Psychiatric Comorbidity and Perceived Alcohol Stigma in a Nationally Representative Sample of Individuals with DSM-5 Alcohol Use Disorder

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Background: Alcohol use disorder (AUD) is among the most stigmatized health conditions and is frequently comorbid with mood, anxiety, and drug use disorders. Theoretical frameworks have conceptualized stigma-related stress as a predictor of psychiatric disorders. We described profiles of psychiatric comorbidity among people with AUD and compared levels of perceived alcohol stigma across profiles.

Methods: Cross-sectional data were analyzed from a general population sample of U.S. adults with past-year DSM-5 AUD (n = 3,368) from the National Epidemiologic Survey on Alcohol and Related Conditions, which was collected from 2001 to 2005. Empirically derived psychiatric comorbidity profiles were established with latent class analysis, and mean levels of perceived alcohol stigma were compared across the latent classes while adjusting for sociodemographic characteristics and AUD severity.

Results: Four classes of psychiatric comorbidity emerged within this AUD sample, including those with: (i) high comorbidity, reflecting internalizing (i.e., mood and anxiety disorders) and externalizing (i.e., antisocial personality and drug use disorders) disorders; (ii) externalizing comorbidity; (iii) internalizing comorbidity; and (iv) no comorbidity. Perceived alcohol stigma was significantly higher in those with internalizing comorbidity (but not those with high comorbidity) as compared to those with no comorbidity or externalizing comorbidity.

Conclusions: Perceived stigma, as manifested by anticipations of social rejection and discrimination, may increase risk of internalizing psychiatric comorbidity. Alternatively, internalizing psychiatric comorbidity could sensitize affected individuals to perceive more negative attitudes toward them. Future research is needed to understand causal and bidirectional associations between alcohol stigma and psychiatric comorbidity.

Key Words: Perceived Stigma, Alcoholism Stigma, Alcohol, Psychiatric Disorders, Latent Class Analysis.

ADDICTION-related stigma, defined as negative attitudes and social rejection toward people who struggle with alcohol or drug problems (Livingston et al., 2012), is common and associated with adverse mental and physical health outcomes (Ahern et al., 2007; Glass et al., 2013b; Schomerus et al., 2011; Smith et al., 2010). Most of the general public believe that people with addiction are unable to make treatment decisions or manage their money (Pescosolido et al., 1999) and support imposing public restrictions upon them including limiting their ability to serve in a public office (van Boekel et al., 2013). Evidence also supports the conceptualizations of stigma-imposed structural discrimination such as healthcare inequities driven by negative attitudes toward healthcare consumers with alcohol or drug problems (Livingston et al., 2012; van Boekel et al., 2013; Williams et al., 2012).

Alcohol use disorder (AUD) is among the most stigmatized health conditions (Schomerus et al., 2010). *Perceived alcohol stigma* is described as individuals' expectations that people will be subjected to discrimination and negative social evaluations based on their current or prior AUD status (Glass et al., 2013a; Link et al., 1989). For people with AUD, the awareness of broad social rejection and discrimination toward them may have detrimental consequences (Glass et al., 2013a; Link and Phelan, 2001;

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Schomerus et al., 2011). Theories describe that psychosocial mechanisms associated with stigma (e.g., increased stress, decreased social support; Glass et al., 2013b; Link and Phelan, 2001; Umberson and Montez, 2010) may result in adverse mental health outcomes, including psychiatric distress or disorder (Link et al., 1997; Luoma et al., 2010; Schomerus et al., 2011).

Several theoretical frameworks have conceptualized stigma as a predictor of psychiatric disorders (Hatzenbuehler, 2009; Link et al., 1989; Meyer, 1995) as defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM). Common psychiatric disorders have been broadly described as "internalizing" (e.g., mood and anxiety) and "externalizing" (e.g., addictive disorders, antisocial personality) disorders based on their "inward" and "outward" expressions, respectively (Krueger, 1999). Both internalizing and externalizing psychiatric disorders are common among people with past-year AUD (range 12 to 19%; Grant et al., 2004a,b; Stinson et al., 2005). A positive association between addiction stigma and internalizing symptoms (e.g., depression severity) has been consistently found in several cross-sectional studies (Ahern et al., 2007; Glass et al., 2013b; Luoma et al., 2007; Schomerus et al., 2011). However, the relationship between addiction stigma and externalizing symptoms has been less consistent. Most existing studies have found no association between addiction stigma and addiction symptoms (Ahern et al., 2007; Luoma et al., 2007; Schomerus et al., 2011), but 1 study found that perceived alcohol stigma was associated with an increased risk of AUD persistence (Glass et al., 2013b). Levels of perceived alcohol stigma have not been previously been described and compared across profiles of psychiatric comorbidity among people with AUD, which may be a necessary first step in understanding their interplay or devoting resources to the longitudinal study of mechanisms linking perceived stigma and psychiatric disorders in this population.

Identifying whether certain groups of people with AUD have high levels of perceived alcohol stigma may have clinical significance. Within addiction treatment samples, higher perceived stigma is associated with an elevated risk of being secretive about substance use, concealing negative and distressing personal information, and treatment noncompletion (Brener et al., 2010; Luoma et al., 2010; Palamar, 2012). Stigma may limit active treatment participation due to secrecy and concealment, which may be of particular concern in treatment when clinical decisions related to psychopathology (e.g., suicidal ideation) or contraindications of alcohol use (e.g., certain psychiatric medications) are time sensitive and/or rely on the disclosure of distressful or stigmatizing information (Livingston et al., 2012). While these studies of addiction stigma in treatment settings may have methodological limitations (e.g., cross-sectional designs), it is certainly possible that the combination of AUD, comorbid psychiatric disorder, and sensitivity to stigma could limit progress in treatment settings.

Therefore, although research on this topic may have clinical implications and help inform theories regarding stigma and psychiatric illness, levels of perceived stigma have not been previously described and compared across psychiatric comorbidities among people with AUD. Due to the large possible number of psychiatric disorder combinations, questions regarding psychiatric comorbidity often require methods to create manageable and clinically meaningful subtypes of psychiatric disorders. This current study had 2 aims: (i) to define empirically derived profiles of psychiatric comorbidity and (ii) to describe and compare levels of perceived alcohol stigma across the empirically derived profiles of psychiatric comorbidity.

To accomplish these aims, we used latent class analysis (LCA) in a cross-sectional general population sample of people with DSM-5 AUD to identify groups (i.e., "latent classes") of alcohol-affected individuals who had similar profiles of comorbid psychiatric disorder. Examining the relationship between perceived alcohol stigma and latent classes of psychiatric disorders, as opposed to creating researcher-specified groups of psychiatric disorders, is preferable because the latter approach assumes psychiatric disorders are entities that can be grouped definitively. We hypothesized that among people with AUD, (i) the dimensions of internalizing and externalizing psychiatric disorders would distinguish the latent classes and (ii) classes with more internalizing comorbidity would have the highest levels of perceived alcohol stigma.

MATERIALS AND METHODS

Data Source

We analyzed data from Wave 2 (W2) of the National Institute on Alcohol Abuse and Alcoholism's National Epidemiologic Survey on Alcohol and Related Conditions (NESARC; Grant et al., 2009). NESARC used a complex survey design to yield population-representative estimates of U.S. adults living in noninstitutionalized settings in 2000. Interviews for W2 were conducted from 2004 to 2005 and included 34,653 respondents, reflecting an 86.7% follow-up rate among Wave 1 (W1) participants who were eligible for reinterview (e.g., those who remained alive and noninstitutionalized). W2 respondents have been compared to eligible nonrespondents, and no significant differences existed in age, race/ethnicity, gender, socioeconomic status, or lifetime AUD (Grant et al., 2009). The methodology and participants of NESARC have been described previously (Grant et al., 2004a, 2009).

Study Population

The current study's analytic sample included 3,368 respondents who met criteria for DSM-5 AUD in the year prior to the W2 interview (10.3% of W2 respondents). Although the W2 NESARC assessment was designed to identify AUD based on DSM-IV criteria, its assessment of alcohol cravings permitted the creation of a past-year DSM-5 AUD diagnosis (Agrawal et al., 2011). A DSM-5 AUD diagnosis was chosen because of its increased validity over the DSM-IV diagnosis (Hasin et al., 2013) and to obviate the need to explore alcohol abuse versus dependence status for a more parsimonious analysis. DSM-5 requires that 2 or more of 11 diagnostic

criteria be met for an AUD diagnosis (American Psychiatric Association, 2013).

Measurement

Psychiatric Disorders. DSM-IV psychiatric disorders were assessed with the AUD and Associated Disabilities Interview Schedule (AUDADIS-IV; Ruan et al., 2008). The individual psychiatric disorders assessed in NESARC that were analyzed in this study have test–retest reliabilities (kappa) that range from 0.40 to 0.77 (Ruan et al., 2008). We included past-year disorders of major depression, dysthymia, mania (bipolar I and II), generalized anxiety, posttraumatic stress, panic (with or without agoraphobia), social phobia, antisocial personality disorder, and 4 categories of past-year drug use disorder (cannabis, opiate [including heroin], cocaine, and "other" [including tranquilizer, sedative, amphetamine, hallucinogen, inhalant, and other]).

Perceived Alcohol Stigma. The Perceived Devaluation–Discrimination Scale adapted for measuring alcohol-related stigma was administered to W2 respondents after the alcohol section of the interview to assess perceived alcohol stigma (Link et al., 1987; Ruan et al., 2008). Items assessed respondents' perceptions of how "most other people" think about (perceived devaluation) or act toward (perceived discrimination) people who might carry the *alcoholic* label (i.e., those who are former alcoholics or have been in alcohol treatment). Responses were measured with a 6-point Likert-type scale, ranging from "strongly agree" to "strongly disagree." Six items with reverse wording were recoded so that higher scores indicated higher levels of perceived alcohol stigma. We created a summed scale from all 12 items ($\alpha = 0.82$; Ruan et al., 2008) yielding a range of 12 to 72. Prior analyses of the NESARC data reported perceived alcohol stigma scores of $M = 37.8$ (SD = 8.47) for the general population (Glass et al., 2013a).

AUD Severity. We created an AUD severity measure by summing the number of past-year DSM-5 AUD criteria met to control for its relationship with internalizing and externalizing disorders when estimating the latent classes (Dawson et al., 2010).

Sociodemographic Characteristics and Prior Alcohol Treatment. Sociodemographic characteristics included gender and race/ethnicity using the 5 groups available in NESARC (White; Black; Native American or Alaskan Native; Asian, Hawaiian, or Pacific Islander; and Hispanic or Latino), marital status (never married, previously married, and currently married/living with someone as if married), family income (0 to 19,999; 20,000 to 34,999; 35,000 to 69,999; and ≥70,000), and education (less than high school, high school or General Educational Development test (GED) equivalent, and greater than high school). We used a continuous variable for age. We also included a variable representing respondents' familiarity with persons with alcohol problems, coded as positive for those reporting alcohol problems in any first-degree relative or any live-in relationship with a partner, which could reduce perceived stigma (Keyes et al., 2010). Prior studies have demonstrated an association between perceived alcohol stigma and these variables (Keyes et al., 2010; Smith et al., 2010). We also created a variable for prior alcohol treatment (see Sensitivity Analyses). The NESARC W1 and W2 interviews asked "Have you ever gone anywhere or seen anyone for a reason that was related in any way to your drinking . . ." and presented a list of 13 types of alcohol treatment. Prior alcohol treatment was coded as positive for respondents who reported attending any alcohol treatment in their lifetime.

Analysis

We used STATA 12.0 (StataCorp, 2012) to calculate descriptive statistics of the analytic sample and M*plus* 7.1 (Muthén & Muthén, Los Angeles, CA) for latent variable modeling. All analyses adjusted for the complex sample design of NESARC permitting the estimation of population-representative estimates with accurate standard errors. For sample descriptive statistics of sociodemographic characteristics and past-year psychiatric disorders, we calculated weighted percentages for categorical variables and means for continuous variables. We addressed missing data for the individual alcohol stigma items and for the AUD severity variable using multiple imputation with chained equations in STATA. Fewer than 6% of the analytic sample had missing data on 1 or more stigma items, and 0.5% had missing data on AUD severity. In the imputation model, we included all sociodemographic covariates. Results of models estimated with full information maximum likelihood were analogous to the results estimated from multiple imputation data.

Establishing Latent Classes of Psychiatric Comorbidity (Aim 1). LCA is a statistical tool to extract respondent profiles that are distinguished by probabilities of responses to the set of variables included in the analysis (i.e., the latent class indicators). We used LCA to extract distinct and mutually exclusive respondent profiles from patterns of 13 psychiatric diagnoses ($2^{13} = 8{,}192$ possible response patterns) among those with AUD. LCA was estimated with the maximum likelihood robust estimator with 200 random sets of starting values and 20 optimizations to ensure the models converged to an appropriate solution (Nylund et al., 2007).

To identify an optimal LCA measurement model, we specified models with 2 to 8 classes and evaluated parameter estimates and model fit. Parameter estimates included item response probabilities and latent class prevalence estimates. Item response probabilities reflected the probability of meeting criteria for each psychiatric disorder conditional upon membership in a latent class. Latent class prevalence estimates corresponded to the proportion of respondents that would be members a latent class accounting for measurement error. Gender and AUD severity were covariates in the LCA due to their association with internalizing and externalizing psychiatric comorbidity (Bucholz et al., 2000; Dawson et al., 2010; Kessler et al., 2005). Hence, latent class prevalence estimates were adjusted for gender and AUD severity.

M*plus* computed measures of global model fit that summarized how well the parameter estimates of the latent class model reproduced the 8,192 possible patterns of psychiatric comorbidity in the data. Because no single authoritative statistical method exists in determining the appropriate number of latent classes, consistent with previous approaches, we selected the optimal LCA models based upon model fit statistics and substantive interpretability of the model (Nylund et al., 2007). We specifically used the Akaike information criterion (AIC), Bayesian information criterion (BIC), the sample-size adjusted BIC (aBIC), entropy, and the Vuong–Lo–Mendell–Rubin likelihood ratio test (VLMR-LRT) to assess model fit. Models with lower values on the AIC, BIC, and aBIC and higher values on the entropy statistic indicated better fit, and the VLMR-LRT indicated whether models including a greater number of latent classes were a statistically significant improvement over those including a smaller number. Substantive interpretability was evaluated by examining patterns of psychiatric disorder probabilities within and across classes to determine if the patterns appeared theoretically meaningful (e.g., consistent with prior conceptions of how psychiatric disorders relate to one another) versus idiosyncratic. After selecting the appropriate LCA measurement model, we used M*plus* to calculate model-estimated descriptive statistics for gender, number of comorbid disorders, and AUD severity across empirically identified psychiatric comorbidity profiles.

Examining Differences in Perceived Alcohol Stigma Across the Empirically Derived Comorbidity Profiles (Aim 2). After selecting the appropriate LCA measurement model, we computed the measurement error associated with assigning individuals to latent classes to control for this error when comparing perceived alcohol stigma across the latent classes. In the statistical literature, this approach is referred to as 3-step analysis (Vermunt, 2010). We used a Wald test to compare adjusted mean perceived alcohol stigma scores across the latent classes. Means were adjusted by regressing perceived alcohol stigma on sociodemographic characteristics and AUD severity. We computed Cohen's *d* (Cohen, 1988) as an effect size measure for differences in adjusted means. A Cohen's *d* of 0.2, 0.5, and 0.80 indicates small, medium, and large differences, respectively.

RESULTS

Participant Characteristics

NESARC W2 participants with past-year DSM-5 AUD were mostly male, White, married, of younger age, had family incomes above $35 thousand dollars and had greater than a high school education (Table 1). With regard to AUD severity, the mean number of past-year DSM-5 criteria met was 3.5 (range 2 to 11). Approximately 50% were classified as having been familiar with someone with alcohol problems (i.e., had a live-in partner or first-degree relative with alcohol problems). Major depression was the most prevalent comorbid psychiatric disorder (16%), and the prevalence of other disorders ranged from 2 to 11%.

Table 1. Respondent Characteristics of NESARC W2 Respondents with Past-Year DSM-5 Alcohol Use Disorder (AUD; n = 3,368)

Characteristic	Weighted % or mean (SE)
Overall sample	100.0 (0.0)
Age	
<35	47.1 (1.04)
35 to 49	34.0 (0.97)
50 to 64	15.8 (0.75)
≥65	3.1 (0.31)
Female	31.7 (0.86)
Race/ethnicity	
Black	12.3 (1.39)
Hispanic	11.6 (0.87)
Asian	3.0 (0.45)
Native American	2.7 (0.63)
White	70.4 (1.70)
Education	
<High school	13.1 (0.85)
High school or GED	26.9 (1.07)
>High school	60.0 (1.27)
Family income	
0 to 19,999	21.4 (1.02)
20,000 to 34,999	17.7 (0.80)
35,000 to 69,999	32.0 (1.03)
≥70,000	29.0 (1.17)
Live-in partner or first-degree relative with alcohol problems	50.2 (1.24)
Marital status	
Presently married	47.8 (1.06)
Previously married	16.6 (0.77)
Never married	35.6 (1.04)
AUD severity (past-year DSM-5 criteria count)	3.5 (0.04)
Perceived alcohol stigma[a]	37.3 (0.18)
Prior alcohol treatment	18.0 (0.01)
Latent Class Indicators (past-year psychiatric disorders)	
1. Major depression	15.6 (0.74)
2. Dysthymia	2.2 (0.29)
3. Bipolar	5.1 (0.47)
4. Social phobia	5.5 (0.51)
5. Panic or agoraphobia	5.8 (0.52)
6. Generalized anxiety	7.1 (0.54)
7. Specific phobia	10.6 (0.68)
8. Posttraumatic stress disorder	10.8 (0.62)
9. Antisocial (lifetime)	9.6 (0.62)
10. Cannabis use disorder	9.11 (0.66)
11. Opiate use disorder	2.7 (0.42)
12. Cocaine use disorder	2.4 (0.37)
13. Other drug use disorders	2.6 (0.35)

[a]Observed scores (a sum of all items in the scale) are reported for perceived alcohol stigma.

Latent Class Model Selection (Aim 1)

As shown in Appendix S1, improvement in the AIC, BIC, and aBIC steadily increased until the 4-class model, whereas any further improvements in statistical fit were minor for the 5-class model, and models with 6 to 8 classes did not converge. The 4-class model also had good substantive interpretability (i.e., subtypes defined largely by distinctive probabilities of internalizing and externalizing of psychiatric disorders, as described in the following paragraphs). We deemed that the 4-class model was superior based on the combination of substantive interpretability and the pattern of model fit.

Description of the 4 Subtypes of Psychiatric Comorbidity. Parameter estimates for the 4-class model are displayed in Table 2. Figure 1 graphs individual psychiatric disorder probabilities by latent class, which describe the probability of having a given psychiatry disorder conditional upon being a member of the class. We named the first class (approximately 1.8% of the sample) the "high-comorbidity" class. Compared to all other classes, persons in this class had the highest probability of many internalizing (all except social phobia, specific phobia, generalized anxiety, and posttraumatic stress) and externalizing disorders (all except antisocial personality). The second class (approximately 10.6% of the sample) had externalizing comorbidity, which was predominantly reflected by a higher probability of antisocial personality disorder than the other classes and a relatively high probability (36%) of cannabis use disorder. Probabilities for all other externalizing disorders ranged from 6 to 19%, which were only exceeded by the high-comorbidity class. The third class (approximately 14.4% of the sample) had predominantly internalizing comorbidity. Major depression, generalized anxiety, specific phobia, and posttraumatic stress were the most common disorders within this class, and there were low probabilities (<12%) for externalizing comorbidity. Finally, we deemed the fourth class to be "comorbidity unaffected." The class had negligible probabilities for all psychiatric disorders (0 to 6%).

Descriptive statistics are presented in Table 2 to highlight differences across the latent classes. Respondents in the

high-comorbidity class had a similar number of internalizing conditions as individuals in the internalizing comorbidity class (3.1 vs. 2.6, respectively), but they had twice as many externalizing conditions than individuals in the externalizing comorbidity class (2.2 vs. 1.1, respectively). The high-comorbidity class was overrepresented by females, whereas the externalizing class was overrepresented by males. As compared to the no comorbidity class, the classes with comorbidity (and particularly the high-comorbidity class) had elevated levels of AUD severity. The proportion of those who received prior treatment was the highest in the high-comorbidity class (54%) and lowest in the comorbidity-unaffected class (13%).

Table 2. Results of the Latent Class Analysis Showing Probabilities of 13 Psychiatric Disorders within Each Psychiatric Comorbidity Profile for Respondents with DSM-5 Alcohol Use Disorder (AUD)

	High Comorbidity (1.8%)	Externalizing Comorbidity (10.6%)	Internalizing Comorbidity (14.4%)	Comorbidity Unaffected (73.1%)
Psychiatric disorders		Probability		
Major depression	**0.87**	0.19	**0.67**	0.03
Dysthymia	**0.24**	0.00	0.11	0.00
Bipolar I or II	**0.40**	0.07	0.19	0.01
Social phobia	0.18	0.11	**0.22**	0.01
Panic or agoraphobia	**0.54**	0.07	**0.23**	0.01
Generalized anxiety	**0.32**	0.05	**0.37**	0.01
Specific phobia	0.19	0.13	**0.32**	0.06
Posttraumatic stress disorder	**0.36**	0.11	**0.44**	0.03
Antisocial	0.18	**0.41**	0.12	0.04
Cannabis use disorder	**0.50**	**0.36**	0.11	0.04
Opiate use disorder	**0.38**	0.11	0.04	0.00
Cocaine use disorder	**0.42**	0.12	0.01	0.00
Other drug use disorders	**0.75**	0.06	0.03	0.00
Within-class characteristics		Mean or proportion		
Number of comorbid disorders	5.31	1.80	2.86	0.26
Internalizing disorders	3.09	0.74	2.55	0.17
Externalizing disorders	2.23	1.07	0.31	0.09
Female (Proportion)	0.45	0.07	0.63	0.29
DSM-5 AUD severity	7.62	5.38	4.38	2.97
Prior treatment (Proportion)	0.54	0.34	0.26	0.13

The latent class measurement model adjusted for gender and AUD severity. Probabilities greater than 20% are bolded to assist with interpretation.

Levels of Perceived Alcohol Stigma Across Comorbidity Subtypes (Aim 2)

Mean perceived alcohol stigma was 37.3 (SD = 8.37) among people with past-year DSM-5 AUD. Table 3 includes effect sizes (Cohen's *d*) for adjusted mean differences in perceived alcohol stigma across the comorbidity classes. There were statistically significant differences in means of perceived alcohol stigma across the latent classes. The internalizing class had significantly higher perceived alcohol stigma than the externalizing comorbidity and comorbidity-unaffected classes. The externalizing class also had significantly lower perceived alcohol stigma than the comorbidity-unaffected class. Levels of perceived alcohol stigma in the high-comorbidity class were not significantly different from the other classes.

Table 3. Mean Comparisons for Perceived Alcohol Stigma Across the Latent Classes

Characteristic Comparison	Difference in adjusted means		
	Cohen's *d*	SE	*p*
Perceived alcohol stigma			
High versus externalizing	0.45	0.28	0.108
High versus internalizing	−0.03	0.28	0.921
High versus unaffected	0.18	0.26	0.487
Externalizing versus internalizing	**−0.48**	**0.13**	**0.000**
Externalizing versus unaffected	**−0.27**	**0.12**	**0.026**
Internalizing versus unaffected	**0.21**	**0.09**	**0.016**

Means differences were adjusted for sociodemographic variables and alcohol use disorder severity. Bolded values indicate statistical significance ($p < 0.05$).

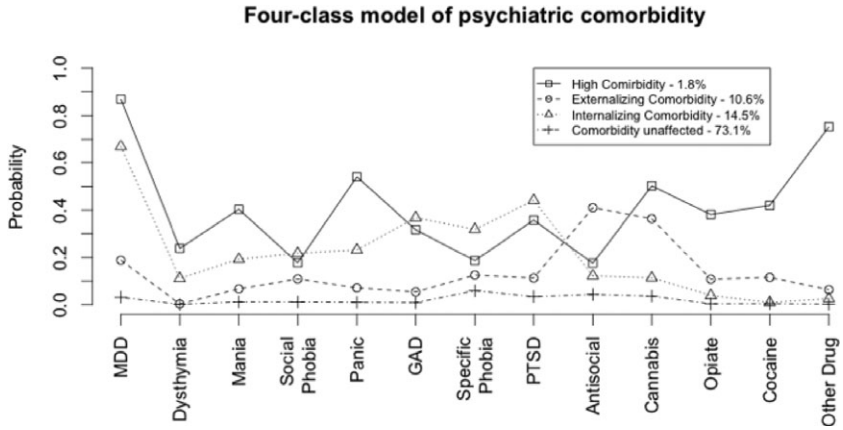

Fig. 1. Four-class model of psychiatric comorbidity.

Sensitivity Analyses

Several sensitivity analyses were warranted. Because several items in the Perceived Devaluation–Discrimination scale ask about perceived stigmatization of people who have previously obtained alcohol treatment (see Appendix S2), and because 18% of the sample had obtained treatment in their lifetime, we examined whether including prior alcohol treatment as a covariate during latent class estimation altered the taxonomy of the comorbidity subtypes. The comorbidity classes remained unchanged. Next, we evaluated adjusted mean differences in perceived alcohol stigma across the latent classes when modeling stigma as a latent factor because our prior work suggested that using a latent factor may reduce the scale's measurement error (Glass et al., 2013a). In this sensitivity analysis, we also adjusted for prior alcohol treatment when comparing stigma means cross the latent classes. Patterns of statistical significance for the adjusted mean differences were consistent with our primary analysis. Sensitivity analysis results are included in Appendix S3.

DISCUSSION

We evaluated 2 hypotheses to advance knowledge regarding etiological and clinical perspectives on the interplay of alcohol stigma and psychiatric disorders among people with DSM-5 AUD. With cross-sectional data of a large, nationally representative survey of the U.S. general population, we found that past-year psychiatric comorbidity among people with AUD appeared to be distinguished by the classifications of internalizing and externalizing disorders. Consistent with our first hypothesis, there was evidence for 4 classes, including (i) a high-comorbidity class reflecting internalizing (i.e., mood and anxiety disorders) and externalizing (i.e., antisocial personality and drug use disorders) comorbidity; (ii) a class with predominantly externalizing comorbidity; (iii) a class with predominantly internalizing comorbidity; and finally (iv) a class that appeared unaffected by comorbidity.

The identification of empirically derived past-year psychiatric comorbidity profiles was motivated by our questions of whether perceived alcohol stigma might be more "severe" among individuals with more highly concentrated internalizing psychiatric comorbidity. Consistent with our second hypothesis, it was evident that the internalizing comorbidity profile had significantly higher levels of perceived alcohol stigma than the comorbidity-unaffected and externalizing comorbidity profiles. Differences in perceived alcohol stigma between the internalizing comorbidity profile and these other profiles had a small to medium "effect" size. This extends previous findings of a positive association between perceived stigma and measures of psychiatric distress in clinical samples (Luoma et al., 2010; Schomerus et al., 2011) showing that perceived alcohol stigma is specifically elevated among those with internalizing psychiatric comorbidity with validated assessments of psychiatric disorders in the general population. Interestingly, the externalizing comorbidity class had lower levels of perceived alcohol stigma than the internalizing class and the no comorbidity class. Perhaps this reflects that the most distinct characteristic of this class was having a high probability of antisocial personality disorder, a condition often characterized by behaviors that lack a regard for social norms and others' feelings.

We are unable to speak to a cause of the differences in perceived alcohol stigma across psychiatric comorbidity profiles using cross-sectional data and broad measures of psychopathology. Etiological perspectives on the interplay of stigma and psychiatric disorders describe that certain sequelae of stigma (e.g., rumination, deficits in emotion regulation) may confer risk for psychiatric disorders (Hatzenbuehler, 2009; Hatzenbuehler et al., 2008). While leading theoretical perspectives describe that stigma is a social process that has consequences for stigmatized individuals across a variety of domains (Link and Phelan, 2001), there has also been attention to specific psychological processes that may elevate perceived stigma. For example, neuroticism has been positively associated with self-report measures of perceived stigma and discrimination, leading some to note that perceived stigma may in part reflect personality orientations (Borecki et al., 2010; Major et al., 2002). Whether internalizing psychiatric comorbidity could sensitize affected individuals to perceive more stigma remains an open question that would be best addressed with prospective data that employs measures of personality orientations to control for their potential confounding nature.

It was unexpected that perceived alcohol stigma was not significantly higher among those in the high-comorbidity class than the other classes. The main distinguishing factor between the high-comorbidity class and the internalizing class (which had the highest perceived alcohol stigma) was the higher probability of drug use disorders among those with high comorbidity. It could be that because there is considerable stigma associated with drug addiction (Pescosolido et al., 1999), any effect of alcohol-related stigma pales in comparison among those with drug use disorders. It may be fruitful to employ measures of both perceived alcohol and drug addiction stigma in future research with comorbid populations.

This study's finding that perceived alcohol stigma is elevated among people with AUD who have internalizing psychiatric comorbidity may have clinical implications. Specifically, because research with treatment seeking populations has shown that perceptions of being stigmatized in regard to one's addiction status (by the general public and/or by treatment providers) are associated with less transparency, more secrecy (Luoma et al., 2007), and treatment noncompletion within substance abuse treatment programs (Brener et al., 2010), treatment providers should be aware that clients with comorbid AUD and internalizing psychiatric disorders may be particularly susceptible to alcohol-related stigma. It is notable that while the propor-

tion of people who had received prior treatment was elevated in the classes with comorbidity, our sensitivity analyses showed that the results comparing stigma across the latent classes were unchanged when adjusting for prior alcohol treatment participation. As such, treatment providers may wish to assess whether their clients' expectations of rejection and discrimination could potentially be limiting their active participation in treatment for their substance use and other psychiatric problems, particularly among those who have internalizing psychiatric comorbidity. Mindfulness interventions in addiction treatment settings have been successful in reducing the shame associated with substance use disorders and improving treatment attendance (Luoma et al., 2012), and treatment providers may want to incorporate mindfulness components into routine care of patients with both AUD and internalizing psychiatric disorders. However, the positive effects of interventions to alleviate stigma at the individual level (i.e., targeting affected individuals) may not result in broad or long-lasting effects without improving societal attitudes toward individuals with substance use disorders and other psychiatric problems (Link, 2013; Livingston et al., 2012). Hence, research on multilevel interventions to address addiction stigma is indicated.

Last, we note that the subtypes of psychiatric comorbidity derived in our LCA measurement model support several prior studies that used researcher-specified subgroups or latent factors defined by internalizing and externalizing comorbidity (Dawson et al., 2010; Hasin and Kilcoyne, 2012; Keyes et al., 2011). The evidence of subgroup differences in perceived alcohol stigma in this study, and alcohol severity or trauma history in other studies (Dawson et al., 2010; Keyes et al., 2011), provides support in alcohol research for the use of 4 broad categories of internalizing, externalizing, both internalizing and externalizing, and no comorbidity. We also note that in comparison with other LCA studies, the number and specific nature of latent psychiatric comorbidity classes varies across reports, although the broad subtypes of internalizing, externalizing, high-comorbidity, and/or unaffected classes have been found in addition to other more distinctive subtypes (Kessler et al., 2005; McCutcheon et al., 2013; Vaidyanathan et al., 2011; Weich et al., 2011). Perhaps the difference in the number of classes identified between the current study and the prior studies is due to the fact that our analysis uniquely only included those with DSM-5 AUD rather than focusing on the entire general population.

Limitations

Perceived alcohol stigma was not assessed in the W1 NESARC survey, and thus, we are unable to determine whether stigma was associated with participation in the W2 survey. Because stigma may be greater among nonrespondents than among respondents, differential response to W2 based on perceived alcohol stigma would be likely to bias findings of this study conservatively (i.e., result in underestimations of stigma in the study). These cross-sectional data lacked temporal ordering for perceived alcohol stigma and psychiatric disorders. Scant longitudinal data on perceived stigma significantly limit the field's knowledge about causal relationships and mediating processes (Livingston and Boyd, 2010). Although we used DSM-5 AUD for our index condition, DSM-IV diagnoses were used for the comorbid psychiatric conditions. Our identification of differences in perceived alcohol stigma across psychiatric comorbidity subtypes is important in its own right, but future studies may wish to explore whether the outcomes of perceiving more stigma are worse across comorbidity profiles. Last, past-year psychiatric diagnoses were assessed, whereas it may be useful for future studies to examine the relationship between perceived stigma and psychopathology at the time of the interview.

CONCLUSIONS

In a large survey of the U.S. general population, perceived alcohol stigma among people with DSM-5 AUD appeared to be significantly elevated among specific psychiatric comorbidity profiles that were empirically derived using LCA. Respondents with AUD who had internalizing psychiatric comorbidity, as compared to those with no psychiatric comorbidity or externalizing comorbidity, had significantly higher levels of perceived alcohol stigma. Longitudinal research is needed to understand the causes and consequences of elevated perceived alcohol stigma among people with AUD and internalizing psychiatric comorbidity.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Fit statistics informing latent class analysis model selection.

Appendix S2. Item wording for the perceived alcohol stigma instrument.

Appendix S3. Sensitivity analysis results.