Anxiety disorders and substance use disorders: Different associations by anxiety disorder

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Abstract

Anxiety disorders (ADs) and substance use disorders (SUDs) often occur together, but the strength of this association and their apparent order of onset differ across studies. The goals of this study were to examine: (1) which ADs were associated with which SUDs, and (2) among people who experienced both an AD and a SUD, which disorder had an earlier onset. Lifetime diagnoses from the National Comorbidity Survey-Replication (*n*=9,282) were used. Social phobia, generalized anxiety disorder, panic disorder, and agoraphobia were positively associated with all SUDs. Among people with both an AD and a SUD, the order of onset differed by anxiety type: social phobia nearly always had an onset prior to any SUD; panic disorder and agoraphobia tended to occur prior to some SUDs; and generalized anxiety disorder tended to occur after the onset of at least one SUD. Therefore, all ADs are positively associated with SUDs, but ADs differ in the timing of their onset relative to comorbid SUDs.

Keywords

Social phobia; generalized anxiety disorder; panic disorder; agoraphobia; substance use disorders; comorbidity

1. Introduction

Anxiety disorders (ADs) and substance use disorders (SUDs) often occur together (e.g., Conway Compton, Stinson, & Grant, 2006; Goodwin, Fergusson, & Horwood, 2004; Kessler et al., 1996; Sareen et al., 2004), but evidence is mixed regarding the strength of this association and the order of onset (i.e., among individuals with both disorders, it is unclear which disorder tends to have an earlier onset). The purpose of this study was to examine (1) overall associations between ADs and SUDs and (2) the order of onset among people with both types of disorders, with a focus on potential differences by type of AD.

In community-based samples, there is evidence for both ADs increasing risk for SUDs (e.g., Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Kessler et al., 1996; Kushner, Sher, & Erickson, 1999; Merikangas et al., 1998; Swendsen, Merikangas, Canino, Kessler, Rubio-Stipec, & Angst, 1998; Woodward & Fergusson, 2001) and SUDs increasing risk for ADs (e.g., Kushner et al., 1999; Swendsen et al., 1998; also see reviews by Kushner, Abrams, &

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Borchardt, 2000; Morris, Stewart, & Ham, 2005; and Schuckit & Hesselbrock, 1994). Part of the increased risk for later SUDs among people with ADs, as well as for the development of social phobia among people with earlier SUDs, may be attributable to using substances for self-medication of anxiety symptoms (Robinson, Sareen, Cox, & Bolton, 2011). Overall, ADs appear to occur earlier (e.g., Costello et al., 2003; Kessler et al., 1996; Merikangas et al., 1998; Schuckit & Hesselbrock, 1994), though this order of onset might differ for different types of ADs (e.g., Falk, Yi, & Hilton, 2008; see below for a discussion of this possibility).

Although most research on associations between ADs and SUDs indicates that they are positively related, some contradictory evidence exists. In some cases, this may be due to the age of the sample. For example, one study found that ADs were unrelated to risk for SUDs occurring up to mid-adolescence (Costello, Erkanli, Federman, & Angold, 1999). Adding to the possibility that ADs may be protective for some people or situations, a recent study reported that among people with externalizing disorders, the presence of an AD is associated with reduced risk for SUDs (Hofmann, Richey, Kashdan, & McKnight, 2009).

Associations between ADs and SUDs may also differ depending on the type of anxiety. For example, some people with social phobia may be so withdrawn that access to substances is reduced; that is, if people with social phobia are not spending time with substance-using peer groups in adolescence and early adulthood, they may escape peer influences that reinforce substance use. Conversely, panic disorder may increase the desire for self-medication with depressant substances due to the extremely uncomfortable nature of panic attacks. Unfortunately, research directly examining the relationship between different types of ADs and SUDs has been inconsistent and limited by the fact that many studies examine combined AD diagnoses and not each individual diagnosis separately. However, one study of adults reported stronger associations with SUDs for phobias than for panic disorder (Swendsen et al., 1998). In contrast, a study of adolescents and young adults found strong associations for panic disorder and significant, though weaker, associations for phobias and no significant association for generalized anxiety disorder (Zimmermann, Wittchen, Hofler, Pfister, Kessler, & Lieb, 2003). Although research supports a positive association between social anxiety disorder and alcohol dependence among adults (Buckner, Zvolensky, Sachs-Ericsson, & Schmidt, 2008), among young people social anxiety may be protective: one study found that anxiety/withdrawal (a dimensional scale defined as behaviors associated with an anxious and fearful interpersonal style) in early adolescence was protective against the development of alcohol dependence in early adulthood (Pardini, White, & Stouthamer-Loeber, 2007).

Type of anxiety may also influence the order of onset of ADs and SUDs. In descriptive analyses, Glantz et al. (2009) reported that most cases of social phobia began before alcohol or drug dependence, whereas approximately half of the cases of generalized anxiety disorder, panic disorder, and agoraphobia occurred prior to the onset of substance dependence. Consistent with this, Swendsen et al. (1998) reported that phobias tended to occur prior to SUDs. Falk, Yi, and Hilton (2008) reported that alcohol abuse and dependence tended to occur prior to generalized anxiety disorder and panic disorder (but not social phobia). Consistent with this finding, Swendsen et al. (1998) found that panic disorder tended to occur after the onset of SUDs, and Kushner et al. (1999) found that ADs were predicted by SUDs in a sample in which generalized anxiety disorder was the most common AD. Thus, although the literature to date is sparse, it seems likely that social phobia tends to have an onset prior to SUDs, while generalized anxiety disorder and panic disorder may occur after the onset of SUDs.

It is not clear whether the mean age of onset of ADs or SUDs differs for people with and without comorbid disorder(s) of the other type. Although not directly addressing the issue of causality, if ages of onset do differ that would imply that the processes involved in the development of the disorders differ for people with and without comorbid disorders of the other type. Alternatively, if the ages of onset are similar for those with and without this comorbidity, that would imply that age-of-onset patterns are more related to overall developmental patterns. For example, social phobia tends to start in early adolescence, while SUDs tend to have later onsets, making a social phobia-precedes-SUD pattern likely regardless of whether social phobia affects risk for SUDs. However, if the average age of onset of SUDs is earlier among people who also have social phobia than those without social phobia, that would imply that the presence of social phobia is indicative of risk for early SUDs (perhaps due to the social phobia itself, or perhaps due to another factor that is associated with the presence of social phobia). Thus, this question indirectly addresses the issue of whether these developmental patterns (which disorder tends to occur first) are related simply to differences in the typical ages of onset of disorders or whether one disorder —or something closely associated with it—may increase risk for the other disorder.

In order to comprehensively examine associations between specific ADs and SUDs in a community-based sample, this study examined: (1) lifetime associations between specific ADs and SUDs; (2) the order of onset among people with both types of disorders, with a focus on potential differences by type of AD; and (3) whether the average age of onset of each disorder varied based on the presence or absence of a comorbid disorder of the other type. Using the National Comorbidity Survey-Replication (NCS-R) sample, we examined four different ADs: social phobia, generalized anxiety disorder, panic disorder, and agoraphobia. These ADs were examined in relation to the following types of SUDs: alcohol abuse, alcohol dependence, drug abuse (any illicit drug), drug dependence (any illicit drug), and any SUD (alcohol abuse, alcohol dependence, drug abuse, or drug dependence).

Based on the literature described above, we examined the following hypotheses. We expected all ADs to be significantly positively associated with all SUDs, though based on previous research we expected the association between social phobia and SUDs to be relatively weaker than those for other ADs. We predicted that social phobia would tend to occur prior to all SUDs. We also expected that agoraphobia would tend to occur prior to SUDs, while generalized anxiety disorder and panic disorder might occur after SUDs, although these hypotheses were considered tentative due to the sparse evidence on these disorders. We did not make specific predictions regarding whether mean ages of onset would differ for those with and without comorbidity due to the exploratory nature of these analyses, though if differences were found we expected them to be in the direction of younger ages of onset among people with comorbidity of the opposite type (due to the likelihood that that those with multiple disorders experience more severe pathology than those with a single disorder).

2. Methods

2.1 Participants

Participants from the National Comorbidity Survey-Replication (NCS-R), a cross-sectional sample of adults in the contiguous United States (*n*=9,282), were used. The sample is representative of English-speaking adult household residents, and the response rate was 70.9%. Informed consent was obtained, and the study was approved by the IRBs of Harvard Medical School and the University of Michigan.

The weighted percentages of participants completing the entire assessment (including part II, which all of these participants did) were: male=47%, female=53%; non-Hispanic

white=73%, non-Hispanic black=12%, Hispanic=11%, other=4%; education less than or equal to 12 years=49%, education at least 13 years=51%. Detailed information about the study design, sample, and assessment procedures can be found elsewhere (Kessler et al., 2004; Kessler and Ustun, 2004).

2.2 Measures

Diagnoses of ADs and SUDs were based on an in-person survey that was administered by trained, supervised interviewers using computer-assisted personal interview (CAPI) methods. The diagnoses were based on a modified version of the Composite International Diagnostic Interview (CIDI; World Health Organization; Kessler et al., 1998). Lifetime diagnoses were used in this study. Specific information about the assessment of each diagnosis is provided below.

2.2.1 ADs—Social phobia, generalized anxiety disorder, panic disorder, and agoraphobia were assessed according to DSM-IV diagnostic criteria. Prevalence rates, as well as the unweighted number of participants with each disorder, are reported in the top row of Table 1. Panic disorder with agoraphobia diagnoses were not included in this study due to low prevalence (1.4%).

2.2.2 SUDs—Alcohol abuse, alcohol dependence, drug abuse, and drug dependence were assessed according to DSM-IV criteria. Prevalence rates, as well as the unweighted number of participants with each disorder, are reported in the leftmost column of Table 1. Hierarchies were not applied; therefore, a participant who met criteria for dependence on a substance was still diagnosed with abuse of that substance if he or she met criteria for it. All illicit drugs were combined into the drug use disorder diagnoses. In addition, a composite variable representing the occurrence of any SUD (alcohol abuse, alcohol dependence, drug abuse, or drug dependence) was created.

2.2.3 Age and order of onset—When a participant reported experiencing any psychiatric diagnosis, he or she reported the at which age it first occurred (median ages of onset are presented in Table 2, and means and standard deviations of ages of onset among participants with different forms of comorbidity are presented in Tables 3 and 4). When a participant reported experiencing both an AD and a SUD, the ages of onset were examined and the age of onset pattern was categorized as "AD before SUD" (the AD onset occurring at an earlier age than the SUD onset) "AD concurrent with SUD" (the two disorders first occurred during the same year), or "AD after SUD" (the AD onset occurring at a later age than the SUD onset). For the order of onset analyses, the "AD concurrent with SUD" participants were eliminated from the sample due to the impossibility of determining which disorder occurred first.

Gender: As part of the interview, the respondent's gender was recorded.

2.3 Statistical Analyses

For all analyses, sample weights were applied to adjust for differential nonresponse, residual differences between the sample and the population, and differential probabilities of selection of respondents within households, as appropriate with the NCS-R data (Alegrai et al., 2001-2003). Participant gender was entered into all analyses in order to adjust for gender differences in the prevalence rates of the disorders.i

AD-SUD associations—First, we conducted a series of logistic regression analyses to examine overall associations between each AD and each SUD. Specifically, each SUD (along with a composite variable representing any SUD) was entered as the dependent

variable, and each AD was entered as the independent variable (along with gender, as noted above).

Order of onset—Next, we conducted two sets of analyses to examine the order of onset of each anxiety disorder and each SUD. First, the proportion of cases with each pair of disorders (e.g., social phobia and alcohol abuse; panic disorder and drug dependence) who experienced the anxiety disorder onset prior to the SUD onset was examined. To test the null hypothesis that approximately half of all comorbid cases would have each type of disorder first, *t*-tests were conducted comparing the proportion of cases with the anxiety disorder first to .5 (50%). For example, to test the null hypothesis that social phobia was equally likely to have an onset before or after alcohol abuse (i.e., among people with both disorders at some point in their lives, 50% would have social phobia first and 50% would have alcohol abuse first), we compared the proportion of cases who experienced social phobia first to .5. Participants who reported concurrent (in the same year) onsets were eliminated from these analyses due to the uncertainty of which disorder occurred first during that year (or whether they had simultaneous onsets). Second, to examine whether mean ages of onset differed for those with and without comorbid ADs (for SUDs) or SUDs (for ADs), we conducted regression analyses entering the presence or absence of each possible comorbid disorder (along with gender) into a model predicting the mean age of onset of the dependent variable (e.g., in a model predicting the mean age of onset of alcohol abuse, the presence or absence of social phobia was included as an independent variable).

3. Results

3.1 AD-SUD Associations

All ADs were significantly positively associated with all SUDs (Table 1). The confidence intervals nearly all overlapped, demonstrating that these associations were generally of similar magnitude across ADs (with the association between social phobia and drug dependence being particularly strong—the lower bound of the confidence interval is higher than the higher bound for some other associations).

3.2 Order of onset

Table 2 presents the percentage of cases in which the AD occurred before the SUD (eliminating those with onsets in the same year). For descriptive purposes, it also includes the percentages of the total number with both disorders who had concurrent onsets (within the same year), along with the percentages of the total number with both disorders who experienced the SUD first (again eliminating those with onsets in the same year; these percentages simply represent the reverse of the percentages with the AD first). These descriptive statistics were followed up with statistical tests of these patterns (the results of which are presented in Table 2, with significance levels from *t*-tests represented by asterisks in the left four columns). Specifically, the null hypothesis that half (50%) of anxiety cases would have onsets prior to the SUD while half would have onsets after the SUD (eliminating cases with concurrent onset) was tested.

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[i]We considered gender as a possible moderator of associations between ADs and SUDs. First, we entered a gender-by-AD interaction term in each overall analysis examining associations between ADs and SUDs. All were non-significant. Second, we entered a gender-by-AD interaction term in the prediction of whether an AD had an onset before (compared to after) the SUD. Only one association was significant: social phobia was more likely to have an onset prior to alcohol abuse among males, compared to females (96.6% and 88.2%, respectively; χ^2=4.79, *p*<.05). Third, a gender-by-AD interaction term was entered into analyses examining the association between mean age of onset of each disorder and the presence of comorbidity of the other type (SUDs for ADs and the reverse). All interaction terms were non-significant. Due to this lack of evidence for gender moderation of these associations, we did not consider it further.

Among participants with both social phobia and an SUD, social phobia nearly always (in 90% or more of cases) came first. This pattern was significant for all SUDs, indicating that social phobia tended to occur before each SUD significantly more than half the time. Generalized anxiety disorder tended to occur after the onset of at least one SUD (as measured by the "any SUD" composite variable), though the analyses examining each specific SUD were non-significant. Panic disorder occurred before most SUDs approximately half of the time, though it tended to occur prior to alcohol dependence (67% of the time). Agoraphobia tended to occur before alcohol abuse, alcohol dependence, and drug abuse. Although agoraphobia had an onset prior to drug dependence most (68%) of the time, this pattern was not significant (due to the small number of cases with both agoraphobia and drug dependence).

Tables 3 presents the mean ages of onset of each type of SUD for people with and without a comorbid AD and Table 4 presents the mean ages of onset of each type of AD and for people with and without a comorbid SUD. As can be seen in Table 3, the mean ages of onset for most SUDs were earlier when panic disorder was also present. These associations were non-significant for other ADs. As can be seen in Table 4, the mean ages of onset of generalized anxiety disorder and panic disorder were earlier when a SUD was present (but this was not the case for social phobia or agoraphobia).

4. Discussion

The results of this study indicate that lifetime diagnoses of social phobia, generalized anxiety disorder, panic disorder, and agoraphobia are positively associated with all SUDs. Among people with both an AD and an SUD, social phobia tends to have an onset prior to all SUDs, generalized anxiety disorder tends to occur after the onset of the earliest SUD, panic disorder tends to occur prior to alcohol dependence (but before or after, with approximately equal frequency, other SUDs), and agoraphobia tends to occur prior to most SUDs. Generalized anxiety disorder and panic disorder tend to have earlier onsets among people with lifetime diagnoses of SUDs than among those without SUDs, and SUDs tend to occur earlier among people with lifetime diagnoses of panic disorder than those without.

Overall, this study supports the notion that the order of onset of ADs and SUDs, among comorbid individuals, varies by type of anxiety. Specifically, social phobia overwhelmingly occurs prior to SUDs. This could simply be because it tends to have an onset in early adolescence, prior to the average onset of SUDs, or could be because social phobia specifically increases risk for SUDs. Perhaps experiencing social phobia in adolescence makes a young person more prone to peer pressure (due to anxiety about fitting in), which would be a risk factor for developing SUDs.

Panic disorder tends to occur prior to alcohol dependence; however, it has an onset before or after other SUDs with approximately equal frequency. Other research suggests that people with panic disorder who hold tension-reduction expectations from alcohol are at particularly increased risk for drinking to cope with their anxiety (Kushner, Abrams, Thuras, & Hanson, 2000).

Agoraphobia tends to occur prior to nearly all SUDs. Future research investigating whether the anxiety experienced in agoraphobia leads particularly to self-medication, or whether there are other processes at work, would be useful.

The analyses examining average ages of onset of each disorder among people with and without disorders of the other type (Tables 3 and 4) point to potential influences of some disorders on the development of disorders of the other type. Specifically, people with panic disorder who also have SUDs tend to develop SUDs earlier than people without panic

disorder. This effect was particularly strong for alcohol use disorders. Taken together with the finding that most people with both panic disorder and alcohol dependence experience the onset of panic disorder first (Table 2), these findings imply that panic disorder may hasten the development of alcohol dependence. Conversely, among people with lifetime SUDs, generalized anxiety disorder and panic disorder tend to have earlier onsets, compared to among people without SUDs. These mean differences were striking, with average onsets of these ADs up to 7 years earlier among people with comorbid SUDs than those without SUDs. Combining this finding with the age-of-onset analyses suggests that early-onset panic disorder may particularly predispose people to the development of SUDs, while SUDs may hasten the development of generalized anxiety disorder among some people.

Despite the finding that social phobia nearly always occurred prior to SUDs, it was not associated with an earlier mean age of onset of SUDs. Similarly, agoraphobia was unrelated to the mean age of onset of SUDs, and the presence of SUDs was unrelated to the mean age of onset of agoraphobia. Therefore, although these ADs were associated with increased lifetime risk for SUDs, they were not associated with the typical timing of the SUDs.

These findings can be integrated with factor-analytic research examining the structure of internalizing disorders. Specifically, this research has shown that generalized anxiety disorder tends to factor together with depression (in contrast to the other anxiety disorders), and that this depression/generalized anxiety factor is closely related to both other internalizing disorders and to externalizing disorders (Lahey et al., 2008). Recent research has shown that depression often has an onset after SUDs (e.g., Marmorstein, Iacono, & Malone, 2010), and the present finding that generalized anxiety disorder often does as well is consistent with this notion that depression and generalized anxiety disorder are closely related and that generalized anxiety may differ from other anxiety disorders in its association with externalizing disorders. In addition, Kushner et al. (1999) reported than alcohol use disorders predicted the onset of anxiety disorders (grouped together); in that study, generalized anxiety disorder was the most common anxiety disorder and therefore may have accounted for that finding.

There were not substantial differences in these associations according to type of SUD. Although the strength of the lifetime associations between different disorders differed somewhat (Table 1), these differences were not substantial (as shown by the overlapping confidence intervals). One possible exception was that panic disorder did seem to be uniquely likely to have an onset prior to alcohol dependence as opposed to other SUDs among comorbid participants. Overall, however, different SUDs did not have substantially different patterns of associations with anxiety disorders.

This study is the first that we are aware of to provide a comprehensive picture of associations between different types of ADs and SUDs in a representative community sample. A particular strength is its description of typical patterns of onset and how these differ across anxiety disorders. In addition, the finding that the presence of some ADs are associated with an earlier onset of SUDs and vice versa points to potentially fruitful areas for future research into understanding risk mechanisms.

It is important to remember that examining the order of onset patterns of different disorders is not the same as examining causality. Even though we found clear patterns in some cases (e.g., social phobia tending to have an earlier onset than SUDs), these patterns could be due to a number of factors other than the obvious possibility that one disorder increases risk for the other. There may be developmental differences that account for these patterns. For example, in this sample, social phobia has a mean age of onset of 11-12 years; it would be rare for a child this young to have access to the substances necessary to develop a SUD,

even if he or she were at very high risk for substance problems. Conversely, it is rare to experience a new-onset social phobia in adulthood. There are likely to be many other factors, ranging from individual- to family- to community-level risk factors, that increase risk for both types of disorders among some people.

There were several limitations to this study. First, these diagnoses were based on retrospective reports. Although this is a commonly-used methodology (e.g., Kuo, Gardner, Kendler, & Prescott, 2006), prospective studies may provide more valid estimates of ages of onset. Also, we did not have information on which drugs participants may have abused or been dependent on; the associations between ADs and drug use disorders may differ by type of drug. For example, depressant drugs may be used to self-medicate anxiety, while it is unlikely that amphetamines and related drugs would be used in this way. In addition, the NCS-R employed skip patterns that only assessed substance dependence symptoms when substance abuse was present. Therefore, a small number of cases of substance dependence may have been missed (i.e., counted as no diagnosis), potentially diminishing the apparent difference between substance-dependent and control participants in this study.

In sum, the results of this study indicate that there are differences in the patterns of onset of ADs and SUDs depending on which AD is examined. Specifically, social phobia nearly always occurs prior to SUDs, agoraphobia frequently follows this same pattern, generalized anxiety disorder often occurs after at least one SUD, and panic disorder occurs with approximately equal frequency before and after SUDs (though typically before alcohol dependence). Among people with both types of disorders, the presence of panic disorder is associated with an earlier age of onset of many SUDs; conversely, the presence of SUDs is associated with an earlier age of onset of generalized anxiety disorder and panic disorder. Therefore, studies examining associations between ADs and SUDs should, whenever possible, consider the possibility of differences by anxiety subtype.

Acknowledgments

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Highlights

- All anxiety disorders are positively associated with all substance use disorders (SUDs)

- Anxiety disorders differ in the timing of their onset relative to comorbid SUDs

- Among people with both social phobia and a SUD, social phobia nearly always has an onset prior to any SUDs

- Among people with panic disorder or agoraphobia and a SUD, panic disorder and agoraphobia tend to occur prior to some SUDs

- Among people with generalized anxiety disorder and a SUD, generalized anxiety disorder tends to occur after the onset of at least one SUD

Table 1

Odds ratios (95% confidence intervals) representing associations between anxiety disorders and substance use disorders[1]

	SP (*n*=1143; 12.3%)	GAD (*n*=752; 8.1%)	PD (*n*=455; 4.9%)	AGO (*n*=231; 2.5%)
ALA (*n*=1034; 11.1%)	3.03*** (2.49-3.69)	2.67*** (2.09-3.41)	3.50*** (2.62-4.68)	3.71*** (2.53-5.45)
ALD (*n*=444; 4.8%)	4.01*** (3.09-5.19)	3.39*** (2.47-4.65)	4.29*** (2.98-6.18)	4.93*** (3.13-7.78)
DRA (*n*=651; 7.0%)	3.54*** (2.81-4.44)	2.84*** (2.14-3.77)	3.39*** (2.42-4.74)	3.11*** (1.98-4.88)
DRD (*n*=248; 2.7%)	5.54*** (4.04-7.59)	3.11*** (2.08-4.66)	4.07*** (2.59-6.39)	3.80*** (2.09-6.88)
Any SUD (*n*=1151; 12.4%)	3.08*** (2.54-3.72)	2.69*** (2.13-3.41)	3.27*** (2.46-4.34)	3.60*** (2.47-5.24)

SP=social phobia; GAD=generalized anxiety disorder; PD=panic disorder; AGO=agoraphobia; ALA=alcohol abuse; ALD=alcohol dependence; DRA=drug abuse; DRD=drug dependence; SUD=substance use disorder. Sample sizes reported in the top row and leftmost column are unweighted and represent the number participants with each disorder.

***
$p<.001$.

[1] All odds ratios are adjusted for sex and are derived from analyses applying sample weights, as appropriate. Numbers in parentheses in the top row and left column are the lifetime prevalence rates of each disorder.

Table 2

Age of onset patterns among participants with both an anxiety disorder and a substance use disorder [1]

	Percentage with anxiety disorder before SUD				Percentage with concurrent (in same year) onset				Percentage with SUD before anxiety disorder			
	SP(12)	GAD(25)	PD(20)	AGO(15)	SP	GAD	PD	AGO	SP	GAD	PD	AGO
ALA (19)	93.4***	43.6	55.6	62.8*	3.3	9.6	12.3	8.3	6.6	56.4	44.4	37.2
ALD (21)	96.8***	56.8	67.4**	75.7***	3.5	16.8	11.8	10.2	3.2	43.2	32.6	24.3
DRA (18)	92.1***	43.7	52.8	70.0**	4.0	5.9	11.5	11.1	7.9	56.3	47.2	30.0
DRD (19)	95.5***	50.5	53.6	67.7	2.6	9.6	10.6	13.3	4.5	49.5	46.4	32.3
Any SUD (18)	90.0***	40.4*	49.8	59.1	3.5	8.8	13.1	5.9	10.0	59.6	50.2	40.9

SP=social phobia; GAD=generalized anxiety disorder; PD=panic disorder; AGO=agoraphobia; ALA=alcohol abuse; ALD=alcohol dependence; DRA=drug abuse; DRD=drug dependence; SUD=substance use disorder.

*
$p < .05$

**
$p < .01$

***
$p < .001$.

[1] All frequencies are weighted. Asterisks represent the results of analyses examining whether the proportion of cases with the anxiety disorder onset prior to the SUD onset is significantly different from .5. Numbers in parentheses in the top row and left column are the median ages of onset of each disorder. Percentages with anxiety disorder before or after SUD are derived from descriptive analyses eliminating cases with concurrent (in the same year) onsets.

Table 3

Associations between anxiety disorders and mean (standard deviation) ages of onset of substance use disorders[1]

	SP			GAD			PD			AGO		
	Present	Absent	t	Present	Absent	t	Present	Absent	t	Present	Absent	t
ALA onset	21.6 (6.1)	22.1 (6.9)	−1.21	21.7 (5.6)	22.0 (6.9)	−.85	20.9 (5.4)	22.1 (6.8)	−1.99*	21.4 (5.2)	22.0 (6.8)	−.88
ALD onset	23.3 (7.1)	23.4 (6.9)	−.21	23.2 (5.8)	23.4 (7.2)	−.26	21.3 (5.4)	23.7 (7.2)	−2.11*	22.3 (5.8)	23.5 (7.1)	−.84
DRA onset	19.7 (4.5)	19.6 (4.7)	.30	19.9 (4.6)	19.6 (4.6)	.64	19.3 (3.9)	19.7 (4.7)	−.56	19.5 (3.9)	19.6 (4.7)	−.14
DRD onset	21.0 (5.4)	21.8 (6.4)	−.99	21.1 (4.8)	21.6 (6.3)	−.36	19.6 (3.3)	21.8 (6.4)	−1.34	21.3 (4.3)	21.5 (6.2)	.10
Any SUD onset	20.7 (5.9)	21.0 (6.6)	−.90	20.6 (5.5)	21.0 (6.6)	−.90	19.8 (5.1)	21.0 (6.5)	−2.04*	20.2 (4.8)	20.9 (6.5)	−1.04

SP=social phobia; GAD=generalized anxiety disorder; PD=panic disorder; AGO=agoraphobia; ALA=alcohol abuse; ALD=alcohol dependence; DRA=drug abuse; DRD=drug dependence; SUD=substance use disorder.

*
$p<.05$.

[1] All values and analyses are weighted, as appropriate, and t-values are derived from analyses adjusting for the main effect of sex.

Table 4

Associations between substance use disorders and mean (standard deviation) ages of onset of anxiety disorders[1]

	ALA			ALD			DRA			DRD			SUD		
	Present	Absent	t	Present	Absent	t	Present	Absent	t	Present	Absent	t	Present	Absent	t
SP onset	12.0 (5.9)	11.5 (5.6)	1.24	11.9 (5.3)	11.6 (5.7)	.62	11.9 (4.8)	11.6 (5.8)	.70	11.5 (4.4)	11.7 (5.8)	−.20	12.2 (5.8)	11.4 (5.6)	1.75
GAD onset	23.4 (8.6)	28.1 (11.8)	−3.32**	22.4 (7.9)	27.7 (11.6)	−2.90**	22.0 (8.1)	27.9 (11.6)	−2.90**	20.6 (8.1)	27.5 (11.4)	−3.72**	23.6 (8.8)	28.2 (11.9)	−3.33***
PD onset	20.4 (8.3)	24.6 (11.1)	−2.83**	19.0 (7.8)	24.2 (10.8)	−2.90**	19.1 (7.4)	24.4 (10.9)	−3.17**	18.5 (6.6)	23.9 (10.7)	−2.45*	20.2 (8.2)	24.8 (11.2)	−3.25**
AGO onset	18.3 (9.3)	18.7 (9.3)	−.11	16.3 (8.4)	19.1 (9.5)	−1.29	16.9 (8.6)	18.9 (9.5)	−.90	15.6 (8.3)	18.9 (9.4)	−1.19	18.9 (9.4)	18.4 (9.3)	.43

SP=social phobia; GAD=generalized anxiety disorder; PD=panic disorder; AGO=agoraphobia; ALA=alcohol abuse; ALD=alcohol dependence; DRA=drug abuse; DRD=drug dependence; SUD=substance use disorder.

**
p<.01

***
p<.001.

[1]
All values and analyses are weighted, as appropriate, and t-values are derived from analyses adjusting for the main effect of sex.