Chapter 3

An evaluation of DSM-III-R and ICD-10 Benzodiazepine Dependence Criteria using Rasch modelling

C.C. Kan[1], M.H.M. Breteler[2], A.H.G.S. van der Ven[3] and F.G. Zitman[1]

[1]Department of Psychiatry*, University of Nijmegen,

PO Box 9101, 6500 HB Nijmegen, The Netherlands

[2]Department of Clinical Psychology*, University of Nijmegen,

PO Box 9104, 6500 HE Nijmegen, The Netherlands

[3]Department of Mathematical Psychology, University of Nijmegen,

PO Box 9104, 6500 HE Nijmegen, The Netherlands

*University of Nijmegen Research Group on Addictive Behaviours (UNRAB)

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ABSTRACT

Aims. To evaluate the homogeneity of the elements of the Substance Dependence Syndrome (SDS) as applied to benzodiazepines (BZDs) by Rasch modelling.

Measurements. The Rasch scaling model was applied to data obtained by administering the SCAN (Schedules for Clinical Assessments in Neuropsychiatry) substance dependence sections. Subsequently, Rasch-homogeneous sets of DSM-III-R and ICD-10 BZD dependence criteria were assessed for subject and item discriminability. To support their construct validity a theoretical rationale was formulated based on the Rasch scale values.

Participants. A heterogeneous sample of 599 outpatient BZD users.

Findings. Only particular subsets of the DSM-III-R and ICD-10 BZD dependence criteria met the requirements for Rasch-homogeneity, which appears to be due to medical aspects of BZD use. The subject and item discriminability results were sufficiently good.

Conclusions. The DSM-III-R and ICD-10 BZD dependence constructs may need to be redefined. The use of a BZD dependence severity model based on a Rasch-homogeneous scale appears to have greater clinical value than a dichotomous diagnostic model based on an arbitrary cut-off point. We recommend Rasch modelling to investigate the homogeneity of the elements of the SDS across other psychoactive substances.

INTRODUCTION

Since 1981 the WHO has been propagating the >Substance Dependence Syndrome= (SDS),[1-3] a psycho-physiological-social dependence model generalized across all psychoactive substances, which was originally put forward in 1976 as the >Alcohol Dependence Syndrome= by Edwards and Gross.[4] The SDS has become the prime source of the substance dependence criteria of the International Classification of Diseases, 10th edition (ICD-10)[5] and the third revised and fourth editions of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R and DSM-IV).[6-8] It has been postulated that the elements of the SDS are homogeneous,[4,9] which means that they should all reflect the same underlying dependence construct.

The homogeneity of the elements of the SDS has been investigated across a number of psychoactive substances. So far this has been done mainly by factor-analytical methods to demonstrate unidimensionality. Most studies have concentrated on alcohol or opiates[10-16] and one on cocaine.[17] The remaining psychoactive substances have only been studied collectively.[18-22] In the majority of these studies the demonstration of a single dependence factor supported the unidimensional view, but in three of them more factors were encountered.[11.,16,18]

The studies in which sedatives, i.e. benzodiazepines (BZDs) and other sedatives, were included are all shown in Table 1. The SDS has never been applied to BZDs specifically, even though benzodiazepine (BZD) dependence has received a great deal of attention in the medical literature.[23-25] As far as sedatives in general are concerned, conclusions about the unidimensionality of the SDS elements have not been unanimous. Kosten et al.[18] found that the DSM-III-R dependence criteria formed three factors instead of one. Confirmatory factor

analysis on seven DSM-IV dependence criteria and five Addiction Severity Index (ASI)

Table 1. Studies on the homogeneity of the elements of the Substance Dependence Syndrome across psychoactive substances, including sedatives

Study	Population	Substance(s)	Factor analytical method(s)	Conclusions
Kosten et al., 1987 [18]	41 inpatients from community mental health centre, 42 outpatients from ambulatory substance-abuse treatment unit	Alcohol, opiates, cocaine,stimulants, hallucinogens, cannabis, sedatives	Guttman scaling and factor analysis of DIS items	Dependence syndrome items (DSM-III-R) formed 1 factor for alcohol, opiates and cocaine; 2 for stimulants and 3 for cannabis and sedatives
Hasin et al., 1988 [19]	random sample of 308 inpatients from alcohol rehabilitation unit	Opiates, cocaine, stimulants, hallucinogens, cannabis, barbiturates, tranquillizers	Principal component factor analysis of DIS items	Selection of dependence syndrome items (DSM-III-R) and related disabilities loaded on 1 factor
Morgenstern et al., 1994 [21]	295 in- and outpatients from 7 alcohol and drugs treatment centres; 74% inpatients, 28% patients from veterans alcohol treatment unit	Alcohol, opiates, cocaine,stimulants, hallucinogens, cannabis, sedatives	a) LISCOMP (factor analysis with comprehensive measurement model) χ^2-goodness of fit coefficients b) Principal component factor analysis of CIDI-SAM items	Dependence syndrome items (DSM-IV) form strong single factor for all substances except hallucinogens
Feingold & Rounsaville, 1995 [22]	521 subjects; 99 inpatients from substance abuse treatment unit, 103 outpatients opiate/ cocaine abuse clinic, 107 outpatients opiate/ alcohol abuse clinic, 109 general psychiatric outpatients, 103 normal subjects	Alcohol, opiates, cocaine, stimulants, marijuana, sedatives	PRELIS and LISREL (SPSS) confirmatory factor analysis with χ^2-goodness of fit coefficients of CIDI items adapted to DSM-IV	Dependence items (DSM-IV) unidimensional and factorially distinct from measures of the consequences for all drug groups as shown by fairly good χ^2-goodness of fit coefficients

composite scores by Feingold and Rounsaville[22] yielded a two-factor solution, reflecting >dependence= and >abuse consequences=, but failed to show goodness-of-fit (Chi square, $P < 0.05$). However, in the study on the DSM-IV dependence criteria by Morgenstern et al.,[21] the fit of the one-factor model was not rejected. Considering these conflicting results with respect to sedatives in general and the lack of any specific data with respect to BZDs, further studies on the SDS elements are required.

Unidimensionality is a basic requirement of scaling models.[26,27] It implies that the dependence criteria should be scalable on a continuum of BZD dependence severity. Additionally, in the DSM-III-R and ICD-10 dependence constructs, each dependence criterion is assigned the same weight, because any sum score of three or more positive criteria yields the diagnosis of BZD dependence. This will only hold true if the criteria have equal discriminative power. This equi-discriminability requirement is not taken into account by factor-analysis, but is specified in the Rasch scaling model. Kosten et al.[18] investigated the equi-discriminability of the DSM-III-R dependence criteria by means of a Guttman scale, but this is a deterministic scaling model, which implies rejection by a single violation. The use of the Rasch model is more appropriate, because it is a probabilistic variant of the Guttman scale and will therefore tolerate some violations of the model due to chance. Rasch modelling is also suitable for the dichotomous DSM-III-R and ICD-10 data and test statistics are available to test the goodness- of-fit.[28,29] Furthermore, Rasch analysis yields estimates of the scale values of the dependence criteria, which might help our theoretical understanding of substance dependence, as will be explained below in the Method section.

Rasch modelling has been applied to the study of problem drinking,[30] but has not yet been used to test the homogeneity of the elements of the SDS. The present study concentrated on the BZD Dependence Syndrome, as there are obvious differences between BZDs and other

psychotropic substances due to the medical context of most BZD use. Unlike most other psychoactive substances, BZDs are prescribed legally for medical complaints. The maintenance of BZD use depends on the self-control of the patient, the clinical judgement of the prescribing physician and the interaction between patient and physician. Long-term BZD use may conceal some signs of dependence and when eventually patients experience symptoms after an attempt to discontinue their BZD use it is often unclear whether these are due to withdrawal, re-emergence of the original disease symptoms or both.[31-34] Considering these special aspects of BZDs as compared to other psychoactive substances, it remains to be seen whether the general SDS is still valid. To improve our conceptual understanding of BZD dependence and to evaluate the present DSM-III-R and ICD-10 classification systems the Rasch model was used to assess the homogeneity of the substance dependence criteria with respect to BZDs.

METHOD

Settings and subjects

This study was conducted on patients from nine general practices, seven psychiatric outpatient departments, two self-help groups concerned with addictive medication use and six community-based outpatient addiction centres (CBACs). Contrary to the patient samples in former studies on the homogeneity of the substance dependence criteria,[18,19,21,22] which mainly consisted of outpatients and inpatients from substance abuse treatment settings (see Table 1), the present sample was more heterogeneous, as it comprised more customary BZD users from general practices and psychiatric outpatient departments who rarely receive any

additional treatment for substance abuse or dependence.

To participate in the investigation the subjects had to meet the following inclusion criteria: 1) actual BZD use; 2) average frequency of BZD use of at least once a week; 3) age between 17 and 70 years; 4) ability to speak and read Dutch. The patients who visited the general practices, psychiatric outpatient departments, self-help meetings or outpatient addiction centres during the period of investigation, or the self-help patients who had individual contact with a self-help team member, were screened according to these inclusion criteria. Eligible patients were invited to participate by a representative from the treatment or self-help team. The majority of eligible subjects agreed to take part. Informed consent was obtained from 65% (217 out of 336) of the general practice (GP) patients, 68% (250 out of 367) of the psychiatric outpatients, 70% (33 out of the 47) of the self-help patients and 76% (99 out of 131) of the outpatients from CBACs. The latter response rate was probably somewhat higher due to a modest financial reward, which was received by the patients in this group if they completed the entire investigation. A small number of methadone users in this group did not comply with the above-mentioned selection procedure and therefore could not be included in our database. The total sample of participants consisted of 599 subjects.

Study design

The present study formed part of a larger project being conducted by the University of Nijmegen Research Group on Addictive Behaviours (UNRAB) in The Netherlands on the detection and diagnosis of BZD dependence. The study population participated in two interviews, described in full in an earlier report,[35] in which sociodemographic data were gathered and several questionnaires were administered, including the SCAN (Schedules for Clinical Assessments in Neuropsychiatry).[36]

The SCAN, in which both the DSM-III-R and ICD-10 criteria are operationalized in a semi-structured format, were developed in the *WHO/NIH (US National Institutes of Health) Joint Project on Diagnosis and Classification of Mental Disorders and Alcohol- and Drug-related Problems.*[37,38] We administered the sections >Alcohol= and >Use of psychoactive substances other than alcohol= from the SCAN in the official Dutch translation,[36] while reserving the category >sedatives= for BZDs only. The DSM-III-R and ICD-10 past year (PY) and lifetime (LT) diagnoses of BZD dependence were computed using the algorithms which are also being used in the *WHO/NIH Reliability and Validity Study on Alcohol and Drugs,* an international multi-centre trial which is currently under way in the Amsterdam Institute for Addiction Research (AIAR) and other centres.

Item Scalability

In this study we investigated the Rasch-homogeneity of two BZD dependence scales, which are the sum scores of the dichotomous responses to the DSM-III-R and the ICD-10 criteria. By using these sum scores, assumptions are made which are specified in the Rasch model. To justify the use of the sum scores these assumptions must be tested, which implies that the Rasch model should hold true. According to Fischer[39] the Rasch model can be derived from the following assumptions:

(1) *Unidimensionality.* All items are functionally dependent upon only one underlying continuum, *u*.

(2) *Monotonicity.* All item characteristic functions are strictly monotonic in the latent trait, *u*. The item characteristic function describes the probability of a predefined response as a function of the latent trait, *u*.

(3) *Local stochastic independence.* Every person has a certain probability of giving a

predefined response to each item and this probability is independent of the answers given to the preceding items.

(4) *Sufficiency of a simple sum statistic.* The number of predefined responses is a sufficient statistic for the latent parameter, *u*.

(5) *Dichotomy of the items.* For each item there are only two different responses, for example, positive and negative.

The Rasch model requires that an additive structure underlies the observed data. This additive structure applies to the logit of p_{ij} , where p_{ij} is the probability that subject i will give a predefined response to item j, being the sum of a subject scale value u_i and an item scale value v_j , i.e.: $\ln(p_{ij}/1- p_{ij}) = u_i + v_j$.

While the item responses depend on the probabilities in a random way, the response probabilities depend in a deterministic way on the subject and item scale values. This additive structure implies that both subjects and items can be arrayed on a unidimensional scale and that the items have equal discriminative power. Glas[28] has developed two statistical tests for the dichotomous Rasch model, which are known as R1 and R2. The statistic R1 is especially sensitive to the property of equi-discriminability and R2 to unidimensionality and local stochastic independence. 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. Similarly, unidimensionality and local stochastic independence hold true when R2 is not significant ($P > 0.01$). Rasch-homogeneity is demonstrated if both statistics hold true, meaning that the sum score across items is a sufficient statistic for the subject scale and that the sum score across subjects is a sufficient statistic for the underlying item scale. To compute R1 and R2 for our DSM-III-R and ICD-10 data we used the Rasch Scaling Program (RSP).[40,41]

Scale Discriminability

Even if the DSM-III-R and ICD-10 benzodiazepine dependence scales are Rasch homogeneous, their clinical utility depends on their discriminative power in appropriate patient samples. This scale discriminability can be subdivided into subject and item discriminability. The subjects as well as the items should systematically differ, i.e. the variation between subjects and between items should be larger than the variation due to random error. The subject discriminability of the benzodiazepine dependence scales was tested by means of the Kuder-Richardson-20 coefficient of internal consistency (KR-20). The size of KR-20 reflects the reliability of the scale, because the error variance of the estimator decreases if KR-20 increases. The item discriminability was tested by Cochran=s Q test for repeated measures.[42] A significant test result implies that each item can be considered to occupy a distinct point on the scale.

Construct Validity

In addition to the above-requirements, the construct of BZD dependence has to be specified. This requires a theoretical rationale about the underlying biopsychosocial process of dependence, which determines the actual responses which are given by the subject. So far, such a rationale is not available, as the SDS has been derived empirically from clinical experience[4] rather than from a basic theory of substance dependence. However, the scale values of a set of Rasch homogeneous dependence criteria provide the clue for a theoretical rationale. As these scale values will reflect different levels of dependence severity, there is only one specific order of the dependence criteria which will reflect an increasing dependence severity. Therefore, a rationale for BZD dependence should explain that specific order of the

dependence criteria on the Rasch scale in contrast to any other order, to promote a more profound theoretical understanding of the underlying dependence concept. This study attempted to describe such a rationale for the DSM-III-R and ICD-10 BZD dependence constructs.

RESULTS

Group characteristics

The data in Table 2 show the different characteristics of the subgroups in the sample. One of the most striking features was the difference between the female:male ratios. In general there was a clear overrepresentation of women. The very high female:male ratio in the self-help sample (85:15) was partly caused by the fact that one of the self-help groups was restricted to women only. The men outnumbered the women only in the outpatients from the CBACs. Contrary to the women, the men appeared to be more inclined towards BZD use in a context of general illicit polydrug use. Another remarkable feature of the CBAC patients was their high-dose BZD use, reflected by the MDD/DDD (>mean daily BZD dose/defined daily BZD dose=). The highest figures for the duration of BZD use, the number of positive DSM-III-

Table 2. Sociodemographic variables, aspects of BZD use and past year diagnostic data on BZD dependence

Subject variables and past-year diagnostic data	GP* patients (n=217)	Psychiatric Outpatients (n=250)	Self-Help Patients (n=33)	Outpatients from CBACs⊥ (n=99^)	Total Sample (n=599^)
Sex (%)					
male	27	42	15	70	40
female	73	58	85	30	60
Mean age (yrs) ∀ sd	51 ∀ 12	47 ∀ 11	44 ∀ 11	38 ∀ 10	47 ∀ 12
MDD/DDD〉	.7	1.1	1.3	2.5	1.2
Quartiles	.2 - .5 - 1.0	.5 - .9 - 1.5	.5 - 1.0 - 2.0	.8 - 1.5 - 3.0	.4 - .8 - 1.5
Mean duration of BZD use (months)	86	51	103	69	70
Quartiles	12 - 48 -120	6 - 18 - 60	20 - 90 -152	12 - 36 - 120	9 - 30- 102
Mean number of positive criteria in the past year ∀ sd					
DSM-III-R	1.8 ∀ 1.8	2.6 ∀ 2.0	4.9 ∀ 2.7	3.7 ∀ 2.6	2.6 ∀ 2.2
ICD-10	2.2 ∀ 1.5	2.9 ∀ 1.6	4.4 ∀ 1.5	3.4 ∀ 1.7	2.8 ∀ 1.6
Past-year diagnosis of BZD dependence					
DSM-III-R (%)	30	49	82	59	46
ICD-10 (%)	41	61	88	71	57

Note to Table 2:
*GP: General Practice; ⊥CBACs: Community-Based Addiction Centres; n^: = n-1 with respect to the diagnostic data due to 1 drop-out; 〉MDD/DDD: mean daily BZD dose/defined daily BZD dose; Mean duration of BZD use: based on the longest used BZD

R and ICD-10 BZD dependence criteria and the past-year prevalence of BZD dependence were observed in the self-help sample, which was evidently due to self-selection with regard to BZD dependence. However, in all the groups the past-year prevalence of BZD dependence was very high; the ICD-10 consistently yielded somewhat higher values than the DSM-III-R.

Scalability of the dependence criteria

The Rasch analyses of the DSM-III-R and the ICD-10 criteria by RSP yielded R1 and R2 values which were all significant (see Table 3). Therefore, the original DSM-III-R and ICD-10 scales for BZD dependence were not Rasch-homogeneous. Subsequently, we looked for subsets of DSM-III-R and ICD-10 criteria, containing as many criteria as possible, which would satisfy the requirements of the Rasch model. The results of the Rasch analyses of the original sets of criteria indicated which criteria had to be removed in order to achieve Rasch-homogeneity. The Rasch analyses of the resulting subsets of DSM-III-R and ICD-10 criteria yielded non-significant R1 and R2 statistics, as can be seen in Table 3, which implied that they were Rasch-homogeneous.

The SCAN items >BZD withdrawal problems= and >BZD use to relieve withdrawal problems=, as separate criteria (DSM-III-R) or a combined criterion (ICD-10), had to be left out of both sets of criteria. Additionally, to obtain a Rasch-homogeneous set of DSM-III-R criteria >impaired capacity to abstain or cut BZD use= and >time involved in BZD-related activities= had to be removed. In the ICD-10 construct these items were not rejected by the Rasch model due to the fact that they are combined with another item into one criterion and analysed as such.

Table 3. Test results of Rasch analysis on the DSM-III-R and ICD-10 BZD dependence criteria by means of RSP

Diagnostic Scale	i	R1	df	p	g	R2	df	p	n
DSM-III-R	9	91.20	24	<.001	4	224.95	32	<.001	466
ICD-10	6	38.07	15	<.001	4	45.62	12	<.001	508
Revised DSM-III-R*	5	6.57	4	.16	2	17.25	8	.03	301
Revised ICD-10*	5	19.04	8	.01	3	16.04	8	.04	500

BZD : Benzodiazepine
RSP : Rasch Scaling Program[40]
R1 and R2 : test statistics of Rasch analysis[28]
i : number of items in the scale
df : degrees of freedom
p : p-value
g : number of subgroups
n : number of subjects left in the analysis
* : see the revised sets of criteria in Table 5

Discriminability of the revised dependence scales

Based on the fact that we were dealing with short scales of 5 dichotomous criteria, the KR-20 values in Table 4 indicate that the subject discriminability of the revised DSM-III-R and the ICD-10 scales was acceptable with respect to the total sample. In the subgroups, the lower KR-20 values in the GP patients and psychiatric outpatients reflect moderate reliability of the revised dependence scales, while the higher KR-20 values in the patients from the self-help groups and the CBACs indicate good reliability. In these subgroups the latter might be due to greater variance of the property which is being measured by the scales.

The item discriminability was sufficient in all the groups of patients, as is shown by the significant results of Cochran=s Q test in Table 4, except for the revised DSM-III-R scale in the self-help patients which yielded a non-significant result (P = .26). As this single exception occurred in the smallest subgroup (33 subjects), it was considered to be due to insufficient statistical power. On the whole, the acceptable subject discriminability and the good item discriminability indicate that the clinical utility of the revised DSM-III-R and the ICD-10 scales is satisfactory.

Table 4. Subject and item discriminability of the Rasch-homogeneous subsets of DSM-III-R and ICD-10 BZD dependence criteria

Subject & Item Discriminability	GP[*] patients (n=217)	Psychiatric Outpatients (n=250)	Self-Help Patients (n=33)	Outpatients from CBACs[⊥] (n=98)	Total Sample (n=598)
DSM-III-R					
Reliability					
KR-20[#]	.57	.54	.74	.69	.66
Cochran=s Q test	33.69	35.08	5.25	25.01	56,40
Q	<.01	<.01	.26	<.01	<.01
p					
ICD-10					
Reliability					
KR-20[#]	.55	.52	.62	.62	.60
Cochran=s Q test	385.98	322.63	25.26	112.68	812.20
Q	<.01	<.01	<.01	<.01	<.01
p					

[*]GP: General Practice
[⊥]CBACs: Community-Based Addiction Centres
[#] KR-20: Kuder-Richardson-20 coefficient of internal consistency

Theoretical rationale for the revised dependence constructs

Table 5 shows the subsets of DSM-III-R and ICD-10 dependence criteria in their SCAN format. The criteria are ranked according to the scale values yielded by the Rasch analyses. At first sight, the DSM-III-R and ICD-10 scales appear to be very different, as similar criteria occupy different positions. However, there are some systematic differences which have to be taken into account. In contrast with the DSM-III-R criteria, two of the ICD-10 criteria are reflected by a combination of two SCAN items, i.e. 'Impaired capacity to control BZD use once started, or to abstain or cut BZD use' and 'Salience of BZD activities or time involved in BZD-related activities'. In these combinations the SCAN item which yields the most positive responses will mainly determine the position on the ICD-10 Rasch scale. Furthermore, the ICD-10 sets a lower cut-off point for 'tolerance' than the DSM-III-R; it requires a 'some but not marked' decrease in the effect of the BZD(s) for a positive score, while the DSM-III-R demands 'marked tolerance' for which 'at least 50% more should be tolerated than previously'. Due to this higher threshold, >tolerance= has got the highest scale value on the revised DSM-III-R Rasch scale, which reflects the highest level of dependence severity. However, besides all these systematic differences there is also one clear similarity. The criterion >Persistence in BZD use despite harm=, which reflects the highest dependence severity on the ICD-10 continuum, is also identically represented in the middle of the DSM-III-R continuum. The DSM-III-R Rasch scale therefore appears to reflect relatively higher levels of BZD dependence severity than the ICD-10 scale.

Despite the above-mentioned differences, we felt that the item-order of both revised scales was reflected best by *>the degree to which BZD use and BZD-related behaviour adversely affect the BZD user and his/her environment*=. Due to the general character of the substance

Table 5. Rasch-homogeneous DSM-III-R and ICD-10 BZD dependence scales and a rationale which reflects the order of the criteria as provided by the Rasch scale values

Rasch-homogeneous DSM-III-R* (B)	Rasch-homogeneous ICD-10* (B)
Criteria Included:	***Criteria Included:***
Social harm or repeated risk-taking behaviour (-.71)	Craving (-2.35)
Salience of BZD activities (.00)	Impaired capacity to control BZD use once started, or to abstain or cut BZD use (-1.19)
Persistence in use despite harm (.12)	Tolerance (.57)
Impaired capacity to control BZD use once started (.14)	Salience of BZD activities or time involved in BZD-related activities (1.24)
Tolerance (.45)	Persistence in use despite harm (1.74)
Criteria Excluded:	***Criteria Excluded:***
Withdrawal Symptoms	Withdrawal Symptoms or BZD use to relieve withdrawal symptoms
BZD use to relieve withdrawal symptoms	
Time Involved in BZD-related activities	
Impaired capacity to abstain or cut BZD use	
Rationale: *The degree to which BZD use and BZD-related behaviour adversely affect the BZD user and his/her environment*	

*: Criteria are shown in the SCAN format
(B): Scale value produced by the Rasch Scaling Program[40]

dependence criteria it remains very difficult to concretize the phrase >adversely affect=, but important aspects are the continuity and predominance of the effect on the physical-mental state and social functioning of the BZD user, regardless of the harm that is being inflicted.

DISCUSSION

The present study was the first to investigate the homogeneity of the DSM-III-R and ICD-10 dependence criteria specifically for BZDs and the first to use Rasch modelling for this purpose. After some of the criteria had been removed from the original sets, the remaining DSM-III-R and ICD-10 BZD dependence criteria met the requirements of the Rasch model and their psychometric scale properties proved to be acceptable for clinical use.

In the interpretation of these results, we considered our total sample to be representative of the heterogeneous population of BZD users in clinical practice; in agreement with earlier reports[43,44] the BZD users drawn from the general practices and psychiatric outpatient departments (the majority of the total sample) comprised more women than than those from the CBACs and they were using lower mean BZD dosages (see Table 2).

To improve the conceptual understanding of BZD dependence, insight is required into the reasons why the Rasch model was violated by particular criteria. Tetrachoric correlations between the rejected criteria and the remaining dependence criteria were too low to suspect that stochastic dependence was responsible for their removal. Violations of unidimensionality and equi-discriminability might well be the result of poor validity of these criteria in some frequently occurring situations. The removal of the DSM-III-R criterion >an impaired capacity to abstain or cut BZD use= can be explained by the fact that it will not be applicable

as long as a patient strictly follows a medical prescription. Similarly, it is questionable whether >the time involved in BZD-related activities= can be a good indicator of BZD dependence, because large or frequent doses would have to be taken >to lose more time than you can afford=. So the clear face-validity of these criteria with respect to other substances disappears when BZD use is assessed. The responses to these criteria therefore might not always reflect BZD dependence adequately.

The removal of the withdrawal criteria from both the DSM-III-R and the ICD-10 sets, in order to meet the requirements of the Rasch model, does not repudiate the existence of BZD withdrawal. Numerous reports have demonstrated undeniably that BZD withdrawal is the major clinical manifestation of physical BZD dependence.[31-34,46] Originally, withdrawal and tolerance were the cardinal diagnostic elements of substance dependence in the DSM-III.[8] Although it is possible that BZD withdrawal constitutes a separate dimension, it is more likely that the withdrawal items in the SCAN (which contain the unfortunate term >ill-effects= to delineate withdrawal symptoms) are sensitive to a broader range of symptoms which emerge after the reduction or discontinuation of BZD use, than withdrawal symptoms only. Many studies which aimed to differentiate between true withdrawal symptoms and the re-emergence of the original disease symptoms have shown that this remains a complicated matter.[31,33,34,46] Sensitivity to other than withdrawal symptoms clearly violates the axiom of unidimensionality of the Rasch model.

According to the results of this study, some of the elements of the DSM-III-R and ICD-10 BZD Dependence Syndrome should be removed to meet the postulate of homogeneity. This can only be avoided if the criteria in question are reformulated in such a way that they satisfy the Rasch model. Owing to the above-mentioned difficulty of operationalizing the BZD withdrawal criteria so that they properly reflect BZD dependence, this approach will probably

fail. If the original DSM-III-R and ICD-10 criteria sets have to be revised, this implies rejection of the construct validity of the DSM-III-R and ICD-10 BZD dependence diagnoses and the appropriate past-year prevalence figures which are shown in Table 2. Consequently, the diagnosis of BZD dependence should then be based on the Rasch-homogeneous DSM-III-R and ICD-10 scales which are shown in Table 5. Because of the fact that the criterion >persistence in BZD use despite harm= is positioned in the middle of the DSM-III-R continuum and at the upper end of the ICD-10 continuum, the DSM-III-R Rasch scale appears to reflect higher levels of BZD dependence severity than the ICD-10 scale. In clinical practice, the DSM-III-R Rasch scale would therefore be especially suited to differentiating between BZD users with higher levels of BZD dependence severity, while the ICD-10 scale would be more suitable for BZD users with lower levels of BZD dependence severity. The most suitable continuum can be chosen depending on the setting and the type of population involved. Once having established that both classifications can be described as Rasch-homogeneous continua, it would be a waste of useful information to choose an arbitrary cut-off point in these scales to diagnose BZD dependence. Whether a particular level of BZD dependence severity is considered to be a problem which has to be dealt with, will depend on the perspective from which it is evaluated. From a public health point of view a single positive criterion might be considered problematic, whereas from the point of view of crime, elevated crime rates might only be associated with, for example, three or more positive criteria.

Rasch-modelling shows promise for substances other than BZDs. To improve our conceptual understanding of substance dependence it seems important to find out whether Rasch analyses on DSM-III-R, DSM-IV and ICD-10 data obtained from users of other psychoactive substances would yield the same sets of Rasch-homogeneous dependence criteria as those found for BZD dependence, or different sets of criteria depending on the substance in question. If Rasch analysis of the data on psychoactive substances other than BZDs also leads to the removal of the withdrawal criteria in order to obtain Rasch-homogeneous dependence scales, this would support the existence of a distinct withdrawal dimension, assuming that there are no re-emerging disease symptoms for non-BZDs. However, the latter assumption is disputed by the >self-medication hypothesis=,[47] which has been put forward as a major mechanism that might trigger the use of addictive substances. On the other hand, if the withdrawal criteria of other substances can remain among the Rasch-homogeneous criteria, this would indicate a specific operationalization problem with respect to BZD withdrawal.

It can be expected that the composition of Rasch-homogeneous sets of dependence criteria obtained in further studies on other psychoactive substances, especially the relative scale positions of the criteria which reflect different levels of dependence severity, will provide a better conceptual understanding of the SDS across different substances.

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