we should keep in mind the remarks by Sweeney et al. about possible misinterpretation of negatively worded statements.[34]

Cross-validation data may reveal these and other differences in experienced craving severity between general practice BZ users and BZ users from other settings.

# REFERENCES


1 Zandstra, S. M., Furer, J. W., Van de Lisdonk, E. H., Van 't Hof, M., Bor, J. H. J., Van Weel, C. & Zitman, F. G. (2002) Different study criteria affect the prevalence of benzodiazepine use. *Social Psychiatry and Psychiatric Epidemiology*, 37, 139–144.

2 Kan, C. C., Breteler, M. H. M. & Zitman, F. G. (1997) High prevalence of benzodiazepine dependence in out-patient users, based on the DSM-III-R and ICD-10 criteria. *Acta Psychiatrica Scandinavica*, 96, 85–93.

3 Lader, M. (1991) History of benzodiazepine dependence. *Journal of Substance Abuse Treatment*, 8, 53–59.

4 Tiffany, S. T. (1990) A cognitive model of drug urges and drug use behavior: role of automatic and nonautomatic processes. *Psychological Review*, 97, 147–168.

5 Miller, W. R., Westerberg, V. S., Harris, R. J. & Tonigan, J. S. (1996) What predicts relapse? Prospective testing of antecedent models. *Addiction*, 91, S155–S172.

6 Kozlowski, L. T. & Wilkinson, D. A. (1987) Use and misuse of the concept of craving by alcohol, tobacco, and drug researchers. *British Journal of Addiction*, 82, 31–45.

7 Pickens, R. W. & Johanson, C. E. (1992) Craving: consensus of status and agenda for future research. *Drug and Alcohol Dependence*, 30, 127–131.

8 Halikas, J. A. (1997) Craving. In: Lowinson, J.H., Ruiz, P. & Millman, R.B., eds. *Substance Abuse: a Comprehensive Textbook*, 3rd edn, pp. 85–90. Baltimore: Williams & Wilkins.

9 American Psychiatric Association (1994) *Diagnostic and Statistical Manual of Mental Disorders*, 4th edn. Washington, DC: American Psychiatric Association.

10 Lucki, I., Volpicelli, J. R. & Schweizer, E. (1991) Differential craving between recovering abstinent alcoholic-dependent subjects and therapeutic users of benzodiazepines. *NIDA Research Monograph*, 105, 322–323.

11 Linden, M., Bar, T. & Geiselmann, B. (1998) Patient treatment insistence and medication craving in long-term low-dosage benzodiazepine prescriptions. *Psychological Medicine*, 28,721–729.

12 Love, A., James, D. & Willner, P. (1998) A comparison of two alcohol craving questionnaires. *Addiction*, 93, 1091–1102.

13 Tiffany, S. T. & Drobes, D. J. (1991) The development and initial validation of a questionnaire on smoking urges. *British Journal of Addiction*, 86, 1467–1476.

14 Willner, P., Hardman, S. & Eaton, G. (1995) Subjective and behavioural evaluation of cigarette cravings. *Psychopharmacology (Berlin)*, 118, 171–177.

15 Golombok, S., Higgitt, A., Fonagy, P., Dodds, S., Saper, J. & Lader, M. (1987) A follow-up study of patients treated for benzodiazepine dependence. *British Journal of Medical Psychology*, 60, 141–149.

16 Holton, A., Riley, P. & Tyrer, P. (1992) Factors predicting long-term outcome after chronic benzodiazepine therapy. *Journal of Affective Disorders*, 24, 245–252.

17 Oude Voshaar, R. C., Gorgels, W. J. M. J., Mol, A. J. J., Breteler, M.H. M., Van de Lisdonk,

E. H., Van Balkom, A. J. L. M. & Zitman, F. G. (1999) Reduction of benzodiazepine use by letter in primary care: first results of the Benzoredux-study stage I. *European Neuropsychopharmacology*, 9, S2341–S2341.

18 Cormack, M. A., Sweeney, K. G., Hughes-Jones, H. & Foot, G. A.(1994) Evaluation of an easy, cost-effective strategy for cutting benzodiazepine use in general practice. *British Journal of General Practice*, 44, 5–8.

19 Cornel, M., Knibbe, R. A., Van Zutphen, W. M. & Drop, M. J.(1994) Problem drinking in a general practice population: the construction of an interval scale for severity of problem drinking. *Journal of Studies on Alcohol*, 55, 466–470.

20 Tyrer, P., Murphy, S. & Riley, P. (1990) The Benzodiazepine Withdrawal Symptom Questionnaire. *Journal of Affective Disorders*, 19, 53–61.

21 Couvée, J. E. & Zitman, F. G. (2002) The Benzodiazepine Withdrawal Symptom Questionnaire: Psychometric evaluation of BWSQ during a discontinuation program in depressed chronic benzodiazepine users in general practice. *Addiction*, 97, 337–345.

22 Kan, C. C., Breteler, M. H. M., Timmermans, E. A., Van der Ven, A. H. G. S. & Zitman, F. G. (1999) Scalability, reliability, and validity of the benzodiazepine dependence self-report questionnaire in outpatient benzodiazepine users. *Comprehensive Psychiatry*, 40, 283–291.

23 Luteijn, F. & Kok, A. R. (1985) *NVM: Nederlands Verkorte MMPI* [NVM: Dutch shortened MMPI]. Lisse, the Netherlands: Swets & Zeitlinger B.V.

24 Wald, F. D. M. & Mellenbergh, G. J. (1990) De verkorte versie van de Nederlandse vertaling van de Profile of Mood States (POMS) [The shortened version of the Dutch translation of the Profile of Mood States (POMS)]. *Nederlands Tijdschrift voor de Psychologie*, 45, 86–90.

25 Goldberg, D. P., Gater, R., Sartorius, N., Ustun, T. B., Piccinelli, M., Gureje, O. & Rutter, C. (1997) The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychological Medicine*, 27, 191–197.

26 Tiffany, S. T., Singleton, E., Haertzen, C. A. & Henningfield, J. E. (1993) The development of a cocaine craving questionnaire. *Drug and Alcohol Dependence*, 34, 19–28.

27 Glas, C. A. W. (1993) *RSP: Rasch Scaling Program User's Manual*. Groningen, the Netherlands: IEC ProGAMMA.

28 Bohn, M. J., Krahn, D. D. & Staehler, B. A. (1995) Development and initial validation of a measure of drinking urges in abstinent alcoholics. *Alcoholism: Clinical and Experimental Research*, 19, 600–606.

29 Ollo, C., Alim, T. N., Rosse, R. B. & Cunningham, S. (1995) Evaluating craving in crack-cocaine abusers. *American Journal of Addiction*, 4, 232–330.

30 Fischer, G. H. (1995) Derivations of the Rasch Model. In: Fischer, G.H. & Molenaar, I.W., eds. *Rasch Models: Foundations, Recent Developments and Applications*, pp. 15–38. New York: Springer Verlag.

31 Hoijting, H. & Molenaar, I. W. (1992) Testing for DIF in a model with single peaked item characteristic curves: the PARELLA model. *Psychometrika*, 57, 383–398.

32 Glas, C. A. W. (1988) The derivation of some tests for the Rasch model from the multinomial distribution. *Psychometrika*, 53, 525–546.
33 Kan, C. C., Van der Ven, A. H. G. S., Breteler, M. H. M. & Zitman, F. G. (2001) Latent trait standardization of the benzodiazepine dependence self-report questionnaire using the Rasch scaling model. *Comprehensive Psychiatry*, 42, 424–432.
34 Sweeney, C. T., Pillitteri, J. L. & Kozlowski, L. T. (1996) Measuring drug urges by questionnaire: do not balance scales. *Addictive Behaviors*, 21, 199–204.
35 Weddington, W. W., Brown, B. S., Haertzen, C. A., Cone, E. J., Dax, E. M., Herning, R. I. & Michaelson, B. S. (1990) Changes in mood, craving, and sleep during short-term abstinence reported by male cocaine addicts. A controlled, residential study. *Archives of General Psychiatry*, 47, 861–868.
36 Gritz, E. R., Carr, C. R. & Marcus, A. C. (1991) The tobacco withdrawal syndrome in unaided quitters. *British Journal of Addiction*, 86, 57–69.
37 Halikas, J. A., Kuhn, K. L., Crosby, R., Carlson, G. & Crea, F. (1991) The measurement of craving in cocaine patients using the Minnesota Cocaine Craving Scale. *Comprehensive Psychiatry*, 32, 22–27.
38 Bandura, A. (1997) *Self-Efficacy. The Exercise of Control*. NewYork: W.H. Freeman.

# APPENDIX

**Rasch-homogeneous BCQ items[c] with Rasch scale value estimates, standard errors, questionnaire of origin (QSU or CCQ) and item category of origin, and item number, placed in order of level of craving (high to low)**

| Item | B | SE(B) | Q/C, Cat | Item no. |
|---|---|---|---|---|
| I would hardly be able to stop myself from taking a BZ if I had some here now | -1.391 | .690 | C,5[a] | 7 |
| I crave a BZ right now | -.969 | .617 | Q,1 | 5 |
| I must take a BZ now | -.969 | .617 | Q,1[a] | 6 |
| If I were offered a BZ, I would take it immediately | -.969 | .617 | Q,4 | 12 |
| All I want right now is a BZ | -.969 | .617 | Q,1 | 17 |
| **I am going to take a BZ as soon as possible** | **-.969** | **.617** | **Q,4** | **18** |
| **I will take a BZ as soon as I get the chance** | **-.969** | **.617** | **Q,4** | **20** |
| I would do almost anything for a BZ now | -.617 | .559 | Q,4 | 3 |
| Nothing would be better than taking a BZ right now | -.617 | .559 | Q,2 | 9 |
| **I want to take a BZ now** | **-.318** | **.514** | **Q,1[a]** | **13** |
| **Right now I have an urgent need to take a BZ** | **-.062** | **.478** | **Q,1[a]** | **11** |
| **I would enjoy a BZ right now** | **-.062** | **.478** | **Q,2[a]** | **15** |
| I would hardly be able to control how many BZ I took if I had some here | .357 | .425 | C,5[a] | 4 |
| If I took a BZ right now I would feel less inhibited | .691 | .389 | 2[b] | 16 |
| **I could control things better right now if I could take a BZ** | **.835** | **.375** | **Q,3** | **14** |
| **I would feel energetic if I took a BZ** | **.835** | **.375** | **C,2** | **19** |
| I am missing my BZs right now | 1.093 | .353 | Q,1[a] | 2 |
| Taking BZ right now would make me feel less tired | 1.093 | .353 | Q,3 | 8 |
| **Taking a BZ would make me feel very good right now** | **1.950** | **.301** | **Q,2** | **1** |
| Taking a BZ would make me feel less depressed | 2.027 | .297 | Q,3 | 10 |

[a] Items 2, 13 and 15 were originally reverse-keyed items; items 4 and 7 were originally negatively worded items; items 6 and 11 were rephrased for clearer comprehension in Dutch.

[b] Item 16 was completely adapted for BZs, not present in QSU nor in CCQ.

[c] Respondents were instructed to substitute their specific benzodiazepine(s) for 'BZ'.

B: Rasch scale value estimate. Note that for purposes of analyses high values indicate low craving.

SE: standard error of the Rasch scale value estimate B.

Q/C: Q = item originated from Questionnaire on Smoking Urges; C = item originated from Cocaine Craving Questionnaire.

Cat: 1 = desire to use; 2 = anticipation of positive outcome; 3 = relief of withdrawal or negative affect; 4 = intention to use; 5 = lack of control.

Items printed in bold were univariately associated with abstinence/current use.