ALCOHOL ABUSE AND DEPENDENCE CRITERIA AS PREDICTORS OF A CHRONIC COURSE OF ALCOHOL USE DISORDERS IN THE GENERAL POPULATION

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Abstract — Aims: To investigate whether DSM-IV abuse and dependence criteria and the ICD-10 criterion for craving differentially predict a chronic course of alcohol use disorders (AUD) in the general population. Methods: Data were derived from the Netherlands Mental Health Survey and Incidence Study, a large representative sample of the general Dutch population with a baseline and a 1- and 3-year follow-up assessment. In the present study, a cohort of subjects with a DSM-IV AUD diagnosis at baseline was followed (n = 382). Diagnostic criteria of AUD according to DSM-IV and ICD-10 were assessed using the Composite International Diagnostic Interview (CIDI). Results: In our cohort of subjects with an AUD diagnosis at baseline, the presence of all dependence criteria, except tolerance, significantly increased the risk for dependence at 1 and 3 years follow-up. Abuse criteria displayed much lower and often non-significant risks for dependence at follow-up, with the exception of the criterion ‘legal problems’. The ICD-10 criterion ‘craving’ had the highest relative risk (RR) of all criteria for dependence at 1 year (RR = 12.4, 95% CI = 5.5–27.8) and 3 years follow-up (RR = 12.9, 95% CI = 4.4–37.7). Conclusion: With the exception of tolerance, all DSM-IV dependence criteria are useful in predicting the course of AUD in the general population.

INTRODUCTION

The course of alcohol use disorders (AUD) in the general population differs from the course in treatment seeking populations (Cohen and Cohen, 1984; Cunningham, 1995; Caetano, 1999; Raimo et al., 1999). In a large prospective general population study, we found that 85% of subjects with DSM-IV abuse and 74% of subjects with DSM-IV alcohol dependence lost their diagnosis in the course of 3 years (De Bruijn, van den Brink, de Graaf and Vollebergh, submitted for publication). This is in contrast with the chronic relapsing course of treatment-seeking alcoholics (Finney and Moos, 1991). The challenge for primary care physicians is to identify the alcoholics who are at risk for developing chronic alcohol problems and to provide treatment or referral for these patients. One of the possible strategies might be to identify AUD criteria or symptoms that are associated with an increased risk for a chronic course.

The presence of the DSM-IV AUD criteria and its association with severity of alcoholism have been extensively studied in both clinical and general population samples (Andreatini et al., 1994; Caroll et al., 1994; Dawson, 1998; Caetano, 1999; Chung et al., 2002; Langenburgcher, 2004). In most studies the criteria ‘using larger amounts or over a longer period’ (AD 3), ‘tolerance’ (AD 1) and ‘hazardous use’ (AA 2) have been found to occur frequently and to be associated with less severe forms of alcoholism, whereas the criteria ‘a great deal of time is spent’ (AD 5), ‘important activities are given up’ (AD 6) and ‘legal problems’ (AA 3) are less prevalent and associated with more severe forms of alcoholism. Also the order of onset of the symptoms has been studied quite extensively (Schuckit et al., 1993, 1995, 1998b; Langenburgcher and Chung, 1995; Martin et al., 1996; Nelson et al., 1996, 1998; Chung and Martin, 2002). To sum up, hazardous use and loss of control are criteria that develop relatively early, although several studies find that withdrawal is a symptom with a relatively late onset.

Few studies have been performed to investigate whether AUD criteria are able to differentially predict a chronic course of alcohol problems over time. Schuckit et al. studied the predictive validity of the DSM-IV AUD criteria among two samples. The first study involved high functioning Caucasian men, half of whom had an alcoholic parent. However, this study did not primarily investigate chronicity, since the majority of these subjects did not have an AUD diagnosis at baseline. Furthermore, the specific characteristics of the sample (high functioning sons of alcoholics) limits the generalizability of these findings (Schuckit et al., 2000). The authors replicated their findings in a sample of treatment-seeking alcoholics, their relatives, and controls (Schuckit et al., 2001, 2005). In this study, subjects were divided in three groups: those with no baseline diagnosis, those with abuse at baseline, and those with dependence at baseline. A comparison was made between subjects who displayed any DSM-IV AUD criterion at a 5-year follow-up and those who did not. Since we are interested in the ability of the criteria to predict a chronic course, we will only discuss the data on the subjects who had an AUD diagnosis at baseline. The authors found that among dependent subjects, DSM-IV criteria were not able to predict the occurrence of AUD-criteria at the 5-year follow-up (68.1% reported AUD-criteria at the follow-up). When abuse and dependence subjects were combined, all dependence criteria except AD 6 (important activities given up) were significantly associated with the occurrence of AUD criteria at the 5-year follow-up. Of the abuse items only AA 1 (role obligations) was associated with the occurrence of AUD criteria at the follow-up.

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Dawson et al. (2005) studied the correlates associated with recovery from alcohol dependence in the general population and found that a larger number of dependence symptoms increased the odds for abstinent recovery but decreased the odds for non-abstinent recovery. This study, however, was retrospective and did not regard the individual AUD criteria.

The ICD-10 criteria have been studied less frequently. The diagnostic criteria for alcohol dependence according to DSM-IV and ICD-10 largely overlap, but ICD-10 dependence has a criterion for craving, whereas DSM-IV does not. Craving is increasingly considered to be the core symptom of alcohol dependence ( Tiffany and Conklin, 2000). There is, however, no consensus on how to define this concept. Research on craving as a predictor of relapse, and on the association of craving with severity of alcoholism, is inconclusive ( van den Brink, 1997; Bottlender and Soyka, 2004; Mezinskis et al., 2001).

In conclusion, the prevalence, order of onset, and severity of the DSM-IV AUD criteria have been studied in clinical as well as community samples. However, the potential of the individual criteria to predict chronicity has only been studied among treatment-seeking alcoholics. In this study, among a cohort of general population subjects with abuse or dependence, we investigate whether the presence of certain DSM-IV AUD criteria or the ICD-10 criterion for craving at baseline differentially increases the risk of still having these disorders at 1- and 3-year follow-up.

METHODS

Subjects

The data were derived from the Netherlands Mental Health Survey and Incidence Study (NEMESIS). NEMESIS is a prospective study collecting data in three waves ( 1996, 1997, and 1999) from a national, multistage random sample (age 18–64 years) in the Netherlands. At the first wave ( T 0) from a national, multistage random sample (age 18–64 years) in the Netherlands. The respondents adequately reflected the Dutch population. For more detailed information, see an earlier report on NEMESIS ( Bijl et al., 1998). For the present analyses we selected a cohort of the subjects who met the criteria for alcohol abuse or dependence at T 0 ( n = 382). Of these subjects, 298 ( 78.0% of T 0) were reinterviewed after 1 year ( T 1) and 238 ( 62.3% of T 0, 79.9% of T 1) were reinterviewed after 3 years ( T 2). Within our study cohort, the presence of the DSM-IV AUD criteria and craving predicted loss to follow-up neither at T 1 nor at T 2 .

Instruments

Diagnostic criteria. The CIDI 1.1 was used to assess criteria of AUD. In these analyses we assessed the presence of the criteria during the past 12 months at T 0 and T 1 and during the last 24 months at T 2 . The CIDI 1.1 is a reliable and validated, fully structured diagnostic interview, enabling to make diagnoses according to ICD-10 and DSM-III-R criteria ( Cottler et al., 1991). The interviewers had been given a 4-day training course at the WHO-CIDI training and reference centre of the Academic Medical Centre in Amsterdam. Since DSM-IV uses the same AUD criteria as DSM-III-R, we could establish DSM-IV criteria based on the Composite International Diagnostic Interview (CIDI) answers. Subsequently, DSM-IV abuse and dependence diagnoses were made. A subject was only diagnosed as having either abuse or dependence when the subject met the full criteria. Subjects who were partially remitted did not get a diagnosis. Subjects with a past dependence diagnosis, who met ‘current’ criteria for abuse only, were diagnosed as having abuse.

Data analyses

At T 0 , the presence of the DSM-IV AUD criteria and the ICD-10 criterion craving was assessed. Among the subjects with a DSM-IV AUD at T 0 for each criterion, the proportion of subjects that still had abuse or dependence at T 1 and at T 2 was calculated. The proportions were compared in crosstabs using the chi-square statistic as the indicator for statistical significance. Subsequently, the relative risk ( RR ) for still having abuse or dependence at follow-up was calculated using the same crosstabs procedure. If risk ratios were significantly >1, a forward stepwise logistic regression analysis was performed, entering both the individual AUD criterion and the total number of AUD criteria present at baseline as predictors.

All statistical analyses were performed with the Statistics Package for Social Sciences (SPSS for Windows, 12.0, 2003).

RESULTS

Sample characteristics

Table 1 displays the characteristics of the 382 subjects with an AUD diagnosis at baseline. At T 0 , 299 subjects met current abuse criteria according to DSM-IV (78.3% of 382; 4.2% of 7076) and 83 subjects were diagnosed with current dependence (21.7% of 382; 1.2% of 7076). Only 8 subjects (2.1% of 382) had been seeking specialized treatment for their addiction in the last 12 months and 26 subjects (6.8%) in their lifetime.

AUD criteria and diagnosis at follow-up

Table 2 displays the DSM-IV AUD criteria and the ICD-10 criterion craving for all 382 subjects with a DSM-IV AUD diagnosis at baseline. For each criterion, the proportions and RRs for still having abuse or dependence at T 1 and T 2 are shown.

The risk for having dependence at follow-up was significantly increased for nearly all dependence criteria and for

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>x (SD)</th>
<th>% (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age&lt;sup&gt;a&lt;/sup&gt; (SD)</td>
<td>34.2 (11.3)</td>
<td></td>
</tr>
<tr>
<td>Sex, (male)</td>
<td>81.4 (311)</td>
<td></td>
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<tr>
<td>Employed</td>
<td>64.7 (247)</td>
<td></td>
</tr>
<tr>
<td>Number of drinks/week&lt;sup&gt;b&lt;/sup&gt; (SD)</td>
<td>26.9 (30.7)</td>
<td>2.1 (8)</td>
</tr>
<tr>
<td>Seeking specialized treatment for addiction in the last 12 months</td>
<td>6.8 (26)</td>
<td></td>
</tr>
<tr>
<td>Seeking specialized treatment for addiction in lifetime</td>
<td>78.3 (299)</td>
<td></td>
</tr>
<tr>
<td>Abuse</td>
<td>21.7 (83)</td>
<td></td>
</tr>
<tr>
<td>Dependence</td>
<td>17.8 (53)</td>
<td></td>
</tr>
<tr>
<td>Dependence of 298 subjects at T 1</td>
<td>9.4 (28)</td>
<td></td>
</tr>
<tr>
<td>Dependence of 238 subjects at T 1</td>
<td>13.4 (32)</td>
<td></td>
</tr>
<tr>
<td>Dependence of 238 subjects at T 2</td>
<td>7.1 (17)</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> the age in years.  
<sup>b</sup> number of drinks/week.
Table 2. Diagnosis at 1 and 3 years follow-up for criteria of DSM-IV AUD and the ICD-10 criterion craving in the cohort of 382 subjects with a baseline DSM-IV AUD diagnosis

<table>
<thead>
<tr>
<th>Presence of AUD criteria (% (n))</th>
<th>T1 (n = 298)</th>
<th>T2 (n = 238)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Abuse RR (95% CI)</td>
<td>Dependence RR (95% CI)</td>
</tr>
<tr>
<td>AD 1 Tolerance 21.2 (81)</td>
<td>22.4 (15) 1.4 (0.8–2.3)</td>
<td>17.9 (12) 2.6** (1.3–5.2)</td>
</tr>
<tr>
<td>AD 2 Withdrawal 18.8 (72)</td>
<td>18.2 (10) 1.0 (0.6–1.9)</td>
<td>23.6 (13) 3.8*** (1.9–7.6)</td>
</tr>
<tr>
<td>AD 3 Larger amounts or longer than intended 39.5 (151)</td>
<td>21.8 (26) 1.4 (0.9–2.4)</td>
<td>19.3 (23) 6.9*** (2.7–17.7)</td>
</tr>
<tr>
<td>AD 4 Persistent desire to cut down or control use 13.4 (51)</td>
<td>18.2 (8) 1.0 (0.5–2.0)</td>
<td>43.2 (19) 12.2*** (5.9–25.2)</td>
</tr>
<tr>
<td>AD 5 Great deal of time obtaining, using or recovering from effects 7.9 (30)</td>
<td>21.7 (5) 1.2 (0.6–2.8)</td>
<td>43.5 (10) 6.6*** (3.5–12.7)</td>
</tr>
<tr>
<td>AD 6 Important activities given up or reduced 4.2 (16)</td>
<td>8.3 (1) 0.5 (0.1–3.0)</td>
<td>41.7 (5) 5.2*** (2.4–11.3)</td>
</tr>
<tr>
<td>AD 7 Continued use despite physical or psychological harm 43.2 (165)</td>
<td>20.9 (27) 1.4 (0.8–2.2)</td>
<td>19.4 (25) 10.9*** (3.4–35.4)</td>
</tr>
<tr>
<td>Craving 18.8 (72)</td>
<td>25.9 (15) 1.6 (1.0–2.8)</td>
<td>36.2 (21) 12.4*** (5.5–27.8)</td>
</tr>
<tr>
<td>AA 1 Failure to fulfill major role obligations 6.8 (26)</td>
<td>21.1 (4) 1.2 (0.5–3.0)</td>
<td>15.8 (3) 1.8 (0.6–5.3)</td>
</tr>
<tr>
<td>AA 2 Hazardous use 68.6 (262)</td>
<td>17.8 (36) 1.0 (0.6–1.7)</td>
<td>6.4 (13) 1.4 (0.2–0.8)</td>
</tr>
<tr>
<td>AA 3 Legal problems 5.2 (20)</td>
<td>20.0 (3) 1.1 (0.4–3.2)</td>
<td>26.7 (4) 3.1* (1.3–7.9)</td>
</tr>
<tr>
<td>AA 4 Continued use despite social or interpersonal problems 32.7 (125)</td>
<td>20.6 (0.8–2.1) 1.3 (1.2–4.8)</td>
<td>15.5 (15) 2.4* (1.1–3.8)</td>
</tr>
</tbody>
</table>

AD, alcohol dependence; AA, alcohol abuse; RR, relative risk for abuse and dependence.
Chi square *P < 0.05; **P < 0.01; ***P < 0.001.
*RR for dependence > RR for abuse.

The presence of AA 2 (hazardous use) significantly reduced the risk for having dependence at T₁. We, therefore, examined these subjects closer. Among the 262 subjects who displayed AA 2, this was the only criterion met at baseline for 120 subjects (45.8% of 262). Of the 120 subjects who did not meet AA 2, only 4 (3.3% of 120) displayed just one AUD criterion, the other 116 subjects met several AUD criteria at baseline.

Withdrawal requiring tremor

Earlier studies have found that withdrawal (AD 2) is associated with more severe forms and later stages of alcoholism (Schuckit et al., 1998b; 2003; Lejoyeux et al., 2001). However, hangover symptoms are sometimes misinterpreted as withdrawal symptoms. Therefore, the suggestion has been made to sharpen the withdrawal definition (Langenbucher et al., 1997; Hasin et al., 2000). Hasin found that requiring tremor for withdrawal gave it a stronger prognostic meaning (Hasin et al., 2000). We recalculated the values for withdrawal when tremor was required. The prevalence of withdrawal requiring tremor was reduced from 18.8% (n = 72) to 6.8% (n = 26). Withdrawal requiring tremor did not significantly increase the risk for abuse at either

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DISCUSSION

In this prospective general population study on the predictive validity of the DSM-IV AUD criteria and craving, we found that nearly all dependence criteria and craving significantly increased the risk for still having alcohol dependence at 1 and 3 years follow-up. The abuse criteria showed much lower and often non-significant risks for having dependence at follow-up. The risk for having abuse at \( T_1 \) was not increased for any of the AUD criteria and was increased for only a few criteria at \( T_2 \). Craving, AD 3 (larger or longer), and AD 4 (quit or cut down) at \( T_2 \) had relatively high RRs for predicting dependence at both 1 and 3 years follow-up. These criteria remained significant predictors of chronicity even after correcting for overall severity (total number of AUD criteria met at baseline). In contrast, the physiological dependence criteria, tolerance (AD 1) and withdrawal (AD 2), had relatively low RRs for having dependence at follow-up in comparison with the other DSM-IV criteria. However, requiring tremor for the presence of withdrawal considerably increased the risk for dependence at follow-up.

Methodological issues

The present study included all subjects with a baseline DSM-IV AUD diagnosis from a large representative general population sample and used a well-validated instrument (CIDI) to assess DSM-III-R and DSM-IV AUD criteria (Compton et al., 1996; Cottler et al., 1997; Pull et al., 1997; Üstün et al., 1997).

Despite the large sample size, some criteria (AD 5, AD 6, AA 1, and AA 3) resulted in small numbers (30, 16, 26, and 20, respectively) because they occur infrequently in the general population. Even with these small numbers we found significant RRs for predicting dependence at follow-up, but the confidence intervals for the RRs were rather broad.

Earlier findings

In general, our results converge with the findings by Schuckit et al. among treatment-seeking subjects with either abuse or dependence at baseline, demonstrating that DSM-IV dependence criteria are useful in predicting the course of AUD, whereas most abuse criteria are not (Schuckit et al., 2001). There are, however, several differences in the designs of the studies. First, the outcome in the Schuckit et al. study was the occurrence of any AUD criterion at follow-up, whereas we studied the presence of a full diagnosis of either abuse or dependence at follow-up.

Furthermore, Schuckit et al. divided their subjects according to their baseline diagnosis (dependence, abuse, or no AUD) and studied the associations between the baseline AUD criteria and the outcome for each of these three groups separately. They did the same analyses for the combined groups of subjects with either abuse or dependence at baseline. The authors found less significant associations when dependence subjects and abuse subjects were considered separately, than when abuse and dependence subjects were combined.

Since we were interested to see whether the criteria could predict a chronic course of AUD in the general population, we confined the present analyses to subjects with an AUD diagnosis at baseline. In an earlier report on NEMESIS, predictors of incidence of substance use disorders were assessed. In these analyses, a much broader range of possible predictors was investigated. The only AUD criterion that was assessed was AD 4 (quit or cut down), which proved to be a strong predictor of the first incidence of substance use disorders (De Graaf et al., 2002).

In order to avoid very small numbers and thus lose power, we did not consider subjects with abuse and subjects with dependence at baseline separately. Furthermore, the clinical relevance of this distinction is of limited value in our general population sample. Our goal was to provide primary care physicians with indicators of a chronic course of AUD. Most of the time, the DSM-IV diagnostic status is not extensively assessed in primary care settings.

Screening instruments for primary care settings

Several screening instruments have been recommended to screen for alcohol problems in primary care settings. The two most commonly studied screening instruments are the CAGE [acronym based on its four questions: Cut down drinking, Annoyed by criticism about drinking, Guilty feelings about drinking, and Eye opener (drinking in the morning), Mayfield et al., 1974] and the alcohol use disorder identification test (AUDIT, Babor et al., 1989). The AUDIT is more effective in identifying subjects with at-risk, hazardous drinking, whereas the CAGE is superior for detecting alcohol abuse and dependence (Aertgeerts et al., 2004; Fiellin et al., 2000). The criteria that we found to have the highest ability to predict chronicity (‘craving’, ‘larger or longer’ and ‘quit or cut down’) match the CAGE questions rather well. These findings might implicate that the CAGE is not only useful for the detection of AUD in the general population and in primary care, but especially for the identification of subjects who are at risk for a chronic subtype of alcohol dependence. This hypothesis calls for further examination, taking into account all items of the CAGE and the AUDIT.

Tolerance and withdrawal

According to DSM-IV, a diagnosis of alcohol dependence should be accompanied by the specification ‘with or without physiological dependence’. Physiological dependence is specified when either withdrawal or tolerance is present. The severity and predictive validity of these criteria have been studied quite extensively. Most studies find that tolerance is not strongly associated with severity or worse prognosis, whereas the findings for withdrawal depend on the way in which this symptom is defined (Caroll et al., 1994; Schuckit et al., 1998, 2003; Hasin et al., 2000; Langebucher et al., 1997; Lejoyeux et al., 2001). Our results converge with these findings; tolerance demonstrated relatively low risk for dependence at \( T_1 \) and was the only dependence criterion that
did not significantly increase the risk for dependence at $T_2$. Withdrawal as defined in DSM-IV performed relatively weak among the dependence criteria. However, requiring the presence of tremor or withdrawal substantially increased the RR for having dependence at follow-up.

**Abuse**

Alcohol abuse according to DSM-IV requires the presence of just one criterion. This results in a heterogeneous group of subjects. The validity of alcohol abuse, especially of the hazardous use criterion, is often criticized (Hasin et al., 1999, 2003; Rounsaville, 2002; De Bruijn et al., 2004; De Bruijn et al., 2005).

Our results show that the abuse criteria, with the exception of ‘legal problems’ (AA 3) demonstrated no or just slightly increased risks for having either abuse or dependence at 1 and 3 years follow-up. The finding that AA 3 had a stronger prognostic meaning links up with earlier findings, demonstrating that this criterion is relatively rare and associated with more severe forms of alcoholism (Muthen et al., 1993; Muthen, 1995; Chung and Martin, 1996). A remarkable finding is the fact that the criterion ‘hazardous use’ (AA 2) significantly lowered the risk of having dependence at $T_1$. AA 2 was the most prevalent of all AUD criteria. For nearly half of the subjects who displayed AA2, this was the only criterion they met. It might well be that hazardous use represents some kind of time-limited risky behaviour, but that it does not belong to the prototype characteristics of an AUD per se.

**Craving**

Craving is not considered among the dependence criteria in DSM-IV. As stated in the introduction, we decided to include this symptom in the study, since it is increasingly considered to be the core symptom of alcoholism. We found that craving was associated with the highest risk for dependence at follow-up among the dependence criteria. Our findings, therefore, support its usefulness as a dependence criterion.

**CONCLUSION**

In the general population, DSM-IV dependence criteria and craving are able to predict the 3 year course of AUD. The abuse criteria are less useful in predicting the AUD course. The criteria ‘craving’, ‘larger or longer’ (AD 3), and ‘persistent desire to quit or cut down alcohol use’ (AD 4) are relatively strongly associated with a chronic course of dependence. Primary care physicians should be alert on the existence or development of a chronic alcohol problem among subjects who endorse these criteria.

**REFERENCES**


