

Personality Disorders in Alcohol-Dependent Individuals: Relationship with Alcohol Dependence Severity

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Key Words

Alcohol dependence • Personality disorders • Severity of alcohol dependence • Comorbidity

Abstract

The rate of axis II disorders in alcohol-dependent individuals is suggested to be high. The aim of this investigation is to assess the rate of DSM-IV axis II diagnoses in alcohol-dependent inpatients and their correlation with clinical characteristics of alcohol dependence (AD). 1,079 inpatients with DSM-IV AD from three inpatient addiction treatment centers ('qualified detoxification', open psychiatric university hospital wards) were included. Characteristics of AD were obtained using standardized structured interviews. Diagnoses of DSM-IV personality disorders (PDs) were generated with SCID-II-PQ and SCID-II interviews. Alcoholism severity was measured using the number of DSM-IV criteria endorsed and age at first drinking. Approximately 60% of the sample had at least one PD. However, rates of Axis II disorders differed significantly across centers. The most frequent PDs were obsessive-compulsive, borderline, narcissistic and paranoid PD. Diagnosis of any PD was related to a more severe clinical profile of AD. Regression analyses revealed that obsessive-compulsive PD was related to the number of DSM-IV criteria

endorsed while antisocial PD was related to early age at first drinking. The majority of alcohol-dependent individuals had one or more comorbid axis II disorders. Univariate and multivariate analyses indicate that different PDs are related to age at first drinking and alcoholism severity.

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Introduction

Numerous research reports indicate a high rate of personality disorders (PDs) in alcohol-dependent subjects [1–3]. These findings were supplemented by recent epidemiologic data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) [4] which reported 39.5% of the alcohol-dependent subjects to have at least one of seven investigated PDs in comparison to 14.8% of controls. Higher rates of PD diagnoses are often reported from inpatient samples of alcohol-dependent subjects, where the frequency of at least one axis II diagnosis ranged between 25 and 93% [5]. This wide range of PD comorbidity rates may depend on specific sample characteristics, differences in admission, treatment modalities and diagnostic instruments employed [6].

Alcohol-dependent subjects affected by a comorbid PD are reported to more likely be high users of the health care system [7], to receive less alcoholism-specific treatment [8] and to have a more severe course of alcohol dependence (AD) than non-comorbid alcohol-dependent individuals [9, 10]. Several previous studies also reported an adverse effect of comorbid PDs on treatment compliance and outcome [11–13].

Hitherto, research on this topic mainly focused on the comorbidity of antisocial PD and AD [4] and not the full range of DSM-IV PDs. The more recent epidemiological NESARC study assessed 7 (obsessive-compulsive, paranoid, antisocial, schizoid, avoidant, histrionic and dependent PD) of 12 axis II disorder diagnoses in alcohol-dependent individuals [4]. The remaining five axis II disorders may be of importance in the etiology, treatment and prognosis of AD, i.e. borderline personality disorder which is often accompanied with alcohol and substance use disorder (ASUD) [5, 13], and is reported to be related with onset and course of AD [5].

While there is no unanimous agreement on how to assess 'severity' of AD, item response analysis of alcohol use disorder symptoms has been utilized as a psychometric indicator of severity [14] and suggested that DSM-IV diagnostic criteria for AD form a continuum of severity. However, to the clinician, 'severity' may include additional characteristics of AD such as refractoriness to treatment, duration of illness, adherence problems, the occurrence of multiple relapses, or the magnitude of individual symptoms presented by their patients [15]. Assessing DSM-IV AD criterion endorsement as a measure of alcoholism severity using the NESARC data set, 6/7 or 7/7 criteria were associated with greater severity across a variety of indicators [15]. Alternative approaches include the age at onset of drinking or measures by the addiction severity index, which have been demonstrated to be useful surrogates for other indicators of severity [16–19].

The first aim of this investigation is to identify the rate of axis II disorders and their relationship with AD characteristics in a larger sample of inpatient alcohol-dependent individuals. Secondly, gender differences in the rate of PDs and AD characteristics and the influence of PD comorbidity on AD severity were investigated.

Patients and Methods

Sample

All participants were recruited as inpatients from three addiction treatment wards ('qualified detoxification') of the psychiatric hospitals Ludwig-Maximilians University of Munich (n = 386),

Gutenberg University of Mainz (n = 202) and University of Regensburg (n = 491). All alcohol-dependent subjects (n = 1079) were treatment-seeking and admitted through an outpatient motivational group (Munich), an addiction outpatient unit (Regensburg) or for emergency detoxification (Mainz). While the mode of admission is different across hospitals, all three centers offer a 'qualified detoxification' program which not only includes somatic detoxification but also individual and group psychotherapy, counseling for social and financial problems and somatic medical care. All subjects met DSM-IV criteria for AD which were assessed using the German Versions of CIDI/DIA-X (Composite International Diagnostic Interview) [20, 21], in Mainz and Regensburg, or SSAGA (Semi-Structured Assessment on Genetics in Alcoholism) [22], in Munich.

Though different assessment instruments were employed because each ward had a specific measure in evaluating AD, all participating hospitals used the same DSM-IV diagnostic criteria. Furthermore, while no differences in gender (χ^2 value = 0.87, $p = 0.64$) or age (F value = 1.18, $p = 0.31$) were detected, a number of AD characteristics differed significantly across recruitment sites, including recent average daily alcohol intake (F value = 4.61, $p = 0.01$) and the number of DSM-IV criteria endorsed (F value = 39.27, $p < 0.001$), all of which were higher in subjects from the Regensburg hospital.

While each recruiting hospital enrolled alcohol-dependent subjects consecutively, several individuals underwent some of the assessments but were not included into the study (n = 430) for a number of reasons. A significant percentage of the individuals left the treatment before completing the assessments or were transferred to another psychiatric or somatic ward for acute physical or psychiatric problems. Comparing characteristics of subjects enrolled or not enrolled into the study, while no significant difference in age (t value = 0.87, $p = 0.38$), gender (χ^2 value = 1.59, $p = 0.20$), age at onset of AD (t value = -0.49, $p = 0.62$), duration of AD (t value = 0.88, $p = 0.38$) and average alcohol intake before admission (t value = -1.31, $p = 0.19$) was detected, subjects not included into the study had a significantly higher number of DSM-IV criteria of AD (not included = 5.33 ± 1.0 vs. included = 5.08 ± 1.1 ; t value = -3.94, $p < 0.001$).

In addition, lifetime axis I disorders were also assessed using these interviews and cross-checked with clinical files. Exclusion criteria included current axis I disorders including schizophrenia, schizoaffective, bipolar disorder, dementia and current suicidal behavior, since these patients were not admitted to open addiction treatment wards in all three hospitals. Alcohol-dependent subjects with current and lifetime major depression but without current suicidal behavior were included. Subjects incapable of informed consent were not enrolled into the study.

All assessments, with the exception of alcohol withdrawal at admission, were conducted approximately 2 weeks after detoxification from alcohol prior to patient's discharge. At this time, all subjects were still inpatients and free of any psychotropic medication. Characteristics of AD including DSM-IV criteria, amount of daily alcohol intake, duration of AD, age at first drinking or rates of specific DSM-IV alcoholism criteria were assessed using the CIDI/DIA-X or the SSAGA.

Axis II disorders were assessed using the SCID-II-PQ self-rating questionnaires and a subsequent SCID-II interview of the positively endorsed items and specific PD diagnosis [German versions: 20]. The combined use of a self-rating screening tool to-

gether with the interview has been reported to have good validity for axis II diagnosis [23].

To cross-check the axis I and axis II disorders assessed with CIDI, SSAGA and SCID-II, a comprehensive psychiatric examination was performed by experienced psychiatrists in each participating hospital (U.W.P., M.J., G.K., C.F.). Diagnosis of PD and intensity of PD traits were determined by summing up the positive items for each specific PD. Finally, the frequencies of cluster A, B and C PDs were ascertained.

All interviewers participated in an initial training using the CIDI, SSAGA and SCID-II. To differentiate between subjects with more and those with less severe AD, a median split of the number of DSM-IV criteria endorsed and age at first drinking was performed.

Ethical Standards

A signed written informed consent was obtained from patients after complete and extensive description of the study. The Ethics Committees of all three institutions (Universities of Mainz, Regensburg and Munich) approved the study.

Statistics

All continuous data were tested for normal distribution using the Kolmogorov-Smirnov nonparametric test. The differences in continuous variables like age and number of AD criteria endorsed across groups (PD vs. no PD diagnosis) were computed using Student's *t* test for independent samples or one-way ANOVA when the three recruitment sites were compared. Comparisons of dichotomous variables like gender between groups were conducted using χ^2 statistics. A two-tailed alpha-significance level of $p = 0.05$ was defined to be statistically significant.

A series of logistic regressions was employed to evaluate how PD characteristics influenced AD severity in the context of all relevant PDs. Axis II diagnoses were entered simultaneously into the equation together with age and gender. A median split of the number of DSM-IV criteria endorsed and age at first drinking were employed as dependent variables.

Results

Sample Characteristics

Sample characteristics across centers are summarized in table 1. All participants were of German descent from the south and southwest of Germany.

PD diagnoses were detected in 652 individuals (60.4%, females = 128 of 231 57.7%; males = 524 of 848, 61.8%). However, the PD diagnoses rates significantly differed across centers. While 239 (61.9%) of Munich inpatients and 60 (29.7%) of Mainz inpatients received at least one PD diagnosis, the highest PD rate was found for Regensburg inpatients ($n = 353$; 71.9%) (overall $\chi^2 = 107.10$, $p < 0.001$). No significant difference was detected regarding the rate of PD diagnoses between genders ($\chi^2 = 0.10$; $p = 0.76$).

As demonstrated in table 1, subjects with AD and PD fulfilled more criteria of AD and lived more often alone.

All alcohol-dependent individuals had an average of 5.43 ± 1.44 DSM-IV AD criteria (median = 6.00). Performing a median-split, 477 (44.2%) subjects were included in the group with 7 DSM-IV criteria endorsed and the remaining individuals (55.8%) in the group with less than 7 criteria endorsed. Average age at first alcohol drinking was 16.89 ± 5.9 years (Median 16.00). The group with a younger age at first drinking comprised 432 (40.0%) individuals, and the remaining subjects were included in the group with later drinking onset (60.0%).

PD Clusters and Characteristics of AD and Other Psychiatric Comorbidity

Comparing subjects with specific cluster A, B and C PD diagnosis, as demonstrated in table 1, individuals with cluster B PDs had the most severe characteristics of AD and social impairment: they were more frequently unemployed and more often lived alone. In comparison, more DSM-IV criteria of AD were endorsed in alcohol-dependent individuals with cluster C PD compared to subjects without any cluster C diagnosis. Patients with cluster A PDs reported more DSM-IV criteria of AD and more severe social consequences compared to cluster B and C subjects, but did not have higher alcohol intake before admission and lived significantly more often alone.

However, rates of axis II diagnoses and characteristics of AD differed significantly across sites. Several factors may account for these differing results. First, despite typical admission strategies of treatment-seeking, alcohol-dependent individuals in Germany and inpatient treatment, selection bias for each site cannot be excluded. It may make a difference in the rate of PDs if the alcohol-dependent individuals are treatment seeking and admitted via a motivational group (Munich site), an outpatient unit (Regensburg site) or admitted for emergency detoxification (Mainz site). Furthermore, subjects of the Regensburg site endorsed more criteria of AD and might therefore have a higher rate of PDs. Interrater differences in assessment of PD may have contributed to the differences in axis II disorders across sites. Differences in characteristics of AD may arise from different assessment methods employed across sites (CIDI vs. SSAGA) even when all participating study centres used ICD10 and DSM-IV diagnostic criteria. While assessing the same characteristics, even slight differences in phrasing the questions may result in significant differences in the responses obtained. Furthermore, subjects from the Regensburg site had a higher number of DSM-IV AD criteria endorsed which might also result in a higher rate of PDs compared to subjects recruited in Munich or Mainz.

Table 1. Characteristics of alcohol-dependent individuals with and without PD and PD clusters (mean \pm SD)

	Axis II disorders and cluster							
	alcohol-dependent subjects		cluster A		cluster B		cluster C	
	with PD n = 652 (60.4%)	without PD n = 427 (39.6%)	yes	no	yes	no	yes	no
Age	42.83 \pm 9.5	45.09 \pm 9.8***	40.86 \pm 9.0	44.62 \pm 9.8***	41.80 \pm 9.3	45.00 \pm 9.7***	43.50 \pm 9.8	43.86 \pm 9.6
Age at onset AD	29.91 \pm 10.0	32.29 \pm 9.8***	29.36 \pm 9.6	31.29 \pm 10.1*	28.53 \pm 9.6	32.46 \pm 9.9***	30.36 \pm 10.3	31.13 \pm 9.7
Age at first drinking	16.1 \pm 5.5	16.86 \pm 6.0	16.59 \pm 5.1	16.50 \pm 5.9	16.04 \pm 5.6	16.83 \pm 5.7*	16.48 \pm 5.5	16.63 \pm 6.0
Mean alcohol intake, g/day	301.25 \pm 165.8	253.54 \pm 141.8***	313.62 \pm 173.3	272.41 \pm 148.8**	312.90 \pm 174.1	261.89 \pm 144.1***	298.83 \pm 161.3	269.73 \pm 149.2**
Duration of AD	12.53 \pm 9.4	12.19 \pm 8.7	11.19 \pm 8.2	12.78 \pm 9.5*	12.91 \pm 9.5	12.01 \pm 8.9	12.67 \pm 9.6	12.20 \pm 8.8
DSM IV criteria	5.89 \pm 1.3	5.42 \pm 1.5***	6.06 \pm 1.2	5.60 \pm 1.4***	5.92 \pm 1.2	5.56 \pm 1.5***	5.94 \pm 1.3	5.53 \pm 1.5***
<i>Categorical variables</i>								
Unemployed	57.4%	56.1%	55.3%	57.0%	53.5%	58.5%	59.3%	54.7%
Living alone	46.6%	32.6%***	50.0%	39.3%*	50.6%	35.5%***	43.0%	41.5%
Tolerance	85.0%	76.9%***	89.1%	79.7%**	85.6%	79.0%**	86.6%	78.9%**
Physical withdrawal	81.4%	79.4%	81.0%	80.3%	81.7%	79.9%	81.4%	79.7%
Alcohol in larger amounts	93.7%	83.4%***	95.5%	88.1%**	94.3%	86.9%***	95.0%	86.3%***
Unsuccessful cut down	93.6%	88.4%**	92.8%	91.4%	92.1%	91.1%	95.7%	88.6%***
Time getting substance	65.9%	58.8%*	70.6%	60.8%*	67.5%	59.5%*	65.0%	61.5%
Given up activities	78.3%	65.2%***	80.6%	70.7%**	78.4%	69.7%**	79.7%	68.0%***
Alcohol use is continued	90.8%	88.8%	93.2%	89.0%*	92.8%	88.2%*	90.2%	89.3%
Delirium history	15.5%	15.4%	15.9%	15.3%	16.4%	14.9%	16.5%	15.0%
Seizure history	19.0%	18.3%	16.9%	19.2%	19.1%	18.0%	19.3%	18.0%
Liver disease	33.5%	30.2%	35.3%	31.4%	34.5%	30.5%	35.7%	30.5%
Pancreas disease	7.7%	11.1%	7.4%	9.5%	8.2%	9.7%	8.4%	9.6%

* p < 0.05; ** p < 0.01; *** p < 0.001.

Effects of Gender on Rate of PDs and Their Influence on AD Characteristics

As presented in table 2, the most frequent PDs diagnosed in the sample were obsessive-compulsive, borderline and narcissistic PDs followed by paranoid and anti-social PD.

Significant gender differences in the rate of axis II disorders were found for cluster B disorders. Females received significantly more often a diagnosis of borderline PD, while males had higher rates of antisocial and narcissistic PD. Depressive and histrionic PD were more often diagnosed in females compared to males, but did not reach statistical significance.

Females and males with a PD (PD+) diagnosis were significantly younger than those without PD diagnosis

(PD-) (males PD+ = 43.10 \pm 9.4 vs. PD- = 44.78 \pm 9.7; females PD+ = 41.89 \pm 10.1 vs. PD- = 45.91 \pm 10.0 years), had a higher daily alcohol intake (males PD+ = 316.37 \pm 169.5 vs. PD- = 272.06 \pm 149.4; females PD+ = 227.45 \pm 112.2 vs. PD- = 182.38 \pm 77.5 g/day), a higher number of DSM-IV AD criteria endorsed (males PD+ = 5.90 \pm 1.3 vs. PD- = 5.40 \pm 1.6; females PD+ = 5.77 \pm 1.4 vs. PD- = 5.32 \pm 1.6) and consumed more often alcohol in larger amounts (males PD+ = 93.1% vs. PD- = 83.3%; females PD+ = 96.5% vs. PD- = 84.8%). Males with an axis II disorder had a significantly earlier age of alcoholism onset (PD+ = 29.33 \pm 9.9 vs. PD- = 31.61 \pm 9.8), more often lived alone (PD+ = 49.8% vs. PD- = 33.7%), reported a higher rate of tolerance (PD+ = 86.6% vs. PD- = 76.0%), unsuccessful attempts to cut down

drinking (PD+ = 93.5% vs. PD- = 87.8%) and giving up important activities (PD+ = 78.7% vs. PD- = 63.5%). The group of females with PD were significantly younger at first drinking (PD+ = 16.99 ± 6.5 vs. PD- = 19.81 ± 10.1).

When all males and females of the sample are compared, males were significantly younger at first drinking (males = 16.10 ± 4.8 vs. females = 18.11 ± 8.2 years) while females were significantly older at AD onset (males = 30.10 ± 9.9 vs. females = 33.59 ± 9.9 years), consumed a smaller amount of alcohol daily (males = 302.64 ± 165.3 vs. females = 209.42 ± 102.2 g/day), had a shorter duration of AD (males = 13.18 ± 9.3 vs. females = 9.19 ± 8.0 years), lived less often alone (males = 44.8% vs. females = 31.6%), reported less often ever having a withdrawal syndrome (males = 82.1% vs. females = 74.1%) and had less often an alcohol-induced pancreatic disease (males = 10.4% vs. females = 3.1%).

Influence of PDs on AD Severity Using Multivariate Statistics

To assess the influence of PD characteristics on severity of AD, assessed with number of DSM-IV criteria endorsed and age at first drinking, two logistic regression analyses were conducted. In a first step, PD diagnoses, gender and age were entered together into the equation with a median split of number of DSM-IV criteria endorsed as the dependent variable.

The results are depicted in table 3. The first equation explained 3.3% of variance. While none of the sociodemographic measures remained in the equation, a significant influence of obsessive-compulsive and schizoid PD on higher number of DSM-IV AD criteria endorsed was revealed. In the second analysis which considered a median split of age at first drinking as the dependent variable, female gender, older age and negativistic PD significantly decreased the risk for early drinking whereas antisocial PD increased the risk. The second regression analysis explained 9.2% of the variance. The results remained mainly unchanged when current or lifetime history of major depression was added as an independent variable to both equations.

In a further analysis, multinomial logistic regression models were computed to use polychotomized response variables (number of DSM-IV criteria endorsed and age at first drinking) as dependent variables. We divided the two dependent variables into quartiles to exploit their variance as best as possible despite their unfavorable distribution characteristics. To reduce complexity and achieve higher parsimony, these models were recomputed

Table 2. Frequencies of PDs in inpatient male and female alcohol-dependent subjects

PD and axis II cluster	Total, % (n = 1,079)	Males, % (n = 848)	Females, % (n = 231)	χ ² value	Significance ♂ vs. ♀
<i>Cluster A</i>					
Paranoid	17.8	18.5	15.4	1.16	0.28
Schizotypal	5.3	5.0	6.8	1.09	0.29
Schizoid	4.1	4.4	3.2	0.68	0.41
<i>Cluster B</i>					
Histrionic	1.1	0.8	2.3	3.13	0.08
Narcissistic	18.6	21.1	9.9	14.37	<0.001
Borderline	26.1	24.5	31.7	4.69	0.03
Antisocial	15.9	17.2	9.9	7.13	0.008
<i>Cluster C</i>					
Avoidant	11.1	10.3	14.0	2.33	0.13
Dependent	5.4	5.8	3.2	2.44	0.12
Obsessive	31.4	31.5	32.0	0.02	0.90
Negativistic	8.8	9.1	8.1	0.21	0.64
Depressive	8.0	7.3	10.9	3.04	0.08

using percentiles of the dependent variables. The results for both dependent variables, however, did not yield other significant predictors as in the models using dichotomized dependent variables.

Discussion

The first aim of this analysis of a larger sample of inpatient alcohol-dependent individuals was to assess the prevalence of the full range of DSM-IV PDs and their association with AD characteristics. As with previous research, approximately 60% of the inpatients received an additional diagnosis of at least one PD. Not surprisingly, this rate is significantly higher than in epidemiologic samples [4] like the NESARC sample but within the PD prevalence range of 25 to 93% of other inpatient samples [5]. Alcohol-dependent inpatients undergoing treatment were suggested to be more severely affected by comorbid psychiatric disorders, including PDs [5].

Comparing these results to rates of PDs in a previous sample of hospitalized alcohol-dependent individuals using DSM-III-R criteria, a higher rate (78%) of axis II diagnosis was found in individuals with ASUD [24]. Previous research found histrionic (34%), dependent (29%), avoidant (19%) and borderline PD (17%) to be the most common axis II diagnoses [24]. The current study de-

Table 3. Logistic regression analyses of PDs significantly associated with severity of AD (number of DSM-IV criteria endorsed and age at first drinking)

Variables (n = 1,079)	Number of DSM-IV criteria			Age at first drinking		
	χ^2 value	OR	95% CI	χ^2 value	OR	95% CI
Gender	2.15	0.77	0.54–1.09	4.29*	0.70	0.49–0.98
Age	0.84	0.99	0.98–1.01	31.19***	0.96	0.95–0.97
Paranoid PD	0.21	1.16	0.75–1.72	0.15	0.92	0.60–1.40
Schizotypal PD	2.15	0.77	0.61–2.21	1.29	1.45	0.76–2.76
Schizoid PD	6.51*	2.38	1.22–4.62	0.31	0.82	0.41–1.65
Histrionic PD	2.64	3.30	0.78–13.97	2.31	0.32	0.07–1.39
Narcissistic PD	2.26	0.74	0.50–1.10	0.01	0.98	0.66–1.46
Borderline PD	0.50	1.14	0.79–1.64	0.009	1.00	0.69–1.44
Antisocial PD	0.02	0.97	0.65–1.45	17.62***	2.30	1.56–3.40
Avoidant PD	0.63	1.23	0.74–2.03	0.06	0.94	0.56–1.56
Dependent PD	1.74	1.55	0.81–2.97	0.90	0.72	0.36–1.43
Obsessive-compulsive PD	9.53**	1.57	1.18–2.10	1.13	1.18	0.87–1.61
Negativistic PD	0.00	1.01	0.59–1.74	5.65*	0.55	0.33–0.90
Depressive PD	0.52	0.81	0.45–1.45	1.00	0.74	0.41–1.33

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. The variance explained in the first logistic regression equation was 3.3% (R^2 value 31.7, d.f. = 14, $p = 0.004$), 9.2% for the second regression equation (R^2 value = 73.7, d.f. = 14, $p < 0.001$).

tected a different, but overlapping profile of most frequent PDs. Obsessive-compulsive (31.4%), borderline (26.1%), narcissistic (18.6%) and paranoid PD (17.8%) were the four most common axis II disorders. Variations in rates of specific PDs across studies might be due to differences in specific sample characteristics (e.g. inpatient vs. outpatient vs. epidemiologic) [4], assessment methods [25] and setting of addiction treatment facilities [26]. Some PDs, i.e. paranoid, borderline, antisocial and obsessive-compulsive PDs, are diagnosed most frequently in alcohol-dependent individuals across studies [16, 27].

Also in line with previous research is the association of PD with selected AD characteristics. Several recent studies reported an earlier onset and more severe characteristics of AD in personality disordered individuals [28, 29]. In particular, subjects with antisocial PD were reported to have worse long-term outcome and increased likelihood of treatment failure [9, 30]. Using two different potential assessments of AD severity in logistic regression analyses, the number of DSM-IV criteria endorsed and age at first drinking, the former was found to be significantly related to schizoid and obsessive-compulsive PD and the latter to be significantly related to antisocial personality. Antisocial personality disorder characteristics, among other factors, have been related in previous research with the initiation of drinking [31, 32]. The num-

ber of DSM-IV criteria, though in part reflecting the severity of AD, may be related to other factors like comorbidity with obsessive-compulsive and schizoid PD.

The current study identifies specific characteristics of sociodemography and AD for PD clusters. These profiles may facilitate clinical risk assessment for comorbid alcohol-dependent and PD subjects. Since cross-sectional studies cannot determine the full picture of relationships between comorbid PDs and AD over time, prospective studies in comorbid subjects with AD and PDs are needed.

Significant gender differences in rates of PDs are present in cluster B disorders only. While males more often met criteria for antisocial and narcissistic disorders, females had more borderline PDs, in line with previous reports on different gender rates of cluster B PDs in alcohol-dependent subjects [33]. These gender differences in rates of PD, however, contributed little to the sex-specific influence axis II diagnoses have on AD characteristics. Though several of these characteristics are significantly different between genders, including age at first drinking, duration of AD or daily alcohol intake, both genders hold a more severe profile of AD when they also have a comorbid axis II diagnosis. While antisocial PD is in general more often found in males, our results indicate that approximately 10% of females have antisocial PD which

influences the severity of AD, as do other comorbid axis II disorders.

The results must be considered in light of some caveats. First, the study collected cross-sectional data from alcohol-dependent inpatients at three different university addiction treatment facilities in Germany. While PDs were assessed using the same instrument (SCID II), other AD characteristics were obtained using two different interviews (CIDI and SSAGA). Further, the different rates of PDs across centers may arise from more severe characteristics of AD in one of the hospitals (Regensburg), potentially resulting in a higher rate of subjects with psychiatric comorbidity of axis II disorders.

Though all centers recruited subjects consecutively, certain individuals could not be recruited for the study. Comparing the available characteristics of subjects enrolled and those not included into the study, while no differences were found in gender, age and some of the AD

characteristics, those patients not included had a higher number of DSM-IV AD criteria. This may indicate that they may be more severely affected by other psychiatric and/or somatic disorders, or have an even higher rate of PDs making them less compliant and less likely to participate in inpatient studies.

Since individuals with axis I disorders, except depression, are not treated in open 'qualified detoxification' wards in Germany, subjects with schizophrenia, schizoaffective or bipolar disorders were excluded from the study, hence limiting the generalizability of the study findings to in- and outpatient samples of treatment-seeking alcohol-dependent subjects. Since the study recruited treatment-seeking alcohol-dependent subjects, no history of criminality was obtained. Furthermore, severity of AD was assessed using only the number of DSM-IV criteria endorsed. There are other measures of addiction severity not used, e.g. Addiction Severity Index [19].

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