

Social anxiety disorder and alcohol use disorder co-morbidity in the National Epidemiologic Survey on Alcohol and Related Conditions

F. R. Schneier^{1,2†}, T. E. Foose^{1,2†}, D. S. Hasin^{1,2,3}, R. G. Heimberg⁴, S.-M. Liu¹, B. F. Grant^{5*} and C. Blanco^{1,2}

¹ New York State Psychiatric Institute, New York, New York, USA

² Departments of Psychiatry, College of Physicians and Surgeons, Columbia University, New York, New York, USA

³ Department of Epidemiology, Mailman School of Public Health, Columbia University, New York, New York, USA

⁴ Department of Psychology, Temple University, Philadelphia, Pennsylvania, USA

⁵ Laboratory of Epidemiology and Biometry, Division of Intramural Clinical and Biological Research, National Institute of Alcohol Abuse and Alcoholism, National Institutes of Health, Bethesda, Maryland, USA

Background. To assess the prevalence and clinical impact of co-morbid social anxiety disorder (SAD) and alcohol use disorders (AUD, i.e. alcohol abuse and alcohol dependence) in a nationally representative sample of adults in the United States.

Method. Data came from a large representative sample of the US population. Face-to-face interviews of 43093 adults residing in households were conducted during 2001–2002. Diagnoses of mood, anxiety, alcohol and drug use disorders and personality disorders were based on the Alcohol Use Disorder and Associated Disabilities Interview Schedule – DSM-IV version.

Results. Lifetime prevalence of co-morbid AUD and SAD in the general population was 2.4%. SAD was associated with significantly increased rates of alcohol dependence [odds ratio (OR) 2.8] and alcohol abuse (OR 1.2). Among respondents with alcohol dependence, SAD was associated with significantly more mood, anxiety, psychotic and personality disorders. Among respondents with SAD, alcohol dependence and abuse were most strongly associated with more substance use disorders, pathological gambling and antisocial personality disorders. SAD occurred before alcohol dependence in 79.7% of co-morbid cases, but co-morbidity status did not influence age of onset for either disorder. Co-morbid SAD was associated with increased severity of alcohol dependence and abuse. Respondents with co-morbid SAD and alcohol dependence or abuse reported low rates of treatment-seeking.

Conclusions. Co-morbid lifetime AUD and SAD is a prevalent dual diagnosis, associated with substantial rates of additional co-morbidity, but remaining largely untreated. Future research should clarify the etiology of this co-morbid presentation to better identify effective means of intervention.

Received 7 August 2008; Revised 28 July 2009; Accepted 1 August 2009

Key words: Alcohol dependence, alcohol abuse, anxiety disorders, epidemiology, social phobia.

Introduction

Alcohol use disorders (AUD) and social anxiety disorder (SAD) are among the five most prevalent psychiatric diagnoses (Kessler *et al.* 2005a). Estimates of lifetime prevalence for AUD (including alcohol dependence and alcohol abuse) range from 8.3 to 30.3%,

and for SAD range from 5.0 to 12.1% (Grant *et al.* 2005; Kessler *et al.* 2005a; Hasin *et al.* 2007). AUD and SAD frequently co-occur, are highly co-morbid with other Axis I and II disorders (Burns and Teesson, 2002; Bakken *et al.* 2005; Grant *et al.* 2005; Hasin *et al.* 2007) and are associated with severe morbidity and functional disability (Lecrubier and Weiller, 1997; Lepine and Pelissolo, 1998; Kushner *et al.* 2000; Crum and Pratt, 2001; Kessler, 2003; Bakken *et al.* 2005; Grant *et al.* 2005; Kessler *et al.* 2005b; Hasin *et al.* 2007). Despite the availability of efficacious treatments, both AUD and SAD frequently go untreated (Olfson *et al.* 2000; Grant *et al.* 2005; Cohen *et al.* 2007; Wang *et al.* 2005; Hasin *et al.* 2007), an important concern given

* Address for correspondence: Dr B. F. Grant, Laboratory of Epidemiology and Biometry, Room 3077, Division of Intramural Clinical and Biological Research, National Institute of Alcohol Abuse and Alcoholism, National Institutes of Health, MS 9304, 5635 Fishers Lane, Bethesda, MD 20892–9304, USA.

(Email: bgrant@willco.niaaa.nih.gov)

† These authors contributed equally to this work.

evidence that recovery from either disorder is compromised by failure to treat the other (Lecrubier, 1998; Moggi *et al.* 1999; Randall *et al.* 2001; Terra *et al.* 2006).

Studies investigating the co-morbidity of AUD with anxiety disorders as a group have characterized a pattern of co-morbidity in which anxiety and alcohol use are each a cause and a consequence of the other (Kushner *et al.* 2000). However, no epidemiologic study has specifically characterized co-morbidity of AUD and SAD, despite documentation of their strong association, and the clear differences between the phenomenology and course of SAD and other anxiety disorders (Kushner *et al.* 2000, 2005; Schneider *et al.* 2001). Furthermore, prior studies of AUD and anxiety disorders were often limited to treatment-seeking samples (Randall *et al.* 2001; Gerlach *et al.* 2006; Terra *et al.* 2006; Book *et al.* 2008) and utilized a unidirectional approach, e.g. examining factors associated with co-morbid AUD among patients with anxiety disorders, but not the reverse. This approach provides only a partial view of the relationship between disorders.

We seek to build on previous work by employing a bidirectional approach to explore co-morbidity of AUD with SAD, utilizing the 2001–2002 National Institute on Alcohol Abuse and Alcoholism's (NIAAA) National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). This approach provides a unique opportunity to investigate the incremental effect of having both disorders relative to either alone in regard to strength of association with particular sociodemographic features and with other DSM-IV disorders. Furthermore, it enables detailed examination of the association of co-morbid alcohol dependence/SAD and alcohol abuse/SAD with age of onset of each disorder, treatment-seeking behavior, family history and illness severity. Such information could be used to identify population characteristics that may help generate hypotheses about the etiology of this co-morbid presentation and improve access to care. Better characterization of persons with co-morbid SAD and AUD will inform the development of effective integrated treatment models, which is an active interest of members of our research group.

Methods

Subjects

The NESARC is a nationally representative sample of the adult population of the United States, conducted by the US Census Bureau under direction of the NIAAA, as previously described (Grant *et al.* 2003, 2005; Hasin *et al.* 2007). The NESARC targeted the civilian, non-institutionalized population, aged 18

years and older, residing in households in the 50 states and District of Columbia. The final sample included 43093 respondents drawn from individual households and group living quarters. African Americans, Latinos, and young adults (aged 18 to 24 years) were over-sampled. Data were adjusted to account for over-sampling and respondent and household response. The overall survey response rate was 81%. Weighted data were adjusted using the 2000 Decennial Census, to be representative of the US civilian population for a variety of sociodemographic variables.

Measures

Sociodemographic measures included age, sex, race, nativity, marital status, education and personal income, assessed as categorical variables.

All psychiatric diagnoses except psychotic disorder were made according to DSM-IV criteria using the NIAAA Alcohol Use Disorder and Associated Disabilities Interview Schedule – DSM-IV version (AUDADIS-IV) (Grant *et al.* 2001, Hasin *et al.* 2007), a valid and reliable fully structured diagnostic interview designed for use by lay interviewers. The test–test reliability and validity of AUDADIS-IV measures of DSM-IV disorders is reported elsewhere (Grant *et al.* 2003, 2005; Hasin *et al.* 2007). We also included data on family history of AUD (not specified as alcohol dependence or abuse), but the AUDADIS-IV does not collect data on family history of SAD.

Both 12-month and lifetime diagnoses were assessed. Consistent with DSM-IV, an AUDADIS-IV diagnosis of alcohol abuse required one or more of four abuse criteria in the last 12 months or any previous 12-month period. Alcohol dependence diagnoses required three or more of seven DSM-IV dependence criteria in the last 12 months or in any previous 12-month period. For prior diagnoses of alcohol dependence, three or more criteria must have occurred at the same time within a 12-month period. Persons who met criteria for both alcohol abuse and dependence were classified as having alcohol dependence. The test–retest reliability of AUDADIS-IV alcohol diagnoses in clinical and general populations ranges from good to excellent ($\kappa=0.70–0.84$) (Hasin *et al.* 2007). Convergent, discriminant and construct validity of AUDADIS-IV alcohol use disorder criteria and diagnoses are also good to excellent (Hasin *et al.* 2007).

Consistent with DSM-IV, diagnosis of SAD required a marked or persistent fear of social or performance situations (here operationalized as at least one of 14 social or performance situations, such as speaking in public, attending social gatherings, conversing with an authority figure), in which embarrassment or

humiliation may occur. In addition, the fear had to be recognized as excessive or unreasonable and the feared social situation must have been avoided or endured with intense anxiety. All SAD diagnoses required that the clinical significance criterion of DSM-IV be met (i.e. symptoms of the disorder must have caused clinically significant distress and/or impairment in social, occupational or other areas of functioning). The generalized subtype of SAD (GSAD), defined by fear of most social situations, was operationalized as fear of more than seven of the 14 situations queried, with the remainder of SAD respondents classified as having the non-generalized subtype (NGSAD). Because scrutiny fears in SAD have specifically been associated with AUD (Buckner *et al.* 2008c), eight of the situations were identified as instances of scrutiny fears for separate analysis. The test-retest reliability of the diagnosis of SAD was fair ($\kappa = 0.42-0.46$) (Grant *et al.* 2005), similar to other instruments used in epidemiological studies (Ruscio *et al.* 2008). Validity of AUDADIS-IV SAD diagnoses has been supported by assessment of impairment using the Short Form 12, version 2 (SF-12 v.2; Gandek *et al.* 1998), a reliable and valid measure in population surveys. Controlling for sociodemographic factors and other mental disorders, SAD and SF-12 v.2 scales (described below) showed highly significant relationships ($p < 0.0001$) (Grant *et al.* 2005).

Mental health treatment

To estimate rates of mental health service utilization, respondents were classified as receiving treatment for SAD if they: (1) visited a physician, psychologist or any other health professional; (2) were a patient in a hospital for at least one night; (3) visited an emergency room; or (4) were prescribed medications. Respondents were classified as receiving treatment for AUD (not specified as alcohol dependence or abuse) if they: (1) visited a physician, psychologist or any other health professional; (2) were a patient in an in-patient ward of a hospital, an out-patient clinic, a detoxification or rehabilitation unit; (3) visited an emergency department or crisis center; or (4) received treatment by a paraprofessional (e.g. a member of the clergy), an employee assistance programme or through family/social services or attended self-help groups. Treatment utilization questions were disorder-specific.

Disability and impairment

Disability among respondents was determined with the SF-12 v.2 scales assessing mental health, social functioning (limitations due to emotional problems) and role emotional functioning (role impairment due to emotional problems). Each SF-12 v.2 norm-based

disability score is a continuous variable with a mean of 50 in the general population, standard deviation of 10 and range of 0 to 100. Lower scores indicate greater disability and have been associated with psychopathology in prior studies (e.g. Compton *et al.* 2007).

Statistical analyses

Weighted percentages, means and cross-tabulations were computed to derive estimates of lifetime prevalence of alcohol dependence, alcohol abuse, SAD and correlates. Odds ratios (ORs) indicated associations between each AUD and SAD and: (1) socio-demographic variables; (2) other psychiatric disorders. Multiple linear or logistic regression (as appropriate) were used to estimate means and ORs after adjusting for sociodemographic covariates. Standard errors and 95% confidence intervals (CI) were estimated using SUDAAN, statistical software that adjusts for characteristics of the NESARC.

Because previous analyses of the NESARC have documented that SAD is significantly associated with alcohol dependence but not abuse (Hasin *et al.* 2007), we focused our main analyses on alcohol dependence, but also summarize results on alcohol abuse (detailed results of analyses for abuse available upon request). We also conducted secondary analyses for GSAD and NGSAD. To address possible concerns about pseudo-co-morbidity that could arise from analyses of lifetime diagnoses, we repeated our analyses using a 12-month timeframe. For data on disability, however, primary analyses used the 12-month time-frame. We present the results of secondary analyses of SAD subtypes and 12-month time-frame, which had more limited statistical power, only where the pattern of results differed from that of the main analyses (results of all secondary analyses available upon request).

Results

Prevalence and sociodemographic characteristics

As has been previously reported, lifetime prevalences in the general population were 5.0% for SAD, 12.5% for alcohol dependence and 17.8% for alcohol abuse. The lifetime prevalence of co-morbid AUD (either dependence or abuse) and SAD in the general population was 2.4% (95% CI 2.2-2.7%). Among respondents with SAD, prevalence was significantly elevated for alcohol dependence (27.3%, adjusted OR 2.8, 95% CI 2.5-3.3), and abuse (20.9%, OR 1.2, 95% CI 1.1-1.4). Among respondents with alcohol dependence, prevalence of SAD was 10.9% (95% CI 9.7-12.2%) and among respondents with alcohol abuse, it was 5.8%

(95% CI 5.2–6.6%). Among respondents with alcohol dependence, lifetime prevalences of SAD subtypes were 6.0% (95% CI 5.1–7.0%) for NGSAD and 4.8% (95% CI 4.1–5.7%) for GSAD. Among respondents with alcohol abuse, lifetime prevalences of SAD subtypes were 3.6% (95% CI 3.07–4.2) for NGSAD and 2.2% (95% CI 1.8–2.7%) for GSAD. Because only alcohol dependence was strongly associated with SAD, subsequent analyses focus on dependence and mention specific findings for abuse where significant.

Prevalence data for alcohol dependence and SAD is shown stratified by sociodemographic characteristics in Table 1. Co-morbid prevalence ranged from 0.6% among blacks to 2.6% among Native Americans. Among respondents with alcohol dependence, the odds of co-morbid SAD were significantly greater for women and lower for blacks and Hispanics relative to non-Hispanic whites. Individuals aged 45–64 years had higher odds of co-morbid SAD than those aged 18–29 years. Respondents with less than high school education had significantly greater odds of SAD than those with a college education. Respondents with individual income less than \$35000/year had significantly greater odds of SAD relative to those with income of \$35000 or greater. Among respondents with SAD, odds of co-morbid alcohol dependence were significantly greater for men, lower for blacks and lower for those aged ≥ 65 years.

For alcohol abuse, sociodemographic patterns were similarly associated in respect of gender, but differed in that, among respondents with SAD, co-morbid alcohol abuse was associated with being native-born, aged 30–64 years and having income of \$20000/year or greater, and was negatively associated with having never married. Among respondents with alcohol abuse, co-morbid SAD was associated with being Native American and aged 30–64 years, and was negatively associated with income of \$70000/year or greater. For SAD subtypes, co-morbid GSAD but not NGSAD was significantly associated with less than high school education. Other minor differences related to the level of significance of the findings.

Table 2 shows lifetime prevalence of other psychiatric disorders among respondents with co-morbid alcohol dependence and SAD. Among them, 97.0% had at least one additional psychiatric disorder, 93.9% another Axis I disorder, 64.1% a mood disorder, 63.1% a second anxiety disorder and 71.7% a personality disorder. Respondents with co-morbid alcohol dependence and SAD had a mean of 4.6 (95% CI 4.3–4.9) additional DSM-IV disorders, compared with 2.7 (95% CI 2.5–2.9) among those with SAD alone and 2.1 (95% CI 2.0–2.2) among those with alcohol dependence alone.

Among respondents with alcohol dependence, co-morbid SAD was significantly associated with all Axis I disorders except for conduct disorder and pathological gambling, and was negatively associated with drug dependence. Within personality disorders, the greatest strength of association was observed with avoidant and dependent (ORs 13.4 and 7.7, respectively) and the weakest with antisocial personality disorder (OR 2.3). Among respondents with SAD, co-morbid alcohol dependence was most strongly associated with drug and nicotine dependence, pathological gambling and histrionic and antisocial personality disorders (OR 3.2–7.9) and was more modestly associated with bipolar disorder, panic disorder, specific phobia and psychotic disorders, as well as avoidant, obsessive-compulsive, paranoid and schizoid personality disorders (OR 1.5–2.4).

For alcohol abuse, co-morbidity patterns were similar, but co-morbid alcohol abuse was significantly associated only with drug abuse and nicotine dependence, and negatively associated with specific phobia, avoidant and schizoid personality disorders. When analyses were examined by SAD subtypes, patterns of associations remained the same. When restricting the sample to respondents with 12-month SAD/AUD comorbidity, the overall pattern of direction and magnitude of associations remained the same and the only changes observed were in the level of significance of some of the associations due to smaller sample size ($n = 88$).

Table 3 shows that age of onset of SAD was significantly earlier than age of onset of alcohol dependence. There were no significant differences in age of onset of either disorder between those with co-morbid alcohol dependence and SAD and those with only one of the disorders. Among co-morbid cases, SAD occurred first in 79.7% (95% CI 76.5–85.9), Alcohol dependence occurred first in 14.7% (95% CI 10.9–19.6%) and the disorders co-occurred in 3.6% (95% CI 2.0–6.5%). Secondary analyses for alcohol abuse, and for SAD subtypes, yielded similar findings. For cases in which SAD occurred first, mean lag time to alcohol dependence was 13.3 years (95% CI 12.1–14.4 years) and to alcohol abuse was 10.6 years (95% CI 9.6–11.7 years). For cases in which an AUD occurred first, mean lag time to SAD was 6.6 years (95% CI 4.0–9.3 years) for dependence and 13.0 years (95% CI 9.6–16.4 years) for abuse.

Among respondents with SAD, co-morbid alcohol dependence was not associated with severity of SAD, as measured by number of situations feared or severity of scrutiny fears. Among respondents with alcohol dependence, co-morbid SAD was associated with greater severity of dependence, as indicated by more dependence criteria (Hasin *et al.* 2006), but not alcohol

Table 1. Prevalence and sociodemographic characteristics

Sociodemographic characteristics		Co-morbid SAD and alcohol dependence (n = 909)		Alcohol dependence, ORs associated with co-morbid SAD		SAD, ORs associated with co-morbid alcohol dependence	
		%	95% CI	OR	95% CI	OR	95% CI
Sex							
Male	n = 18518	1.5	(1.3–1.8)	0.6	(0.4–0.7)	2.2	(1.7–2.8)
Female	n = 24575	1.2	(1.0–1.4)	1.0	(1.0–1.0)	1.0	(1.0–1.0)
Race							
White	n = 24507	1.6	(1.4–1.8)	1.0	(1.0–1.0)	1.0	(1.0–1.0)
Black	n = 8245	0.6	(0.4–1.0)	0.6	(0.4–1.0)	0.5	(0.3–0.9)
Native American	n = 701	2.6	(1.4–4.7)	1.1	(0.6–2.2)	1.1	(0.5–2.1)
Asian	n = 1332	0.7	(0.3–1.4)	0.9	(0.4–2.2)	0.6	(0.3–1.3)
Hispanic	n = 8308	0.7	(0.5–1.1)	0.6	(0.4–1.0)	0.7	(0.4–1.1)
Native							
Yes	n = 35622	1.5	(1.3–1.7)	1.0	(1.0–1.0)	1.0	(1.0–1.0)
No	n = 7320	0.4	(0.2–0.9)	0.7	(0.3–1.4)	0.5	(0.2–1.1)
Age (years)							
18–29	n = 8666	1.7	(1.3–2.1)	1.0	(1.0–1.0)	1.0	(1.0–1.0)
30–44	n = 13382	1.5	(1.2–1.8)	1.0	(0.8–1.4)	0.8	(0.6–1.1)
45–64	n = 12840	1.6	(1.3–1.9)	1.6	(1.2–2.1)	0.8	(0.6–1.1)
≥65	n = 8205	0.3	(0.2–0.5)	1.0	(0.6–1.7)	0.2	(0.1–0.4)
Education							
<High school	n = 7849	1.4	(1.0–1.9)	1.4	(1.0–2.0)	1.1	(0.7–1.6)
High school	n = 12547	1.4	(1.1–1.7)	1.2	(0.9–1.5)	0.9	(0.7–1.2)
College	n = 22697	1.3	(1.1–1.6)	1.0	(1.0–1.0)	1.0	(1.0–1.0)
Individual income (\$)							
0–19000	n = 21075	1.5	(1.2–1.8)	1.0	(1.0–1.0)	1.0	(1.0–1.0)
20–34000	n = 9999	1.5	(1.2–1.9)	0.8	(0.6–1.1)	1.1	(0.8–1.6)
35–64000	n = 9031	1.1	(0.8–1.5)	0.6	(0.4–0.8)	1.0	(0.7–1.4)
>70000	n = 2988	1.0	(0.6–1.5)	0.6	(0.4–1.0)	1.2	(0.7–1.9)
Marital status							
Married	n = 22081	1.3	(1.1–1.5)	1.0	(1.0–1.0)	1.0	(1.0–1.0)
Widowed	n = 11117	1.5	(1.2–1.9)	1.1	(0.8–1.4)	1.2	(0.9–1.6)
Never married	n = 9895	1.5	(1.2–2.0)	0.8	(0.5–1.0)	1.2	(0.9–1.6)

CI, Confidence interval.

The sample sizes in the second column provide denominators for the prevalence of co-morbid social anxiety disorder (SAD)/alcohol dependence by sociodemographic group, but not for the two odds ratio (OR) columns.

Table 2. Prevalence and odds ratios (ORs) of lifetime DSM-IV disorders among respondents with co-morbid social anxiety disorder (SAD) and alcohol dependence

Associated psychiatric disorders	Neither SAD nor AUD (<i>n</i> = 30176)		Co-morbid SAD and alcohol dependence (<i>n</i> = 487)		Alcohol dependence, ORs associated with co-morbid SAD		SAD, ORs associated with co-morbid alcohol dependence	
	%	95% CI	%	95% CI	aOR ^a	95% CI	aOR	95% CI
Any psychiatric disorder ^b	30.7	(29.5–31.9)	97.0	(94.6–98.3)	8.0	(4.3–15.1)	7.1	(3.8–13.3)
Any Axis I disorder ^c	27.2	(26.0–28.4)	93.9	(90.7–96.0)	4.4	(2.8–7.0)	5.1	(3.2–8.2)
Any drug use disorder	2.8	(2.5–3.1)	45.7	(39.9–51.6)	1.3	(1.0–1.7)	4.4	(3.2–6.1)
Drug abuse disorder	2.4	(2.1–2.6)	19.5	(15.6–24.1)	0.7	(0.5–0.9)	1.7	(1.2–2.5)
Drug dependence disorder	0.4	(0.3–0.5)	26.2	(21.1–32.1)	2.4	(1.7–3.3)	7.9	(4.9–13.0)
Nicotine dependence disorder	9.6	(8.9–10.3)	59.2	(53.6–64.6)	1.5	(1.1–1.9)	4.7	(3.5–6.3)
Any mood disorder	13.2	(12.6–13.9)	64.1	(58.1–69.7)	3.5	(2.6–4.6)	2.0	(1.5–2.7)
Major depressive disorder	10.5	(9.9–11.1)	35.4	(30.5–40.7)	1.9	(1.4–2.4)	1.2	(0.9–1.5)
Dysthymia	2.3	(2.1–2.5)	12.9	(9.7–16.8)	2.0	(1.4–3.0)	1.3	(0.9–1.9)
Bipolar I disorder	1.5	(1.3–1.6)	21.9	(17.4–27.3)	3.1	(2.3–4.3)	2.2	(1.5–3.2)
Bipolar II disorder	0.7	(0.6–0.8)	5.8	(3.6–9.2)	2.1	(1.2–3.6)	2.2	(1.2–4.0)
Any anxiety disorder	10.7	(10.0–11.4)	63.1	(57.7–68.1)	4.9	(3.9–6.2)	1.7	(1.4–2.2)
Panic disorder	3.4	(3.1–3.6)	30.0	(25.5–34.8)	3.5	(2.6–4.6)	1.6	(1.2–2.1)
Specific phobia	6.7	(6.2–7.2)	46.0	(40.5–51.6)	4.7	(3.7–6.0)	1.7	(1.3–2.2)
Generalized anxiety disorder	2.5	(2.2–2.8)	27.3	(22.6–32.6)	4.7	(3.5–6.4)	1.3	(0.9–1.8)
Conduct disorder	0.8	(0.7–1.0)	0.8	(0.3–2.1)	0.5	(0.2–1.3)	0.2	(0.1–0.7)
Pathological gambling	0.1	(0.1–0.2)	1.4	(0.8–2.5)	0.9	(0.4–1.7)	3.2	(1.3–7.6)
Psychotic disorder	0.2	(0.2–0.3)	2.9	(1.4–6.3)	3.5	(1.3–9.2)	2.5	(1.0–6.8)
Any personality disorder	9.0	(8.5–9.6)	71.7	(66.6–76.3)	6.3	(4.8–8.2)	2.6	(2.0–3.4)
Avoidant	1.1	(0.9–1.2)	29.4	(24.5–34.8)	13.4	(9.5–18.8)	1.5	(1.1–2.1)
Dependant	0.3	(0.2–0.3)	5.6	(3.5–9.1)	7.7	(3.9–15.0)	1.1	(0.6–2.1)
Obsessive–compulsive	5.1	(4.7–5.5)	38.9	(33.9–44.2)	4.1	(3.2–5.3)	1.5	(1.1–1.9)
Paranoid	2.6	(2.3–2.8)	33.8	(28.5–39.5)	5.6	(4.3–7.4)	2.4	(1.8–3.3)
Schizoid	1.8	(1.6–2.0)	21.2	(17.3–25.7)	4.7	(3.5–6.3)	1.4	(1.0–1.9)
Histrionic	0.9	(0.8–1.0)	15.4	(11.9–19.6)	3.5	(2.5–5.0)	3.2	(2.0–5.0)
Antisocial	1.2	(1.0–1.3)	23.8	(19.5–28.7)	2.3	(1.7–3.2)	3.7	(2.5–5.6)

AUD, Alcohol use disorders; CI, confidence intervals; aOR, adjusted odds ratio.

^a These ORs are adjusted for sex, US born, income, marital status, education, race, age, urbanicity, and region.

^b Any psychiatric disorder includes any drug use disorder, nicotine dependence disorder, any mood disorder, panic disorder, specific phobia, generalized anxiety disorder, conduct disorder, pathological gambling and psychotic disorder.

^c Any Axis I disorder includes any drug use disorder, nicotine dependence disorder, any mood disorder, panic disorder, specific phobia, generalized anxiety disorder, conduct disorder, pathological gambling, psychotic disorder and any personality disorder.

Table 3. Age of onset, severity, family history, treatment-seeking and disability among respondents with alcohol dependence, social anxiety disorder (SAD) and co-morbid disorders

	SAD without AUD (<i>n</i> = 1074)		Co-morbid SAD and alcohol dependence (<i>n</i> = 487)		Alcohol dependence without SAD (<i>n</i> = 4294)	
	Mean	95% CI	Mean	95% CI	Mean	95% CI
Age of onset (SAD)	15.7	(14.8–16.6)	14.3	(13.2–15.4)		
Age of onset (AUD)			21.7	(20.9–22.5)	21.1	(20.8–21.4)
No. of social fears	7.2	(6.9–7.4)	7.1	(6.7–7.5)		
No. of scrutiny fears	4.7	(4.5–4.8)	4.5	(4.3–4.8)		
No. of AUD abuse criteria			2.0	(1.9–2.1)	1.8	(1.8–1.9)
No. of AUD dependence criteria			4.7	(4.5–4.8)	4.3	(4.2–4.4)
SF-12 subscales ^a						
Social functioning scale	45.2	(44.1–46.3)	41.4	(37.2–45.6)	49.8	(49.2–50.5)
Role emotional scale	44.9	(43.8–46.0)	41.5	(38.1–44.8)	48.7	(47.9–49.4)
Mental health scale	44.0	(43.1–44.9)	41.2	(37.0–45.5)	47.9	(47.2–48.6)
Family history of AUD (%)	43.6	(40.3–47.1)	64.6	(59.3–69.5)	52.4	(50.5–54.3)
Treatment sought for SAD (%)	17.5	(14.8–20.6)	23.8	(19.5–28.8)		
Treatment sought for AUD (%)			25.7	(21.5–30.5)	24.0	(22.5–25.5)

CI, Confidence intervals.

^a SF-12 Subscale data are reported for 12-month samples: SAD without alcohol use disorders (AUD) (*n* = 999); co-morbid SAD and alcohol dependence (*n* = 88); alcohol dependence (*n* = 1484).

abuse. Family history of AUD was more prevalent among individuals with co-morbid SAD and alcohol dependence compared with those with either disorder alone. SF-12 scores for social functioning, role emotional and mental health scales were worse among individuals with co-morbid alcohol dependence and SAD, or with SAD alone, compared with individuals with alcohol dependence alone, but there were no significant differences between those with SAD alone and those with co-morbid alcohol dependence and SAD. Rates of treatment-seeking for either disorder were not significantly affected by co-morbidity with the other.

When alcohol abuse was examined separately, and SAD subtypes were examined separately, patterns of association with SAD severity remained non-significant. Individuals with either subtype of SAD co-morbid with alcohol abuse had higher rates of family history of AUD than those with the respective SAD subtype alone or alcohol abuse alone. Measures of disability and treatment rates for alcohol abuse and SAD subtypes followed the same pattern as for alcohol dependence and SAD, and 12 month cases followed the same pattern as lifetime.

Discussion

This epidemiological study examined demographic and clinical correlates, co-morbidity, disability and treatment-seeking patterns of individuals with

co-morbid SAD and AUD. We found that: (1) co-morbid AUD (dependence or abuse) and SAD is a prevalent dual diagnosis that is associated with increased co-morbidity with other psychiatric disorders; (2) SAD is associated with increased alcohol dependence (and weakly, with alcohol abuse); (3) in persons with alcohol dependence, SAD is associated with increased family history of AUD and severity of AUD, impairment and co-morbidity; (4) treatment rates are low for SAD and AUD, whether occurring together or separately.

Consistent with prior studies documenting high rates of SAD among AUD patients and high rates of AUD among SAD patients, we found that co-morbid SAD and AUD had a lifetime prevalence of 2.4%. The finding that co-morbid SAD is associated with alcohol dependence, in particular, increased severity of dependence, and increased impairment relative to alcohol dependence or abuse alone is consistent with findings from clinical samples (Thomas *et al.* 1999). Unlike some other reports from community and clinical samples (e.g. Schneier *et al.* 1989; Buckner *et al.* 2008*b,c*), the co-morbid condition was not associated with greater severity of SAD, scrutiny fears or impairment relative to SAD alone. This may be due to different approaches to the assessment of severity and impairment. Separate analyses of alcohol abuse showed some sociodemographic differences from findings for dependence but, generally, analyses of alcohol abuse and subtypes of SAD did not yield

consistent qualitative differences from the findings for alcohol dependence and SAD overall.

Sociodemographic correlates of co-morbid alcohol dependence and SAD were intermediate to those of each disorder; but patterns of additional co-morbidity associated with the combined condition appear to be the sum of co-morbidity separately associated with alcohol dependence and SAD. Among persons with SAD, co-morbid alcohol dependence was particularly associated with increased co-morbidity of drug and nicotine dependence, pathological gambling and histrionic and antisocial personality disorders. Among persons with alcohol dependence, co-morbid SAD was most strongly associated with mood disorders, other anxiety disorders and dependent and avoidant personality disorders. The high co-morbidity with avoidant personality disorder is likely due in part to the substantial overlap in its diagnostic criteria with those of SAD (Chambless *et al.* 2008). While co-morbid SAD conferred a broad increase in psychiatric co-morbidity, it was associated with decreased rates of externalizing disorders such as conduct disorder, pathological gambling and drug abuse, suggesting that SAD may be an indicator of protective factors in respect of externalizing disorders among persons with alcohol dependence. Alcohol abuse was generally associated with lower rates of co-morbidity, compared with alcohol dependence.

In current models of the structure of common mental disorders, SAD is generally conceptualized as an internalizing disorder, shown to have greatest co-morbidity with other internalizing disorders (i.e. mood and anxiety disorders and avoidant personality disorder). AUD are considered externalizing disorders, having the strongest association with other externalizing disorders, such as other substance use disorders and antisocial personality disorder (Krueger, 1999; Vollebergh *et al.* 2001; Kendler *et al.* 2003). However, the clinical presentation of co-morbid AUD and SAD includes features of internalizing and externalizing disorders and does not resemble the clinical fingerprint of either AUD or SAD alone. Our findings suggest that externalizing and internalizing features can exist in tandem and thus should not be conceptualized as opposites on a spectrum. This is consistent with recent findings that a subset of persons with SAD paradoxically evidence risk-prone behavior (Kashdan *et al.* 2009).

The present study replicates previous findings that SAD precedes and increases risk for AUD (Schneier *et al.* 1989; Merikangas *et al.* 1998; Crum & Pratt, 2001; Zimmermann *et al.* 2003; Buckner *et al.* 2008b), supporting the hypothesis of a directional etiological link from SAD to alcohol dependence and abuse. On the other hand, co-morbid SAD did not appear to

accelerate the onset of either alcohol dependence or abuse, which has also been noted previously (Buckner *et al.* 2008b) and the co-morbid condition was not associated with a greater number of social fears. The true relationship between these disorders is undoubtedly more complex.

Animal studies have shown that stress and substance use disorders share common circuitry and the potentiating effect of corticotropin-releasing factor on mesolimbic dopaminergic reward pathways (Piazza and Le Moal, 1998), suggesting that stress may reinforce the addictive properties of substances of abuse. Human studies have documented that alcohol can play an anxiolytic role by interfering with appraisal of stressful information (Sayette *et al.* 2001), attenuating anxiety reactions during the stressor (Kushner *et al.* 2000; Thomas *et al.* 2003; Dai *et al.* 2007) and interfering with the consolidation of memories related to stressful events (Gerlach *et al.* 2006). The current finding that individuals with AUD (dependence or abuse) and SAD have greater prevalence of familial AUD than individuals with either AUD alone is consistent with previous findings suggesting the offspring of alcoholics differ from controls with regard to HPA-axis hormonal response to subjective psychological stress (Uhart *et al.* 2006; Dai *et al.* 2007). However, though alcohol is a short-term anxiolytic, it is also disinhibiting, which may release the excess inhibition present in SAD and increase the risk of traumatic or anxiety-inducing social interactions (Brady *et al.* 2007). The amnesic effects of alcohol may contribute to the persistence of social anxiety by impairing extinction of fear response and possibly interfering with desensitization (Cameron *et al.* 1987). Furthermore, alcohol withdrawal is anxiogenic in the setting of autonomic hyperactivation (Johnston *et al.* 1991; Duka *et al.* 2002). The etiology of joint AUD and SAD may therefore be heterogeneous, multi-factorial and bidirectional.

Despite the finding that co-morbid AUD (dependence or abuse) and SAD was more impairing than either AUD alone, and the known tendency for co-morbid cases in general to be more likely to receive treatment, the majority of respondents with co-morbid AUD and SAD did not receive treatment for either disorder. The current findings are consistent with data from previous epidemiological studies (Olfson *et al.* 2000; Wang *et al.* 2005; Cohen *et al.* 2007) and suggest that efforts to increase treatment rates for AUD and SAD represent an important opportunity for improving quality of care in this population with joint co-morbidity. Earlier onset of SAD than of AUD and expectations of individuals with SAD that alcohol will alleviate anxiety symptoms (Ham *et al.* 2007) suggests that psychoeducation and treatment for SAD, especially in the presence of family history of AUD, may

prevent a subset of cases of AUD. Efforts to identify and target at-risk populations may have greater impact during adolescence, around the time of SAD onset (Grant *et al.* 2005), especially given evidence that alcohol exposure during adolescence may result in structural brain changes and dysregulation of drinking later in life (Chambers *et al.* 2003; Dawson *et al.* 2007).

Several factors may contribute to the cumulatively poor treatment rates of co-morbid AUD (dependence or abuse) and SAD, including the low rates of treatment-seeking associated with each disorder. SAD patients may be reluctant to seek treatment due to avoidance of interaction with authority figures or embarrassment about their symptoms (Olsson *et al.* 2000). AUD patients may avoid treatment due to stigma or low perceived need (Brady *et al.* 2007). The unique clinical presentation of SAD and AUD in combination may also present a diagnostic challenge contributing to low treatment rates. Clinicians whose primary focus lies in anxiety or AUD may identify and treat the disorder most familiar to them, but fail to identify or be less familiar with treatments for the other disorder.

Lack of an evidence-based treatment model for co-morbid SAD and AUD constitutes another major obstacle to effective care of this population. Use of benzodiazepines, SSRIs or monoamine oxidase inhibitors, the medications with strongest empirical support for the treatment of SAD (Blanco *et al.* 2003), require caution due to concerns about potential risk of addiction (Blanco *et al.* 2002), increased risk of relapse to alcohol (Chick *et al.* 2004) and dietary restrictions, respectively (Balon *et al.* 1999). Popular group treatment approaches to AUD, such as Alcoholic Anonymous, present specific social obstacles for persons with co-morbid SAD (Book *et al.* 2009).

To date, there has been a dearth of research and treatment-development efforts to meet specific needs of individuals with co-morbid AUD and SAD, possibly due to the focus of most research and treatment programmes on pure rather than co-morbid disorders or to the assumption that treatments efficacious for a pure disorder work in the presence of co-morbidity (Randall *et al.* 2001). Data from this study suggest the need to accelerate our understanding of this large population to improve their outcome. At present, there are no empirically supported integrated cognitive behavioral therapy (CBT) models for the joint treatment of SAD and alcohol dependence or abuse. A study comparing CBT for the combined treatment of AUD and SAD *versus* CBT for AUD alone resulted in worse outcomes for the combined CBT, indicating the difficulty of developing such approaches (Randall *et al.* 2001). Although there is some agreement about important elements in the treatment of co-morbidity,

empirical support for the superiority of an integrated treatment *versus* separate or sequential treatments of the two disorders is lacking (Watkins *et al.* 2004). Our group is currently developing alternative CBT models to treat joint AUD and SAD co-morbidity, based on an integration of cognitive behavioral and motivational enhancement strategies, and preliminary data are encouraging (Buckner *et al.* 2008a).

This study shares limitations common to most large epidemiological studies. Because the NESARC sample only included civilian households and group-living populations aged >18 years, information was unavailable on adolescents or individuals in prison. The cross-sectional design does not permit us to establish directionality between symptoms of social anxiety and use of alcohol, or between lifetime disorders and current impairment in functioning. Some covariates in our analyses may be causes, correlates or consequences of other variables in this model, including the outcome variable. Mental health treatment results, because they rely on respondent linkage to specific disorders, may underestimate the proportion of affected individuals who received mental health care for disorders other than SAD or AUD.

Our study details the impact of co-morbid AUD and SAD. Co-morbid AUD (dependence or abuse) and SAD are highly prevalent for a dual diagnosis, more disabling than AUD alone, and largely untreated. Treatment and preventive interventions are needed to decrease the public health burden and the suffering of these individuals.

Acknowledgements

The National Epidemiologic Survey on Alcohol and Related Conditions was sponsored by the National Institute on Alcohol Abuse and Alcoholism and funded, in part, by the Intramural Program, NIAAA, National Institutes of Health. This study is supported by NIH grants DA019606, DA020783, DA023200 and MH076051 (Dr Blanco), AA08159 and AA00161 (Dr Hasin), the American Foundation for Suicide Prevention (Dr Blanco) and the New York State Psychiatric Institute (Drs Foose, Hasin, Schneier and Blanco). The views and opinions expressed in this report are those of the authors and should not be construed to represent the views of any of the sponsoring organizations, agencies or the US government.

Declaration of Interest

None.

References

- Bakken K, Landheim AS, Vaglum P** (2005). Substance-dependent patients with and without social anxiety disorder: occurrence and clinical differences. A study of a consecutive sample of alcohol-dependent and poly-substance-dependent patients treated in two counties in Norway. *Drug and Alcohol Dependence* **80**, 321–328.
- Balon R, Mufti R, Arfken CL** (1999). A survey of prescribing practices for monoamine oxidase inhibitors. *Psychiatric Services* **50**, 945–947.
- Blanco C, Antia SX, Liebowitz MR** (2002). Pharmacotherapy of social anxiety disorder. *Biological Psychiatry* **51**, 109–120.
- Blanco C, Schneier FR, Schmidt A, Blanco-Jerez CR, Marshall RD, Sanchez-Lacay A, Liebowitz MR** (2003). Pharmacological treatment of social anxiety disorder: a meta-analysis. *Depression and Anxiety* **18**, 29–40.
- Book SW, Thomas SE, Dempsey JP, Randall PK, Randall CL** (2009). Social anxiety impacts willingness to participate in addictions treatment. *Addictive Behaviors* **34**, 474–476.
- Book SW, Thomas SE, Randall PK, Randall CL** (2008). Paroxetine reduces social anxiety in individuals with a co-occurring alcohol use disorder. *Journal of Anxiety Disorders* **22**, 310–318.
- Brady KT, Tolliver BK, Verduin ML** (2007). Alcohol use and anxiety: diagnostic and management issues. *American Journal of Psychiatry* **164**, 217–221; quiz 372.
- Buckner JD, Ledley DR, Heimberg RG, Schmidt NB** (2008a). Treating comorbid social anxiety and alcohol use disorders: Combining motivation enhancement therapy with cognitive-behavioral therapy. *Clinical Case Studies* **7**, 208–223.
- Buckner JD, Schmidt NB, Lang AR, Small J, Schlauch RC, Lewinsohn PM** (2008b). Specificity of social anxiety disorder as a risk factor for alcohol and cannabis dependence. *Journal of Psychiatric Research* **42**, 230–239.
- Buckner JD, Timpano KR, Zvolensky MJ, Sachs-Ericsson N, Schmidt NB** (2008c). Implications of comorbid alcohol dependence among individuals with social anxiety disorder. *Depression and Anxiety* **25**, 1028–1037.
- Burns L, Teesson M** (2002). Alcohol use disorders comorbid with anxiety, depression and drug use disorders. Findings from the Australian National Survey of Mental Health and Well Being. *Drug and Alcohol Dependence* **68**, 299–307.
- Cameron OG, Liepman MR, Curtis GC, Thyer BA** (1987). Ethanol retards desensitisation of simple phobias in non-alcoholics. *British Journal of Psychiatry* **150**, 845–849.
- Chambers RA, Taylor JR, Potenza MN** (2003). Developmental neurocircuitry of motivation in adolescence: a critical period of addiction vulnerability. *American Journal of Psychiatry* **160**, 1041–1152.
- Chambless DL, Fydrich T, Rodebaugh TL** (2008). Generalized social phobia and avoidant personality disorder: meaningful distinction or useless duplication? *Depression and Anxiety* **25**, 8–19.
- Chick J, Aschauer H, Hornik K** (2004). Efficacy of fluvoxamine in preventing relapse in alcohol dependence: a one-year, double-blind, placebo-controlled multicentre study with analysis by typology. *Drug and Alcohol Dependence* **74**, 61–70.
- Cohen E, Feinn R, Arias A, Kranzler HR** (2007). Alcohol treatment utilization: findings from the National Epidemiologic Survey on Alcohol and Related Conditions. *Drug and Alcohol Dependence* **86**, 214–221.
- Compton WM, Thomas YF, Stinson FS, Grant BF** (2007). Prevalence, correlates, disability, and comorbidity of DSM-IV drug abuse and dependence in the United States: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Archives of General Psychiatry* **64**, 566–576.
- Crum RM, Pratt LA** (2001). Risk of heavy drinking and alcohol use disorders in social phobia: a prospective analysis. *American Journal of Psychiatry* **158**, 1693–1700.
- Dai X, Thavundayil J, Santella S, Gianoulakis C** (2007). Response of the HPA-axis to alcohol and stress as a function of alcohol dependence and family history of alcoholism. *Psychoneuroendocrinology* **32**, 293–305.
- Dawson DA, Grant BF, Li TK** (2007). Impact of age at first drink on stress-reactive drinking. *Alcoholism, Clinical and Experimental Research* **31**, 69–77.
- Duka T, Townshend JM, Collier K, Stephens DN** (2002). Kindling of withdrawal: a study of craving and anxiety after multiple detoxifications in alcoholic inpatients. *Alcoholism, Clinical and Experimental Research* **26**, 785–795.
- Gandek B, Ware Jr. JE, Aaronson NK, Alonso J, Apolone G, Bjorner J, Brazier J, Bullinger M, Fukuhara S, Kaasa S, Leplege A, Sullivan M** (1998). Tests of data quality, scaling assumptions, and reliability of the SF-36 in eleven countries: results from the IQOLA Project. International Quality of Life Assessment. *Journal of Clinical Epidemiology* **51**, 1149–1158.
- Gerlach AL, Schiller A, Wild C, Rist F** (2006). Effects of alcohol on the processing of social threat-related stimuli in socially phobic women. *British Journal of Clinical Psychology* **45**, 279–295.
- Grant BF, Dawson DA, Hasin DS** (2001). *The Alcohol Use Disorder and Associated Disabilities Schedule-DSM-IV Version*. National Institute on Alcohol Abuse and Alcoholism: Bethesda, MD.
- Grant BF, Dawson DA, Stinson FS, Chou PS, Kay W, Pickering R** (2003). The Alcohol Use Disorder and Associated Disabilities Interview Schedule-IV (AUDADIS-IV): reliability of alcohol consumption, tobacco use, family history of depression and psychiatric diagnostic modules in a general population sample. *Drug and Alcohol Dependence* **71**, 7–16.
- Grant BF, Hasin DS, Blanco C, Stinson FS, Chou SP, Goldstein RB, Dawson DA, Smith S, Saha TD, Huang B** (2005). The epidemiology of social anxiety disorder in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Journal of Clinical Psychiatry* **66**, 1351–1361.
- Grant BF, Moore T, Shepard J, Kaplan K** (2003). *Source and Accuracy Statement: Wave I National Epidemiologic Survey on Alcohol and Related Conditions (NESARC)*. National Institute on Alcohol Abuse and Alcoholism: Bethesda, MD.
- Ham LS, Bonin M, Hope DA** (2007). The role of drinking motives in social anxiety and alcohol use. *Journal of Anxiety Disorders* **21**, 991–1003.

- Hasin DS, Liu X, Alderson D, Grant BF** (2006). DSM-IV alcohol dependence: a categorical or dimensional phenotype? *Psychological Medicine* **36**, 1695–1705.
- Hasin DS, Stinson FS, Ogburn E, Grant BF** (2007). Prevalence, correlates, disability, and comorbidity of DSM-IV alcohol abuse and dependence in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Archives of General Psychiatry* **64**, 830–842.
- Johnston AL, Thevos AK, Randall CL, Anton RF** (1991). Increased severity of alcohol withdrawal in in-patient alcoholics with a co-existing anxiety diagnosis. *British Journal of Addictions* **86**, 719–725.
- Kashdan TB, McKnight PE, Richey JA, Hofmann SG** (2009). When social anxiety disorder co-exists with risk-prone, approach behavior: investigating a neglected, meaningful subset of people in the National Comorbidity Survey-Replication. *Behaviour Research and Therapy* **47**, 559–568.
- Kendler KS, Prescott CA, Myers J, Neale MC** (2003). The structure of genetic and environmental risk factors for common psychiatric and substance use disorders in men and women. *Archives of General Psychiatry* **60**, 929–937.
- Kessler RC** (2003). The impairments caused by social phobia in the general population: implications for intervention. *Acta Psychiatrica Scandinavica* (Suppl.), 19–27.
- Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE** (2005a). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry* **62**, 593–602.
- Kessler RC, Chiu WT, Demler O, Merikangas KR, Walters EE** (2005b). Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry* **62**, 617–627.
- Krueger RF** (1999). The structure of common mental disorders. *Archives of General Psychiatry* **56**, 921–926.
- Kushner MG, Abrams K, Borchardt C** (2000). The relationship between anxiety disorders and alcohol use disorders: a review of major perspectives and findings. *Acta Psychiatrica Scandinavica* **20**, 149–171.
- Kushner MG, Abrams K, Thuras P, Hanson KL, Brekke M, Sletten S** (2005). Follow-up study of anxiety disorder and alcohol dependence in comorbid alcoholism treatment patients. *Alcoholism, Clinical and Experimental Research* **29**, 1432–1443.
- Leclercq Y** (1998). Comorbidity in social anxiety disorder: impact on disease burden and management. *Journal of Clinical Psychiatry* **59** (Suppl.), S33–S38.
- Leclercq Y, Weiller E** (1997). Comorbidities in social phobia. *International clinical psychopharmacology* **12** (Suppl.), S17–S21.
- Lepine JP, Pelissolo A** (1998). Social phobia and alcoholism: a complex relationship. *Journal of Affective Disorders* **50** (Suppl.), S23–S28.
- Merikangas KR, Stevens DE, Fenton B, Stolar M, O'Malley S, Woods SW, Risch N** (1998). Co-morbidity and familial aggregation of alcoholism and anxiety disorders. *Psychological Medicine* **28**, 773–788.
- Moggi F, Ouimette PC, Moos RH, Finney JW** (1999). Dual diagnosis patients in substance abuse treatment: relationship of general coping and substance-specific coping to 1-year outcomes. *Addiction* **94**, 1805–1816.
- Olfson M, Guardino M, Struening E, Schneier FR, Hellman F, Klein DF** (2000). Barriers to the treatment of social anxiety. *American Journal of Psychiatry* **157**, 521–527.
- Piazza PV, Le Moal M** (1998). The role of stress in drug self-administration. *Trends in Pharmacological Sciences* **19**, 67–74.
- Randall CL, Thomas S, Thevos AK** (2001). Concurrent alcoholism and social anxiety disorder: a first step toward developing effective treatments. *Alcoholism, Clinical and Experimental Research* **25**, 210–220.
- Ruscio AM, Brown TA, Chiu WT, Sareen J, Stein MB, Kessler RC** (2008). Social fears and social phobia in the USA: results from the National Comorbidity Survey Replication. *Psychological Medicine* **38**, 15–28.
- Sayette MA, Martin CS, Perrott MA, Wertz JM, Hufford MR** (2001). A test of the appraisal-disruption model of alcohol and stress. *Journal of Studies on Alcohol* **62**, 247–256.
- Schneider U, Altmann A, Baumann M, Bernzen J, Bertz B, Bimber U, Broese T, Broocks A, Burtscheidt W, Cimander KF, Degkwitz P, Driessen M, Ehrenreich H, Fischbach E, Folkerts H, Frank H, Gurth D, Havemann-Reinecke U, Heber W, Heuer J, Hingsammer A, Jacobs S, Krampe H, Lange W, Lay T, Leimbach M, Lemke MR, Leweke M, Mangholz A, Massing W, Meyenberg R, Porzig J, Quattert T, Redner C, Ritzel G, Rollnik JD, Sauvageoll R, Schlafke D, Schmid G, Schroder H, Schwichtenberg U, Schwoon D, Seifert J, Sickelmann I, Sieveking CF, Spiess C, Stiegemann HH, Stracke R, Straetgen HD, Subkowski P, Thomasius R, Tretzel H, Verner LJ, Vitens J, Wagner T, Weirich S, Weiss I, Wendorff T, Wetterling T, Wiese B, Wittfoot J** (2001). Comorbid anxiety and affective disorder in alcohol-dependent patients seeking treatment: the first Multicentre Study in Germany. *Alcohol and Alcoholism* **36**, 219–223.
- Schneier FR, Martin LY, Liebowitz MR, Gorman JM, Fyer AJ** (1989). Alcohol abuse in social phobia. *Journal of Anxiety Disorders* **3**, 15–23.
- Terra MB, Barros HM, Stein AT, Figueira I, Jorge MR, Palermo LH, Athayde LD, Goncalves MS, Spanemberg L, Possa MA, Daruy Filho L, Da Silveira DX** (2006). Social anxiety disorder in 300 patients hospitalized for alcoholism in Brazil: high prevalence and undertreatment. *Comprehensive Psychiatry* **47**, 463–467.
- Thomas SE, Randall CL, Carrigan MH** (2003). Drinking to cope in socially anxious individuals: a controlled study. *Alcoholism, Clinical and Experimental Research* **27**, 1937–1943.
- Thomas SE, Thevos AK, Randall CL** (1999). Alcoholics with and without social phobia: a comparison of substance use and psychiatric variables. *Journal of Studies on Alcohol* **60**, 472–479.
- Uhart M, Oswald L, McCaul ME, Chong R, Wand GS** (2006). Hormonal responses to psychological stress and family

history of alcoholism. *Neuropsychopharmacology* **31**, 2255–2263.

Vollebergh WA, Iedema J, Bijl RV, de Graaf R, Smit F, Ormel J (2001). The structure and stability of common mental disorders: the NEMESIS study. *Archives of General Psychiatry* **58**, 597–603.

Wang PS, Lane M, Olfson M, Pincus HA, Wells KB, Kessler RC (2005). Twelve-month use of mental health services in the United States: results from the National Comorbidity Survey Replication. *Archives of General Psychiatry* **62**, 629–640.

Watkins KE, Hunter SB, Wenzel SL, Tu W, Paddock SM, Griffin A, Ebener P (2004). Prevalence and characteristics of clients with co-occurring disorders in outpatient substance abuse treatment. *American Journal of Drug and Alcohol Abuse* **30**, 749–764.

Zimmermann P, Wittchen HU, Hofler M, Pfister H, Kessler RC, Lieb R (2003). Primary anxiety disorders and the development of subsequent alcohol use disorders: a 4-year community study of adolescents and young adults. *Psychological Medicine* **33**, 1211–1222.