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Applicability of Type A/B alcohol dependence in the general population.

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Journal

Drug and alcohol dependence, 138(1)

ISSN

0376-8716

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Publication Date

2014-05-01

DOI

10.1016/j.drugalcdep.2014.02.698

Peer reviewed

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Contents lists available at ScienceDirect

Drug and Alcohol Dependence

journal homepage: www.elsevier.com/locate/drugalcddep

Full length article

Applicability of Type A/B alcohol dependence in the general population

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ARTICLE INFO

Article history:

Received 30 April 2013

Received in revised form 15 February 2014

Accepted 17 February 2014

Available online 5 March 2014

Keywords:

Alcoholic subtype
Alcohol dependence
Latent class analysis
Type A/B

ABSTRACT

Background: This study examined the concurrent and predictive validity of Type A/B alcohol dependence in the general population—a typology developed in clinical populations to gauge severity of dependence. **Methods:** Data were drawn from Waves 1 and 2 of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). The sample included 1,172 alcohol-dependent drinkers at baseline who were reinterviewed three years later. Latent class analysis was used to derive Type A/B classification using variables replicating the original Type A/B typology. Predictive validity of the Type A/B classification was assessed by multivariable linear and logistic regressions.

Results: A two-class solution consistent with Babor's original Type A/B typology adequately fit the data. Type B alcoholics in the general population, compared to Type As, had higher alcohol severity and more co-occurring drug, mental, and physical health problems. In the absence of treatment services utilization, Type B drinkers had two times the odds of being alcohol dependent three years later. Among those who utilized alcohol treatment services, Type B membership was predictive of heavy drinking and drug dependence, but not alcohol dependence, three years later.

Conclusions: Findings suggest that Type A/B classification is both generalizable to, and valid within, the US general population of alcohol dependent drinkers. Results highlight the value of treatment for mitigating the persistence of dependence among Type B alcoholics in the general population. Screening for markers of vulnerability to Type B dependence could be of clinical value for health care providers to determine appropriate intervention.

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1. Introduction

Considerable research has demonstrated heterogeneity within the alcohol dependent population with respect to family history of alcoholism, drinking history, drinking patterns, alcohol problems, and comorbid psychiatric and drug diagnoses (Dawson, 2000; Grant et al., 2004; Harford et al., 1992). Numerous attempts have thus been made to identify homogeneous subtypes of dependent drinkers to better understand the etiology and course of the disorder. Such typologies are potentially useful in the prognosis and treatment of alcohol dependence. However, the extent to which they are of practical value partly hinges on their predictive validity, the ease with which they may be used in practice, and their relevance for a general population.

Research on alcohol dependence typologies has progressed from unidimensional typologies based on a single defining characteristic, to multidimensional typologies and, with recent advances in measurement and multivariate statistical techniques, complex typologies comprising several subtypes (Babor et al., 1992; Bucholz et al., 1996; Cloninger, 1987; Morey and Skinner, 1986; Moss et al., 2007, 2010; Windle and Scheidt, 2004; Zucker, 1994). Despite this move toward greater levels of specificity, it is not clear whether the reliability and validity of multiple subtype models are superior to parsimonious models with fewer categories. And perhaps more importantly, it is not at all clear that multiple subtype models of alcohol dependence will have greater, or even similar, clinical utility. There is likely to be a trade-off between the goal of increased specificity for research purposes and the need for simple, easily applied typologies that can inform clinical practice.

In this study, we focus on the Type A and Type B model of alcoholism, arguably the most prominent typology of alcohol dependence. Given its parsimony and demonstrated discriminant and predictive validity (Epstein et al., 2002), potential value to

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clinicians is significant. Like many key developments in alcoholism nosology—ranging from Jellinek's Greek alphabet typology to Edward's formulation of an alcohol dependence syndrome (Edwards, 1986)—the Type A/B typology grew out of the systematic empirical observation of alcoholics in clinical settings. In Babor et al.'s original formulation (1992), derived using 17 different severity-related dimensions, two distinct clusters of alcoholics were identified. The less severe "Type A" alcoholics had a later age of onset of problem drinking, fewer childhood risk factors, and less alcohol-related problems as well as dependence and psychiatric symptoms. The more severe "Type B" alcoholics had an earlier onset, more childhood risk factors, plus high rates of familial alcoholism, greater severity of dependence, polydrug use, comorbid psychiatric conditions, and longer treatment histories.

Following Babor et al.'s 1992 paper, a growing body of research has investigated whether the Type A/B model is generalizable across substance abusers in different clinical settings (Ball, 1996, 1995, 2000; Litt et al., 1992; Schuckit et al., 1995). Some studies suggest that the typology is applicable to populations in treatment for illicit drug dependence (Ball et al., 1995; Feingold et al., 1996). Others demonstrate its discriminant and predictive validity in populations of inpatient and outpatient treatment programs (Epstein et al., 2002; Litt et al., 1992; Morgenstern et al., 1998; Schuckit et al., 1995). The majority of studies have, however, focused exclusively on clinical samples of alcoholics. A few notable exceptions have demonstrated the Type A/B typology's applicability to a range of illicit drug disorders among substance users outside of treatment (Feingold et al., 1996) and to nondependent problem drinkers in general population and community-based samples (Carpenter and Hasin, 2001; Carpenter et al., 2006).

Importantly, the discriminant and predictive validity of the Type A/B typology has not been evaluated among alcohol dependent drinkers in the general population. This is an important gap to address. It has long been understood that there are "two worlds of alcohol problems," one inhabited by dependent patients in clinical settings and the other by people experiencing dependence in the general population (Room, 1980, 1983). The population treated for alcoholism tends to be more severely affected by drinking compared to their counterparts in the general population and is dominated by men, the unmarried, and lower-income, socially marginalized individuals (Room, 1989; Weisner et al., 2003; Weisner and Schmidt, 1993). A strong test of the validity of the Type A/B typology therefore requires examination of its external validity with respect to the general population, its associations with other meaningful severity indicators, and ability to predict the course of alcohol problems over time.

Moreover, given the rapidly growing interest in alcohol screening and brief intervention in primary care and other mainstream health settings, identifying distinctive markers of Type A and Type B dependence in the general population could help to inform a health provider's decision about whether to aggressively recommend treatment for patients with dependence symptoms. At present, the NIAAA's clinician guidelines simply indicate that the clinician should "consider referring [patients with alcohol use disorder symptoms] for additional evaluation by an addiction specialist" (emphasis added; National Institute on Alcohol Abuse and Alcoholism, 2005).

The present study advances work on the Type A/B classification in several ways. First, we utilize nationally representative data to examine whether the Type A/B typology developed in the clinical world extends to alcohol dependent persons in the general population. Second, unlike most prior studies of Type A/B predictive validity which have focused largely on treatment outcomes (Babor et al., 1992; Ball et al., 2000; Feingold et al., 1996; Litt et al.), the present study prospectively assesses drinking and health outcomes over a three-year period. Third, by examining the demographic and

clinical profiles of Type A and Type B dependent drinkers in the general population, we elucidate markers of Type B vulnerability to improve clinical utility of the Type A/B typology.

2. Methods

The present study uses data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), where large sample permits study of how severity ranges in a representative sample of alcohol-dependent people in the general population. Ample baseline measurement of clinical and behavioral characteristics for severity allowed us to operationalize the Type A/B typology accurately and to assess its concurrent validity against a range of other well-documented indicators of alcoholism severity. A three-year prospective follow-up of the entire NESARC sample provided a unique opportunity to study the predictive validity of the Type A/B typology in the general population using drinking- and health-related outcomes, as opposed to the treatment outcomes used in previous research (Babor et al., 1992; Ball et al., 2000; Feingold et al., 1996; Litt et al., 1992; Morgenstern et al., 1998).

2.1. Sample

The NESARC involved in-person interviews with a nationally representative US sample of adults, aged 18 and older, residing in households and noninstitutional group living quarters in all 50 states and the District of Columbia (Grant et al., 2003, 2004). The baseline survey, conducted in 2001–2002, consisted of 43,093 completed in-person interviews. A subset of the sample was reinterviewed in 2004–2005 ($n = 34,653$) to form the three-year follow-up sample. The response rates for the baseline and follow-up were 81.0% and 86.7%, respectively (Grant and Kaplan, 2005). This analysis used a subsample of drinkers who met the criteria for the DSM-IV alcohol dependence at baseline and were reinterviewed three years later ($n = 1,172$).

2.2. Measures

2.2.1. Alcohol consumption, alcohol and drug dependence, and psychiatric disorders. The NESARC used the Alcohol Use Disorder and Associated Disabilities Interview Schedule-DSM-IV version (AUDADIS-IV; Grant and Hasin, 1992) to assess alcohol consumption, alcohol use disorder, and other psychiatric and behavioral disorders including drug use, major depression, antisocial personality, and generalized anxiety based on the diagnostic criteria set out in the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 2000). Alcohol consumption was measured by a comprehensive set of questions asking respondents' beverage-specific consumption during usual and heaviest drinking periods.

2.2.2. Type A/B model domains. The original Type A/B model consisted of 17 dimensions that represent drinker characteristics in four domains: premorbid risk factors, pathological use of alcohol and other substances, chronicity and consequences of drinking, and psychiatric symptoms (Babor et al., 1992). We were able to identify 16 comparable dichotomous variables from the NESARC baseline with which to derive the Type A/B classification (please see Table 1 for prevalence and a full description of the measures). Two of the original dimensions, bipolar character and benzodiazepine use, were not available in NESARC. To dichotomize ordinal and continuous measures, we employed meaningful cut-points established in the literature and/or which capture the upper range of response scales. Onset of problem drinking was captured by early onset of drinking (prior to age 15) and alcohol dependence (prior to age 25), measures also used in Babor et al.'s study. Heavy alcohol use was defined as weekly 5+/4+ drinking for men/women, which is a strong predictor of alcohol problems (Greenfield and Kerr, 2008; National Institute on Alcohol Abuse and Alcoholism, 2005). Dependence syndrome (a measure of severity of alcohol dependence in Babor et al.'s study) was operationalized as 5 or more alcohol dependence criteria in the past 12 months (the mid-point of 3 to 7 dependence criteria). Lifetime severity was defined as having 8 or more of 11 possible alcohol abuse or dependence criteria. A cut-point of 10 or more years was used to capture the upper range of the years of heavy drinking continuum. NESARC's only available measure of childhood disorder was childhood conduct disorder and defined as having no adult antisocial behavior.

2.2.3. Validation measures. Validation measures were chosen based on findings from existing studies that demonstrate the associations of the Type A/B typology with concurrent and prospective measures of alcohol severity, co-occurring substance use, psychiatric functioning, health conditions, and treatment outcomes (Babor et al., 1992; Ball et al., 2000; Carpenter et al., 2006; Feingold et al., 1996; Litt et al., 1992; Schuckit et al., 1995). Drug dependence was assessed for sedatives, tranquilizers, painkillers, stimulants, marijuana, cocaine/crack, hallucinogens, inhalants/solvents, heroin, or other illicit drugs within the 12 months prior to the baseline and the three-year follow-up interviews. Mental and physical health status was assessed by the SF-12 (V2R) survey to calculate norm-based Mental as well as Physical Health Composite Scores with lower scores indicating worse health (Moss et al., 2010; National Institute on Alcohol Abuse and Alcoholism, 2004; Ware et al., 2002).

Table 1
Operationalization of Type A and Type B alcohol dependence domain characteristics (n = 1172).

Type A/B Characteristics	NESARC Measures	Prevalence (%)
Premorbid Risk Factors		
Familial Alcoholism	Any first degree relatives including blood or natural father or mother and full brother or sister ever been an alcoholic or problem drinker	47.5
Childhood Disorder	DSM-IV Conduct Disorder (no antisocial personality disorder)	1.7
Onset of Problem Drinking	Onset of drinking prior to age 15 Onset of alcohol dependence prior to age 25	18.8 60.3
Pathological Use of Alcohol and Other Substances		
Heavy Alcohol Use	Weekly 5+ drinking for men and 4+ drinking for women	63.5
Relief Drinking	Had taken a drink or used any drug or medicine to get over any of the bad aftereffects of drinking or to keep from having any of these bad effects of drinking	29.0
Dependence Syndrome	5 or more alcohol dependence criteria in the last 12 months	31.5
Polydrug Use	Any use of drugs, including sedatives, tranquilizers, painkillers, stimulants, marijuana, cocaine or crack, hallucinogens, inhalants/solvents, heroin, or other drugs, in the last 12 months	40.6
Chronicity and Consequences of Drinking		
Medical Conditions	Had any alcohol contributed health conditions, including hypertension, liver cirrhosis, other liver disease, chest pain/angina pectoris, rapid heartbeat/tachycardia, heart attack or myocardial infarction, other forms of heart disease, stomach ulcer, and gastritis (Anderson and Baumberg, 2006), in the past 12 months	28.4
Physical consequences	Any physical harm because of drinking in the last 12 months	54.2
Social Consequences	Any problem with family, job, friends, physical fights, or arrests because of drinking in the last 12 months	36.7
Lifetime Severity	8 or more lifetime alcohol abuse or dependence criteria	32.7
Years Heavy Drinking	Self-reported heaviest drinking period lasting 10 or more years	13.2
Psychiatric Symptoms		
Depression	DSM-IV Major Depression in the last 12 months	22.3
Antisocial Personality	DSM-IV Antisocial Personality Disorder (with conduct disorder)	18.3
Anxiety Severity	DSM-IV Generalized Anxiety in the last 12 months	6.1

Recovery status within the 12 months prior to the follow-up was categorized into five levels for consistency with other remission studies (Dawson et al., 2007, 2006, 2005): 1) Remained dependent: 3 or more alcohol dependence criteria, 2) Partial remission: nonalcohol dependent but reported one or more alcohol abuse or dependence criteria, 3) Asymptomatic risk drinker: no DSM-IV criteria for either alcohol abuse or dependence but was a past-year risk drinker (more than 14 drinks for men/7 drinks for women per week or 5 or more drinks for men/4 or more drinks for women in a single day in the past year), 4) Low-risk drinker: past-year drinker with no symptoms of either abuse or dependence and was not a risk drinker, 5) Abstainer: did not consume any alcohol in the 12 months prior to follow-up interview. Prospective analyses also controlled for alcohol treatment utilization. Consistent with prior studies (e.g., Cunningham and Blomqvist, 2006; Keyes et al., 2010, 2012), treatment utilization is broadly defined here to include utilization of specialty (detoxification, inpatient, outpatient, and rehabilitation programs) and nonspecialty (Alcoholic Anonymous, family or social services, emergency room, halfway house, crisis center, employee assistance program, clergyman, physician, or mental health clinicians) services for one's drinking.

2.3. Statistical analyses

All analyses were adjusted for the complex survey design to provide correct standard errors and significance tests (Grant and Kaplan, 2005; Grant et al., 2003). All longitudinal analyses had additional weights applied to adjust the analysis sample to be representative of the original alcohol-dependent drinkers at baseline (Grant and Kaplan, 2005).

The first goal was to assess whether the Type A/B distinction, largely studied in clinical population samples, was generalizable to a large, household population sample. Analysis therefore began with Latent Class Analysis (LCA) to derive the Type A/B classification based on 16 variables representing four domains of the original formulation. LCA has been previously used to identify multidimensional conceptual classifications of alcohol dependence, problem drinking, smoking, and health risk behaviors (Laska et al., 2009; Moss et al., 2007; Reboussina et al., 2006; Sutfin et al., 2009). In the interest of clinical utility, LCA focused on a two-class solution to identify Type A or B groups with distinctive item endorsement probabilities profiles using *Mplus* (Muthén and Muthén, 2011); however, three-class solution was also estimated to compare model fit (Nylund et al., 2007). Using cross-tabulations, we examined sociodemographic differences between those classified as Type A and B drinkers. Also, we compared item endorsement probabilities of the 16 variables to identify any general patterns in symptomatology.

We proceeded to assess concurrent validity, or associations of the resulting Type A/B classification with other indicators of severity not included in the LCA. Chi-square tests were performed using *STATA V13* (Stata Corp, 2009, 2013) to compare Type A and B drinkers with respect to baseline drinking profiles, lifetime problem severity, drug dependence, and mental and physical health composite scores. Final steps of the validation analysis used the three-year follow-up data to assess predictive validity of the Type A/B typology, taking into account alcohol treatment utilization between baseline and follow-up. Multivariable linear and logistic regressions were specified for alcohol consumption, alcohol and drug dependence, and

mental and physical health composite scores at follow-up, as a function of baseline Type A/B class and controls (i.e., baseline sociodemographic characteristics). We also compared the recovery status at three years for those baseline-classified as Type A versus B drinkers in the treated and untreated groups.

3. Results

3.1. Generalizability of Type A/B typology in the US general population

Results of LCA indicated that a two-class solution adequately fit the data (Loglikelihood = −9552.90, BIC = 19339.00, Entropy = 0.81), thereby differentiating two subgroups of alcohol dependent drinkers in a manner consistent with the Type A/B distinction observed by Babor et al., 1992. One class, with resemblance to Babor et al.'s more severe Type B drinkers, consisted of 31% of alcohol dependent drinkers in the US general population, with the remainder resembling the less severe, Type A. The Lo-Mendell-Rubin adjusted likelihood ratio test (LMR) compares the improvement in fit between nested latent class models (i.e., comparing k - and $k-1$ class models). At the 5% level, a p -value less than 0.05 suggests a statistically significant improvement in fit for the inclusion of one more class (Nylund et al., 2007). The LMR test ($p=0.53$) rejected a three-class solution (Loglikelihood = −9437.60, BIC = 19228.52, Entropy = 0.73) in favor of a two-class model (A four-class model was also rejected). LCA models were initially conducted separately for dependent men and women, but the distribution of class membership and item endorsement probabilities were similar across gender, and no major changes were found when LCA was performed on the entire sample. Therefore, results based on the entire sample are reported here.

Figure 1 shows variation in rates of item endorsement probabilities for those identified as Type A and B drinkers across all 16 variables in the model. Type B drinkers were most distinguished from the less severe Type A class by higher item endorsement probabilities for: 1) lifetime severity; 2) social consequences, and 3) dependence syndrome (5 or more dependence symptoms). Other domains that differentiate Type A and B drinkers include physical consequences, polydrug use, antisocial personality disorder, relief drinking, heavy alcohol use, and family alcoholism.

Figure 1. Item endorsement probabilities by class membership. Note: All items correspond to measures described in Table 1.

Table 2 further characterizes cases falling into the Type A and B groups by contrasting their baseline sociodemographic characteristics. Type B dependent drinkers are more likely to be male (AOR = 1.42), American Indian versus White (AOR = 7.96), and more socially marginalized group with less education (AOR = 1.86).

3.2. Concurrent and predictive validity

Table 3 shows comparisons of baseline markers for severity that were not included in the LCA modeling between Type A/B dependence to demonstrate concurrent validity. Those classified as Type B dependent drinkers drank alcohol more frequently, consume

higher quantities, and had more severe lifetime alcohol problems than Type A dependent drinkers. Type B drinkers were also significantly more likely to have comorbid drug dependence and lower (worse) mental and physical health scores than Type A.

To investigate predictive validity, we performed longitudinal analyses using the three-year follow-up data. We examined whether the elevated alcohol severity associated with Type B dependence persists over time and is predictive of subsequent outcomes, including alcohol consumption, recovery status, alcohol and drug dependence, and physical and mental health conditions at follow-up. Because of large differences in treatment utilization between baseline and follow-up (41% of Type B vs. 9% of Type A

Table 2
Sociodemographic characteristics of Type A and Type B alcohol dependent drinkers.

Sociodemographic characteristics	Type A (n = 832) %	Type B (n = 340) %	Unadjusted odds ratios for Type B (95% CI)	Adjusted odds ratios ^a for Type B (95% CI)
Class size	69.2	30.8		
Gender				
Male	65.8	73.1*	1.41 (1.01–1.97)*	1.42 (1.00–2.00)*
Female	34.2	26.9	1.0	1.0
Age				
18–29	54.2	51.9	1.0	1.0
30–44	30.3	32.4	1.11 (0.76–1.63)	1.19 (0.75–1.88)
≥45	15.4	15.7	1.06 (0.68–1.66)	1.07 (0.62–1.85)
Ethnicity				
White	71.3	66.8**	1.0	1.0
Black	11.5	9.4	0.87 (0.54–1.40)	0.75 (0.45–1.26)
US born hispanic	8.9	10.6	1.26 (0.76–2.10)	1.19 (0.71–2.03)
Immigrant Hispanic	4.7	3.2	0.73 (0.35–1.52)	0.52 (0.23–1.15)
American Indian	0.6	5.1	9.92 (2.32–42.34)**	7.96 (1.86–34.04)**
Other minority	3.0	5.0	1.74 (0.71–4.31)	1.86 (0.78–4.39)
Education				
Less than high school	14.4	21.3*	2.23 (1.31–3.81)**	1.86 (1.00–3.48)*
High school graduate	27.4	30.5	1.68 (1.03–2.76)*	1.36 (0.81–2.29)
Some college	38.5	35.1	1.38 (0.88–2.17)	1.25 (0.78–2.01)
4-year college graduate	19.7	13.0	1.0	1.0
Marital status				
Married/living together	36.5	31.5	1.0	1.0
Widowed/divorced/separated	14.5	19.4	1.55 (1.03–2.31)*	1.34 (0.87–2.06)
Single	49.0	49.1	1.16 (0.82–1.64)	1.01 (0.66–1.54)
Family income				
< \$20,000	30.9	37.5	1.87 (1.17–3.00)*	1.60 (0.93–2.74)
\$20,000–34,999	19.9	21.9	1.70 (1.05–2.76)*	1.51 (0.89–2.57)
\$35,000–69,999	28.1	26.7	1.46 (0.90–2.38)	1.27 (0.76–2.11)
> \$70,000	21.2	13.8	1.0	1.0

Percentages are weighted.

^a Adjusted odds ratios: The model included all variables listed in the column at the far left. * p < 0.05, **p < 0.01.

Table 3

Concurrent validity of the Type A/B classification: Associations with alcohol consumption and problem severity at baseline.

Baseline Outcomes	Type A (n = 832)		Type B (n = 340)	
	Mean	(SE)	Mean	(SE)
Alcohol consumption				
Number of days drank any alcohol	147	(5)	212	(8)***
Number of drinks consumed on days when drank alcohol	5.65	(0.20)	8.32	(0.40)***
Largest number of drinks consumed on days when drank alcohol	11.68	(0.40)	16.55	(0.65)***
Average daily number of drinks consumed	3.79	(0.26)	7.90	(0.53)***
Lifetime alcohol problem severity				
Number of episodes of alcohol dependence	1.45	(0.05)	3.69	(0.65)**
Months of longest episode of alcohol dependence	15.47	(1.26)	33.00	(4.00)***
Comorbid conditions				
Drug dependence (%)	3.6	(0.9)	21.1	(2.7)***
Mental health composite score (SF-12)	48.90	(0.44)	44.52	(0.82)***
Physical health composite score (SF-12)	54.20	(0.33)	51.09	(0.66)***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ **Table 4**

Predictive validity of Type B (vs. Type A) dependence by treatment utilization: Associations with alcohol consumption, problems, and comorbidity at the three-year follow-up.

Follow-up outcomes	Treatment (n = 221)		No Treatment (n = 951)	
	Adjusted ^a coefficients	95% CI	Adjusted coefficients	95% CI
Number of days drank 5+ drinks	40.56*	(6.45, 74.67)	25.32**	(10.53, 40.11)
Average daily number of drinks consumed	2.27*	(0.07, 4.48)	1.12***	(0.56, 1.69)
Mental health composite score	−2.85	(−6.13, 0.44)	−2.38**	(−3.99, −0.78)
Physical health composite score	−1.28	(−4.23, 1.66)	−1.93**	(−3.29, −0.56)
	Adjusted ^a odds ratios		Adjusted odds ratios	
Alcohol dependence	1.32	(0.65, 2.72)	2.00**	(1.27, 3.15)
Drug dependence	9.39*	(1.41, 62.55)	2.57*	(1.24, 5.33)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ ^a Linear and logistic regression analyses adjusted for gender, age, ethnicity, and education.

Note: Alcohol treatment utilization is broadly defined to include utilization of specialty services (detoxification, inpatient, outpatient, and rehabilitation programs) and non-specialty services (Alcoholic Anonymous, family or social services, emergency room, halfway house, crisis center, employee assistance program, clergyman, physician or mental health clinicians) for one's drinking from baseline to follow-up.

Table 5

Prevalence (%) of follow-up recovery status by baseline Type A and Type B membership and treatment utilization.

	Treatment ^a		No Treatment	
	Type A (n = 81)	Type B (n = 140)	Type A (n = 751)	Type B (n = 200)
Recovery Status				
Remained alcohol dependent	54.8 (6.6)	59.8 (5.1)	27.7 (1.9)	43.0 (4.8) ^b
Partial remission	26.6 (6.3)	15.5 (3.8)	44.0 (2.1)	36.8 (4.3)
Asymptomatic risk drinker	4.7 (2.9)	9.1 (3.0)	16.2 (1.6)	14.5 (3.0)
Low-risk drinker	6.2 (2.8)	3.1 (1.4)	7.6 (1.1)	3.1 (1.4)
Abstainer	7.7 (3.1)	12.6 (3.1)	4.5 (0.9)	2.7 (1.2)

Note: Standard errors are in parenthesis. Partial remission indicates nonalcohol dependent but reported one or more alcohol abuse or dependence criteria.

^a Alcohol treatment utilization is broadly defined to include utilization of specialty services (detoxification, inpatient, outpatient, and rehabilitation programs) and non-specialty services (Alcoholic Anonymous, family or social services, emergency room, halfway house, crisis center, employee assistance program, clergyman, physician or mental health clinicians) for one's drinking from baseline to follow-up.^b Significantly different between Type A and Type B drinkers who had no treatment ($p < 0.01$).

used services), analyses were conducted separately for treatment services users and non-users.

Table 4 shows the adjusted regression coefficients and odds ratios of Type A/B dependence in predicting outcomes at follow-up. The adjusted parameters controlled for gender, age, ethnicity, and education. Among those who did not use treatment services from baseline to follow-up, Type B drinkers reported greater daily consumption, more frequent heavy drinking, and worse physical and mental health at follow-up (all $ps < 0.01$). They also had roughly two times the odds of being alcohol dependent (AOR = 2.00) and drug dependent (AOR = 2.57) three years later. Among those who utilized alcohol treatment services between baseline and follow-up, Type B drinkers were at elevated risk for frequent heavy drinking and drug dependence compared to Type A drinkers three years later. But they did not differ significantly from Type A drinkers in their risk for alcohol dependence and their mental and physical health scores at follow-up.

Table 5 shows differences in recovery after three years among those classified as Type A/B dependent drinkers at baseline. More than half of the Type A (54.8%) and Type B (59.8%) drinkers who received treatment were still alcohol dependent at follow-up. More Type B drinkers who received treatment, however, became abstainers at follow-up, while more Type A drinkers were in partial remission. Among those who did not receive treatment, significantly more of the Type B (43.0%) than Type A (27.7%) drinkers continued to be alcohol dependent at follow-up. Moreover, Type B drinkers were less likely to be in partial remission than Type A (36.8% of Type B vs. 44.0% of Type A).

4. Discussion

We examined the concurrent and predictive validity of Type A/B alcohol dependence in the US general population. Most prior research focusing on dimensional approaches to addiction

diagnosis, such as the Type A/B typology, has focused on a rather narrow band of the alcohol dependent population in clinical settings, which significantly differs from the wider population in sociodemographic composition, social marginalization, and overall severity of illness. On the whole, our findings suggest that the typology is both generalizable to, and valid within, the US general population of alcohol dependent drinkers.

Our findings suggest that approximately one-third of the alcohol-dependent drinkers in the US general population can be classified as the more severe Type B alcoholics—including 31% of dependent men and 27% of dependent women. This distribution is quite comparable to some studies with treatment samples. For example, Schuckit et al., 1995 found that 29% of the sample from the Collaborative Study on the Genetics of Alcoholism fit the Type B classification (31% of men and 25% of women). Also, Epstein et al.'s (2002) study of in- and outpatient alcoholics indicated that 35% were Type B drinkers (38% among men and 25% among women). However, Babor et al.'s (1992) original study found that 49% of a treatment population could be classified as Type B (53% for men and 38% for women). Other studies of treatment-seeking samples also reported Type A/B proportions similar to those reported in Babor et al. (Litt et al., 1992; Morgenstern et al., 1998).

On the whole, Type B dependent drinkers in the general population looked very similar to those found in clinical samples, with significantly more chronic alcohol problems and co-occurring conditions than their Type A counterparts. Specific symptoms that differentiated Type A and B drinkers in the general population were similar to those identified in clinical samples of dependent patients: lifetime alcohol use disorder severity, social consequences, and current dependence severity (Epstein et al., 2002; Schuckit et al., 1995). Age of onset of alcohol dependence also distinguished Type A and B drinkers, although the difference was relatively smaller in our study compared to prior studies (0.57 vs. 0.67, $p < 0.001$). We used a dichotomous variable to define early onset prior to age 25 which might have contributed to a smaller difference compared to studies that used continuous measures.

Unlike the original clinical studies by Babor et al., 1992 and Schuckit et al., 1995, conduct disorder and years of heavy drinking did not differentiate Type A and B dependence in our analysis. The very low endorsement probabilities for conduct disorder we observed might reflect the NESARC's operationalization of conduct disorder as the presence of the disorder without adult antisocial behavior. Additionally, years of heavy drinking have been measured differently across studies, and measures have not always specified the actual level of consumption (see Babor et al., 1992; Schuckit et al., 1995), which might explain why findings for heavy drinking have varied somewhat. Compared to Type A drinkers, Type B drinkers reported shorter duration of heavy drinking (Babor et al., 1992), longer duration (Schuckit et al., 1995) and, in our current study, showed no difference in whether their heaviest drinking period lasted 10 or more years.

Unlike most prior clinical studies, the NESARC's large sample and population heterogeneity allowed us to assess racial/ethnic differences in Type A/B classification. Here, we found a higher percentage of Type B drinkers among American Indians in particular, but also among US-born Hispanics. Beyond this, differences in the demographic profiles of Type A and B drinkers paralleled those described in clinical studies, with Type B drinkers more likely to be male (Babor et al., 1992; Epstein et al., 2002; Schuckit et al., 1995), unmarried or cohabiting (Ball et al., 2000; Schuckit et al., 1995), and with lower family incomes (Schuckit et al., 1995). In some studies, young age has been related to severe dependence subtypes (Carpenter and Hasin, 2001; Moss et al., 2007), but we found neither age in continuous or categorical form to be associated with Type B dependence, similar to a study of the Type A-Type B classification in a community sample of problem drinkers (Carpenter et al., 2006).

It should be noted that other research on alcohol dependence subtypes has conducted latent class analysis using the NESARC data. Unlike the current study which focused on Babor's original Type A and Type B typology and variables, Moss et al.'s (2007) classification identified 5 classes based on 26 categorical variables, some of which differed from the current study's (e.g., current alcohol abuse and alcohol dependence criteria, different lifetime psychiatric diagnoses [such as dysthymia, social phobia, and obsessive-compulsive disorder], current daily smoking, multigenerational alcoholism, and early onset of depression). Despite such differences, Type B drinkers in our study resemble the Young Antisocial subtype in Moss's study in terms of their high lifetime and current alcohol dependence severity, high rates of family alcoholism and antisocial personality disorder, young age, and low socioeconomic status. Our Type B group also appears to overlap somewhat with the Chronic Severe subtype in Moss' study, who share many common characteristics with the Young Antisocial subtype but are of older age, and have later onset of dependence. They also have a high rate of alcohol-related psychosocial dysfunction, similar to the physical and social consequences seen among Type B in our study (Figure 1). Moss et al., 2010 found that at follow-up, the Young Antisocial and Chronic Severe subtypes were more likely to be alcohol dependent, to have received treatment services, and continue to have worse mental and physical health scores than other drinkers, consistent with our findings for Type B drinkers.

Our assessment of the predictive validity of the Type A/B model provided evidence that among those who did not use alcohol treatment services Type B dependence is associated with more persistent alcohol and drug disorders and health comorbidities three years later. Type B dependent drinkers had greater daily consumption, more frequent 5+ drinking, and had more drinking and psychiatric problems. These findings too are paralleled in clinic-based studies (Babor et al., 1992; Litt et al., 1992; Morgenstern et al., 1998). Type B, therefore, does not simply appear to be marker for higher-severity alcohol problems, but also is predictive of a longer, more troubled course of alcohol problems over time.

On an optimistic note, we observed substantial rates of remission from alcohol dependence, especially among the Type A drinkers, often in the absence of alcohol services utilization. At the year three follow-up, only 28% of Type A drinkers remained alcohol dependent, and an additional 12% were either abstinent or drank within the low-risk consumption limits put forth by NIAAA (National Institute on Alcohol Abuse and Alcoholism, 2005). Type A dependent drinkers therefore seem to be particularly apt to experience natural recovery.

Among the dependent drinkers who utilized alcohol treatment services during the three-year observation period, we found roughly equivalent rates of remission among Type A and B drinkers. Given that Type B drinkers had greater alcohol severity and more co-occurring drug and mental health problems, our finding of similar remission rates is significant and somewhat unexpected. We speculated that Type B drinkers might have a different experience of treatment utilization, owing to their greater problem severity, and therefore conducted post hoc descriptive analyses to more closely examine the services utilization of the two groups of treatment users. We found that Type B drinkers used a greater number of alcohol treatment services than Type A drinkers (on average, 3.7 vs. 1.9 types of services at Wave 1, and 5.7 vs. 2.9 during the follow-up period, p 's $< .05$). Type B drinkers were also more likely than Type A drinkers to receive both specialty and nonspecialty treatment (55.6% vs. 26.8% at Wave 1, $p < .06$ and 61.9% vs. 35.3% during the follow-up period, $p < .05$). The more intensive services utilization by Type B dependent drinkers might, thus, help to account for the similar remission rates in the Type A and B groups.

With regard to the clinical significance of our study, these findings suggest the need for active intervention with Type B dependent

drinkers. Toward that end, screening for markers of vulnerability to Type B dependence could be of clinical value for providers in mainstream health care settings to decide the appropriate level of intervention for patients with alcohol dependence symptoms. While our analysis of item endorsement suggested a few characteristics that mostly differentiated Type A and B dependent drinkers, more work is clearly needed to identify essential screening items that could further guide provider decision-making for alcohol dependent patients.

Several limitations of the study should be noted. Due to limitations of the data set, some domain characteristics were not operationalized exactly as defined in the original Type A/B model developed by Babor et al., and we had no measure of bipolar character and benzodiazepine use (indicators of premorbid risk and pathological substance use). In addition, due to the lack of available data at Wave 2, we could only derive Type A/B dependence based on baseline characteristics and thus could not assess the stability of class membership as an indicator of validity. Finally, it should be noted that prior studies of the Type A/B typology have used varying timeframes to assess pathological alcohol and other substance use and alcohol-related consequences, ranging from the prior 6 months in Babor's original study and other Type A/B studies of clinical populations (Babor et al., 1992; Ball et al., 2000; Schuckit et al., 1995), to prior 12-month timeframes used in Type A/B studies of non-dependent problem drinkers in the general population (Carpenter and Hasin, 2001; Carpenter et al., 2006). Similar to the latter, our analysis measures alcohol use, other substance use, and physical and social consequences occurring within the last 12 months to examine subtype classifications. Unlike other Type A/B studies, we used 12-month (as opposed to lifetime) measures of some psychiatric conditions such as depression and generalized anxiety. Had lifetime measures of these psychiatric conditions been used, the concurrent and predictive validity findings (especially related to mental health) might have been less strong.

Despite these limitations, this study based on a nationally representative sample of alcohol dependent drinkers with comprehensive and longitudinal alcohol, drug, physical health, and mental health data is an important contribution to the literature on the heterogeneity in alcohol disorders, and on the Type A/B alcohol dependence typology specifically. Given the evidence supporting the validity and robustness of this designation, and its ability to predict the course of alcohol problems, the Type A/B distinction has the potential to offer a simple, easily applied typology for providers in mainstream health settings to determine appropriate recommendations for alcohol dependent drinkers in the general population.

Role of funding source

Funding for this study was provided by NIAAA grant R01 AA017197 and P50 AA005595. NIAAA funded the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) used in this study and contributed to the survey design and research protocol for the survey. NIAAA had no input into the analysis and interpretation of data; in the writing of the report; or in the decision to submit the paper for publication.

Contributors

Tammy Tam conducted the literature review, developed the research questions, conducted all statistical analysis, and wrote the introduction, methods, results, and discussion section. Nina Mulia revised the introduction and wrote parts of the discussion, and provided feedback and suggestions on the development of research questions and analyses. Laura Schmidt reviewed and revised the first draft of introduction and discussion, and provided feedback

and suggestions on the development of research questions. All authors contributed to and have approved the final manuscript.

Conflict of Interest

No conflict declared.

Acknowledgments

We thank Dr. Jason Bond and Mr. Yu Ye for their valuable comments early on in the analysis phase.

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