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Limitations of Lifetime Alcohol Use Disorder Assessments: A Criterion-Validation Study

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Abstract

The goal of the present study was to compare etiologically and clinically relevant correlates of lifetime AUD (e.g., alcohol consumption, personality traits, psychiatric disorders) based on a single assessment compared to a cumulative, prospective assessment of lifetime AUD. Data were drawn from the Alcohol, Health and Behavior (AHB; baseline $N = 489$) study, which consisted of a prospective cohort of college students assessed seven times over a 16-year period ([*M*(*SD*) age at baseline = 18.56 (.97)] and [*M*(*SD*) age at final assessment = 34.33 (.82)]). The participants were assessed using the Diagnostic Interview Schedule (DIS) for DSM-III at Waves 1-7 and for DSM-IV at Waves 6-7. A single assessment and cumulative assessments of DSM-III lifetime AUD at Wave 6 (*M*[*SD*] age = 28.98 [1.03]) were used to predict past-year alcohol related variables (e.g., alcohol consumption, drinking motives, drinking expectancies), personality variables, general functioning, lifetime substance use, and lifetime psychiatric disorders at Wave 7. Significantly larger correlations were found between the cumulative assessment and eight of the 25 etiologically relevant correlates of AUD compared to the single assessment. Further, significant incremental validity of cumulative assessment over single, retrospective assessment was observed for 16 of the 25 covariates. Overall, this study provides further support for the value of using prospective data with multiple assessments when determining lifetime history of disorder.

Keywords

lifetime alcohol use disorder; reliability; validity; prospective assessment

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Contributors

All three authors were personally and actively involved in substantive work leading to the report and will hold themselves jointly and individually responsible for its content. Each author has approved the final manuscript.

Conflict of Interest

All authors declare that they have no conflicts of interest.

Alcohol use disorder (AUD) is characterized by a maladaptive pattern of alcohol consumption causing significant impairment or distress in functioning in important areas of life (American Psychiatric Association, 2013). Estimating lifetime prevalence of AUD is useful for understanding factors associated with the development of this disorder, and emerging evidence suggests studies based on cross-sectional assessments provide lower prevalence estimates compared to multiple, sequential assessments (Copeland, Shanahan, Costello, & Angold, 2011; Haeny, Littlefield, & Sher, 2014a; Moffitt et al., 2010). This is because lifetime diagnosis based upon a single report is surprisingly unreliable as indicated by: (1) individuals meeting lifetime criteria at a given measurement occasion failing to rediagnose at a subsequent occasion ("negative prevalence"; Jackson et al., 2006; Robins, 1985; Shrout et al., 2011; Vandiver and Sher, 1991), and (2) individuals reporting dates of onset of disorder at times predating an earlier measurement occasion where no lifetime diagnosis was reported (Haeny, Littlefield, & Sher, 2014b). With this in mind, it has been suggested that longitudinal studies assessing lifetime AUD should conduct a full-lifetime assessment at each time period instead of only assessing the interval since the last the interview (Haeny et al., 2014a).

Despite the improved estimation of prevalence that multiple lifetime assessment affords, it is unclear if these synthesized estimates bear stronger relations to established correlates of AUD. It is useful to know if an association based on a single assessment is likely to be biased and, if so, by how much. This is important to determine given there is often opportunity for obtaining multiple lifetime assessments in longitudinal studies. However, full lifetime assessments after baseline are uncommon. To our knowledge, no study has investigated whether significant validity-related information is lost using a single assessment of lifetime AUD compared to multiple assessments of lifetime AUD.

Comorbidity

Large-scale epidemiologic studies (i.e., Epidemiologic Catchment Area [ECA] Study [Regier et al., 1990]; National Longitudinal Alcohol Epidemiologic Survey [NLAES; Grant & Hartford, 1995]; National Comorbidity Survey [NCS; Kessler et al., 1997]; NCS – Replication [NCS-R; Kessler et al., 2005]; and the National Epidemiologic Study of Alcohol Related Conditions [NESARC; Hasin et al., 2007) provide evidence that lifetime AUD is highly comorbid with other lifetime psychiatric disorders. NESARC data indicate individuals with any anxiety, mood, and drug (other than alcohol) use disorder (DUD) had greater odds of having lifetime AUD (Hasin et al., 2007). Trull, Jahng, Tomko, Wood, and Sher (2010) found individuals in NESARC with any personality disorder had greater odds of having alcohol dependence. However, these relations may be attenuated due to underestimates of lifetime AUD when based on a single assessment.

Other Correlates of AUD

Single assessments of lifetime AUD have also been linked to other etiologically-and clinically relevant covariates. For example, extensive work has found robust relations between AUD and family history status (e.g., Lieb et al., 2002; Merikangas, Weissman, Prusoff, Pauls, & Leckman, 1985), drinking motives and alcohol expectancies (e.g., Beseler,

Aharonovich, Keyes, & Hasin, 2008; Goldman et al., 1999; Prescott, Cross, Kuhn, Horn, & Kendler, 2004; Smith, 1994), and personality traits (Hopwood et al., 2011; McCormick et al., 1998; Martin et al., 2000; Sher et al., 1991; Swendsen et al., 2002; Trull, Wadby, & Sher, 2004). These are just a few examples of myriad reports using a single assessment of lifetime AUD to estimate correlates of these disorders.

The present study investigated whether the strength of relations between lifetime AUD assessed via a single assessment or via a cumulative assessment varies when prospectively predicting alcohol-related variables, substance use, psychiatric disorders, personality variables, and general functioning.

Method

Participants

The data came from the Alcohol, Health, and Behavior Study (AHB; Sher et al., 1991), which is a prospective sample of 489 first-year college students characterized by 53% women and 94% White. Data were collected when participants were approximately 18, 19, 20, 21, 24, 29, and 34 years of age. The AHB study was approved by the University's Institutional Review Board, and informed consent was obtained. Fifty-two percent of participants were classified as having a history of paternal alcoholism based on the Family History-Research Diagnostic Criteria (FH-RDC; Endicott, Andreasen, & Spitzer, 1978) interview and adapted versions of the Short Michigan Alcoholism Screening Tests (SMAST; Selzer, Vinokur, & van Rooijen, 1975), which was assessed at Wave 1.

Attrition

In terms of retention, 363 participants (74%) provided data at each wave and 383 participants (78%) provided data at the final wave. Attrition analyses indicated no significant differences between attriters (i.e., 126 participants with data at six or fewer waves) versus completers (i.e., 363 participants with data at each wave) on baseline measures of numerous personality variables and cognitive functioning. However, attriters were less likely to be female (56%; OR=.65[.43, .97]) and more likely to meet criteria for DSM-III past-year AUD (34%; OR=1.96[1.25, 3.06]), lifetime AUD (37%; OR=2.00[1.29, 3.11]), lifetime DUD (16%; OR=1.83[1.01, 3.31]), and lifetime tobacco use disorder (TUD; 18%; OR=2.03[1.15, 3.58]) at baseline.

Measures

Psychiatric disorders—The Diagnostic Interview Schedule (DIS) for DSM-III (Robins, Helzer, Croughan, Williams, & Spitzer, 1985; used at Waves 1-7), DSM-III-R (Robins, Helzer, Cottler, & Goldring, 1989; used at Waves 3-7) and DSM-IV (Robins, Cottler, Bucholz, & Compton, 1997; used at Wave 6-7) was used to assess lifetime psychiatric diagnoses. In-person interviews were conducted by trained, masters-level interviewers.

Correlates of lifetime AUD assessed at Wave 7—Variables assessed at Wave 7 were used to minimize potential time-of-measurement effects. DSM-IV lifetime psychiatric disorders assessed included AUD (36%), TUD (7%), DUD (11%), and major depressive

episode (MDE; 23%). Alternative measures were used given the low base rate of some disorders in the sample. Adult antisocial behavior (AAB; 30%) was assessed by endorsing two or more antisocial symptoms. Lifetime anxiety disorder (18%) was assessed by endorsing lifetime posttraumatic stress disorder, panic attacks, specific phobia, or generalized anxiety disorder.

Several alcohol-related variables were included. Alcohol quantity-frequency was assessed using the product of quantity per drinking occasion and weekly frequency of drinking over the past year and expressed as total drinks/week (this variable was log transformed, after adding one, to reduce skew). Past-year alcohol consequences were assessed using a count of 27-items (α =.89) measuring alcohol dependence symptoms (e.g., tolerance, withdrawal) and alcohol-related consequences (e.g., damaging property, feeling guilty). A composite of positive alcohol expectancies was assessed using 44 items (see Sher et al., 1991; Sher et al., 1996). The Drinking Motives Questionnaire (DMQ-R; Cooper, 1994) was used to assess coping and enhancement. A composite of past-month number of times light-headed from alcohol, number of times drunk, and number of heavy drinking occasions was used to assess heavy drinking.

The frequency of lifetime cigarette, marijuana, and other illicit drug use was also assessed. Two cigarette use variables included: (1) “ever smoke a cigarette in your life”, and (2) “ever smoke five or more packs in your lifetime” (Jackson, Sher, & Wood, 2000; Sher et al., 1991). The marijuana and other illicit drug use questions were drawn from a larger questionnaire assessing marijuana, amphetamine, barbiturate, tranquilizer, cocaine, heroin, opiate, psychedelic, and inhalant use adapted from questionnaires used by Blane (1987) and Jessor and Jessor (1973; Jessor et al., 1981).

Several personality traits were assessed. The NEO Five Factor Inventory (NEO-FFI; Costa & McCrae, 1992), a short form of the NEO-PI-R personality inventory (Costa & McCrae, 1989), consists of 60 items assessing: neuroticism, extraversion, openness, agreeableness, and contentiousness. The impulsivity subscale of the Eysenck Personality Inventory (EPI; as used by Rocklin & Revelle, 1981) was also included. Additionally, the MacAndrew (1965) scale (developed to distinguish alcoholic from nonalcoholic patients) of the Minnesota Multiphasic Personality Inventory (MMPI; see also Graham, 1977) broadly assessing behavioral disinhibition was used.

General functioning was assessed using the General Severity Index (GSI) of the 53-item Brief Symptom Inventory (BSI; Derogatis, 1993; Derogatis & Spencer, 1982). Self-esteem was assessed using the 10-item Rosenberg Self-Esteem scale (Rosenberg, 1979).

Analyses

Lifetime AUD based on a single assessment (i.e., DSM-III lifetime AUD at Wave 6; $n_{endorse}$=118; 29%) and lifetime AUD based on a cumulative assessment (i.e., DSM-III lifetime AUD at Waves 1-6; $n_{endorse}$=230; 47%) were used to predict DSM-IV lifetime psychiatric disorders, alcohol-related variables, cigarette use, marijuana use, other illicit drug use, and personality traits at Wave 7. The two-tailed test for correlated correlations was used to estimate significant differences in the relation between the single lifetime AUD

assessment versus the cumulative lifetime AUD assessment and presumed correlates of AUD. Given that the coefficient of determination (i.e., *R*-squared) is an estimation of the proportion of variance explained by the regression model (Nagelkerke, 1991), significant changes in *R*-squared (i.e., ΔR^2) would suggest significant improvement in prediction (i.e., incremental validity). Ordinary least squares (OLS) regression was used for continuous variables and logistic regression was used for categorical variables to estimate incremental validity. Statistically significant changes in adjusted *R*-squared for continuous variables and pseudo *R*-squared for categorical variables when including the cumulative lifetime AUD assessment into the model with the single lifetime AUD assessment indicated incremental validity. Each set of analyses was subset on those not missing on Wave 6 DSM-III lifetime AUD and the Wave 7 covariate of interest.

Results and Discussion

The strongest relations were found between the cumulative lifetime AUD assessment and drinking motives and substance involvement. Further, predictive validity is reduced when using a single assessment of lifetime AUD to predict drinking motives, substance involvement, and externalizing behavior. However, using either the single or the cumulative assessment of AUD produced roughly equivalent associations with several personality variables, psychiatric disorders, general distress, and self-esteem. Table 1 outlines the findings from the correlated correlations analyses and changes in *R*-squared. Regarding family history, both methods produced similar associations with paternal family history status.

Two important conclusions can be drawn from the current study. First, the strength of association between clinically and etiologically relevant variables and lifetime AUD is likely to be underestimated when based upon the type of assessment typically employed in most research studies. Indeed, change in *R*-squared between the single vs. cumulative assessments for several key outcomes (e.g., illicit drug use) reflected conventional medium to medium-large effect sizes (Cohen, 1988). Second, when conducting longitudinal research where AUD is being assessed on multiple occasions, there is significant value in obtaining lifetime information on multiple assessment occasions in contrast to simply assessing criteria occurring over the follow-up intervals (a common practice).

Prior research indicates that single lifetime assessments tend to largely underestimate prevalence compared to cumulative assessments (Haeny et al., 2014a,b). While logically it might be expected that longer intervals between measurement occasions would result in higher estimates of lifetime prevalence owing to a longer period of which new onsets could accrue, this has not been found to be true in our own work nor in the work of others of which we are aware. Notably, it is often not practical to conduct multiple lifetime assessments; in this event, researchers should be aware and make note of the limitations of single assessments of lifetime AUD in relation to their correlates. Based on the current study, prior studies by our group (Haeny et al., 2014a,b), and others (Grant, Dawson, Stinson, Chou, Kay, & Pickering, 2003; Chatterji, Saunders, Vrasti, Grant, Hasin, & Mager, 1997; Copeland et al., 2011; Moffitt et al., 2010), it is clear that the reliability of lifetime diagnosis is much

less than is typically recognized, single assessments underestimate the prevalence of lifetime AUD, and also underestimate the strength of association with important correlates.

Limitations

The present sample was limited to predominantly White, college students in the Midwest. The findings may not generalize across ethnically, educationally, and age diverse samples. Additionally, the relatively small sample sizes (i.e., N_{range}=360-370) at Wave 7 limited the number of psychiatric disorders that could be considered given their low base rates. Further, some of the missing data in the sample was not completely at random which may have influenced the findings. Notably, this pattern of attrition would be expected to lead to more conservative estimates of differences between those with and without lifetime AUD.

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Highlights

- Lifetime AUD assessed at a single wave vs. multiple, sequential waves was compared
- The relation between AUD and etiologically-relevant correlates of AUD were examined
- Correlations were attenuated when AUD was assessed at a single wave
- Evidence for incremental validity was found when synthesizing multiple assessments
- Longitudinal researchers should assess lifetime AUD fully at each assessment period

Table 1

Differential Associations between Cumulative Assessments and a Single Session Assessment of Lifetime AUD Measured at Wave 6 and Clinically and Etiologically Relevant Covariates Measured at Wave 7

	Mean (SD) or Proportion	Single Assessment	Cumulative Session Assessment	Difference between Correlations	ΔR^2 Single vs. Cumulative Assessment
Alcohol Involvement					
Alcohol Quantity-Frequency (*N*=361)	.43 (.42)	$r = .20^{***}$	$r = .31^{***}$	$z = -2.60^{*}$	$\Delta R^2 = .05^{***}$
Heavy Drinking (*N*=361)	.32 (.71)	$r = .25^{***}$	$r = .29^{***}$	$z = -1.04$	$\Delta R^2 = .03^{**}$
Alcohol Consequences (*N*=361)	1.24 (2.00)	$r = .21^{***}$	$r = .34^{***}$	$z = -3.29^{**}$	$\Delta R^2 = .07^{***}$
Positive Expectancies (*N*=361)	5.79 (3.95)	$r = .32^{***}$	$r = .40^{***}$	$z = -1.87$	$\Delta R^2 = .06^{***}$
AUD (*N*=370)	35%	$\varphi = .43^{***}$	$\varphi = .45^{***}$	$z = -.58$	$\Delta R^2 = .04^{***}$
Other Substance Involvement					
Illicit Drug Use (*N*=361)	30%	$\varphi = .24^{***}$	$\varphi = .35^{***}$	$z = -2.67^{*}$	$\Delta R^2 = .06^{***}$
Marijuana Use (*N*=361)	51%	$\varphi = .24^{***}$	$\varphi = .33^{***}$	$z = -2.34^{*}$	$\Delta R^2 = .05^{***}$
Cigarette Use (*N*=370)	73%	$\varphi = .17^{**}$	$\varphi = .26^{***}$	$z = -2.38^{*}$	$\Delta R^2 = .04^{***}$
Heavy Cigarette Use (*N*=361)	30%	$\varphi = .19^{***}$	$\varphi = .29^{***}$	$z = -2.70^{*}$	$\Delta R^2 = .05^{***}$
DUD (*N*=370)	10%	$\varphi = .15^{*}$	$\varphi = .19^{***}$	$z = -.84$	$\Delta R^2 = .01^{*}$
TUD (*N*=370)	7%	$\varphi = .15^{**}$	$\varphi = .17^{***}$	$z = -.41$	$\Delta R^2 = .01$
Drinking Motives					
Coping (*N*=361)	3.75 (3.62)	$r = .23^{***}$	$r = .30^{***}$	$z = -1.60$	$\Delta R^2 = .03^{***}$
Enhancement (*N*=361)	6.64 (4.03)	$r = .29^{***}$	$r = .40^{***}$	$z = -2.74^{*}$	$\Delta R^2 = .07^{***}$
Personality Variables					
NEO-FFI Neuroticism (*N*=360)	16.09 (7.42)	$r = .07$	$r = .11^{*}$	$z = -.98$	$\Delta R^2 = .01$
NEO-FFI Extraversion (*N*=360)	29.73 (6.27)	$r = -.06$	$r = -.03$	$z = -.73$	$\Delta R^2 < .01$
NEO-FFI Openness (*N*=360)	27.63 (6.52)	$r = .10$	$r = .07$	$z = .74$	$\Delta R^2 < .01$
NEO-FFI Agreeableness (*N*=360)	33.72 (5.82)	$r = -.24^{***}$	$r = -.31^{***}$	$z = 1.79$	$\Delta R^2 = .04^{***}$
NEO-FFI Contentiousness (*N*=360)	34.14 (5.98)	$r = -.06$	$r = -0.08$	$z = .49$	$\Delta R^2 < .01$

	Mean (SD) or Proportion	Single Assessment	Cumulative Session Assessment	Difference between Correlations	ΔR^2 Single vs. Cumulative Assessment
Externalizing					
AAB (*N*=370)	30%	$\varphi = .28^{***}$	$\varphi = .32^{***}$	z = −.95	$\Delta R^2 = .03^{**}$
EPI-Impulsivity (*N*=361)	3.27 (1.76)	$r = .13^{*}$	$r = .19^{***}$	z = −1.49	$\Delta R^2 = .02^{*}$
MacAndrew Scale (*N*=361)	20.00 (3.56)	$r = .13^{*}$	$r = .23^{***}$	$z = -2.56^{*}$	$\Delta R^2 = .04^{***}$
Psychiatric Disorders, General Distress, and Self-Esteem					
MDE (*N*=366)	22%	$\varphi = .17^{**}$	$\varphi = .18^{***}$	z = .75	$\Delta R^2 = .01$
Anxiety Disorder (*N*=370)	18%	$\varphi = .11^{*}$	$\varphi = .14^{**}$	z = .77	$\Delta R^2 = .01$
BSI-GSI (*N*=361)	.22 (.27)	$r = .15^{*}$	$r = .17^{**}$	z = −.56	$\Delta R^2 < .01$
Rosenberg Self-Esteem (*N*=361)	24.48 (4.61)	$r = -.12^{*}$	$r = -.15^{*}$	z = .75	$\Delta R^2 = .01$

Note.

r = Pearson product moment correlation coefficient for continuous variables. φ = phi coefficient for binary variables. ΔR^2 = change in adjusted *R*-square for continuous variables and pseudo *R*-square for categorical variables. The correlation between the single assessment lifetime AUD and the cumulative assessment lifetime AUD ranged between .69-.70 depending on the sample size (*N* range 360-370) of the correlate assessed in the analysis. AUD = alcohol use disorder. DUD = drug use disorder. TUD = tobacco use disorder. NEO-FFI = The NEO Five Factor Inventory (Costa & McCrae, 1989). AAB = adult antisocial behavior. EPI = Eysenck Personality Inventory (as used by Rocklin & Revelle, 1981). MDE = major depressive episode. BSI-GSI = General Severity Index of the Brief Symptom Inventory (Derogatis, 1993; Derogatis & Spencer, 1982). The dependent variables assessed at Wave 7 ranged in their time period assessed: the BSI-GSI was assessed in the past seven days; alcohol quantity-frequency, alcohol consequences, and heavy drinking were assessed in the past-year; and AUD, TUD, DUD, AAB, anxiety disorder, MDE, cigarette use, marijuana use, and illicit drug use were assessed over the lifetime. No time frame was provided for alcohol expectancies, drinking motives, self-esteem, and the personality variables as is typical in these assessments.

$^{*}p<.05$

$^{**}p<.01$

$^{***}p<.001$.

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