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Transitions To and From At-Risk Alcohol Use in Adults in the United States

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Abstract

Introduction: The objective of this research was to study transitions to and from at-risk alcohol use.

Methods: Logistic regression analyses (done 2015–2016) assessed transitions to and from past-year at-risk drinking in a representative sample of U.S. adults surveyed twice (in 2001–2 and 2004–5).

Results: Among 34,653 adults, 28% reported at-risk use at time 1. Of those, 73% had at-risk use at time 2. Of those without at-risk use at time 1, 15% reported at-risk use at time 2. Positive high-risk drinking transition predictors were, at time 1, being young, male, white, childless, in good to excellent health, ever smoking, using drugs, military membership (time 1 but not 2), and becoming divorced or separated by time 2. Positive low-risk drinking transition predictors were being elderly (age ≥ 65), female, non-white, never smoking or using drugs, no alcohol use disorder, alcohol treatment, and, after time 1, having children.

Conclusions: Many adults transition to and from at-risk alcohol use; youth is the strongest positive predictor of transition to at-risk and not transitioning to low-risk drinking. Persons transitioning to legal drinking age are most likely to transition to high-risk and least likely to low-risk drinking.

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DECLARATION OF INTEREST STATEMENT

Conflicts of interest and financial disclosures are fully made in the cover letter and may be inserted here at the discretion of the editors.

Keywords

Alcohol; Binge; Drinking (drinkers); prevention

INTRODUCTION

More than half of adults drink alcohol, and use that risks health consequences (at-risk use) is common (28%) (National Institute on Alcohol Abuse and Alcoholism, 2005). In fact, approximately half of drinkers exceed low-risk limits. At-risk drinking (exceeding low risk limits, and defined by consumption associated with important risk for consequences; in the US, more than 14 U.S. standard (14g) drinks per week or >4 drinks for men per occasion, >7 and >3 respectively for women) is more common than alcohol use disorders (Center for Behavioral Health Statistics and Quality, 2015).

Risk factors for alcohol use disorder and heavy drinking have been well described (Patrick & Schulenberg, 2013). However, risk factors specifically for transitions in at-risk drinking have not been as thoroughly investigated. Sparse available literature points towards age as a significant predictor for transitions, with younger age associated with increased alcohol consumption (Capaldi, Feingold, Kim, Yoerger, & Washburn, 2013; Capaldi, Tiberio, Washburn, Yoerger, & Feingold, 2015). Further studies have demonstrated a trend in transitioning away from at-risk drinking starting in young adulthood (Bennett, McCrady, Johnson, & Pandina, 1999; Jackson, Sher, Gotham, & Wood, 2001; Muthén & Muthén, 2000).

Few studies have examined the natural history of at-risk drinking. Much of what we know comes from the control groups of randomized trials of brief counseling interventions (Bischof, Freyer-Adam, Meyer, John, & Rumpf, 2012). In most such studies, drinking decreases. These observed self-reported decreases may be due to natural history, secular trends or methodological issues (e.g. social desirability bias). Some of these explanations are nuisances—they interfere with interpretations of the true effects of interventions. But other explanations (particularly, the natural history of changes in drinking) reflect changes that occur without intervention.

The natural history of alcohol use disorder has been described, though long-term population-based data are limited (Clark, 2004; Dawson et al., 2005; Moos & Moos, 2006; Rohde, Lewinsohn, Kahler, Seeley, & Brown, 2001; Vaillant, 1995). Some longitudinal studies were done in the last century in selected samples of men. More recent studies have assessed complex trajectories and transitions in latent classes which are useful for understanding etiology and discovering new and important patterns of risk (Auerbach & Collins, 2006; Casswell, Pledger, & Pratap, 2002; Delucchi, Matzger, & Weisner, 2004), however, few studies have explored simple categorical changes in at-risk drinking in population-based large samples that are widely applicable and accessible for public health professionals, clinicians and the general public. At-risk drinking is arguably the target of public health interventions, and transitions in population-based samples of men and women have not been adequately studied (Cahalan, 1970; Cahalan & Room, 1974; Fillmore, 1987; Fillmore & Midanik, 1984; Roizen, Cahalan, & Shanks, 1978). Knowing the magnitude of change, and

risk and protective factors is essential for designing interventions for this major risk factor for chronic disease and a leading preventable cause of death.

Therefore, we analyzed a nationally representative survey to achieve the main aims of the study, which were to describe transitions to and from at-risk and lower-risk (including no) alcohol use, and risk and protective factors for those transitions among adults.

METHODS

We analyzed data (in 2015–2016) collected in the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) in 2001–2002 (time 1) and in 2004–2005 (time 2) from 43,093 non-institutionalized adults. The original study involved written informed consent and was approved by the National Institute on Alcohol Abuse and Alcoholism Institutional Review Board. This current report involved analysis of anonymous data (without private health information) and thus was not human subjects research.

Participants

Participants were ages 18 or over, and lived in the U.S. The survey oversampled minorities and youth. The overall response rate was 81%. Our analytic sample for the current study consisted of the 34,509 (80%) participants who had data at both time-points.

Outcomes

Our focus is on the transition from at-risk alcohol use to lower risk use, and from lower risk to at-risk use. Using the Alcohol Use Disorder and Associated Disabilities Interview Schedule-IV (Grant et al., 2003), alcohol use was categorized as either at-risk alcohol use in the past month (more than 14 U.S. standard (14g) drinks per week or >4 drinks for men per occasion; >7 and >3, respectively, for women) or lower risk alcohol use in the past month (not meeting criteria for at-risk use, and including no use). The study focus is at-risk alcohol use versus lower risk use (including no use), because it is at-risk use that is associated with the majority of health consequences and thus of interest to clinicians and public health entities (American Society of Addiction Medicine, 2013; National Health Service, 2015; National Institute on Alcohol Abuse and Alcoholism, 2005; World Health Organization, 2009).

Independent variables

Independent variables considered in analyses included demographics (sex, age, race, marital status and change in it, education, college and change in student status, overall health, employment and change in status, military service and change in status, and change in having children); alcohol-related variables (past year Diagnostic and Statistical Manual of Mental Disorders 4th edition (DSM IV) defined alcohol dependence and abuse (Grant et al., 2003), age at onset of drinking and when the participant started drinking more than one drink per week, self-reported family history of problem alcohol use, past year and ever treated alcohol problem, largest number drinks on days drank alcohol per year, ever thought should seek help for drinking but didn't go, spouse is alcoholic or problem drinker); other substance use (ever smoked, age at onset of smoking, ever and past year drug use, past year

DSM IV drug dependence or abuse, past year and ever treated drug problem, and family history of drug use); mental health (schizophrenia or psychotic illness or episode); and life experiences (parents divorced before participant was 18 years old, number of kids ever had, number of stressful life experiences (e.g. death or serious injury of a family member or close friend, employment troubles, financial crisis)) (Chen et al., 2006).

Analysis

We performed separate analyses for those with lower risk and at-risk alcohol use at time 1. For those with lower risk use at time 1, multiple logistic regression models with methods to adjust for the complex sampling design of the NESARC survey were used to examine associations with transitioning from lower risk to at-risk alcohol use at time 2. For those with at-risk use at time 1, we examined associations with transitioning from at-risk to lower risk use at time 2. Our goal was to identify key predictors of transition. All variables were eligible for inclusion in models and final models retained variables significantly associated with outcomes using forward selection with entry criteria of $p < 0.05$ (for individual variables or overall for variables with multiple categories such as age). SUDAAN version 11.0.0 (Research Triangle Institute) was used to perform all statistical analyses.

RESULTS

More than half of the 34,509 participants were between the ages of 30 and 65 years; 48% were male, 11% black and 12% Hispanic; 43% ever smoked, 23% ever used illicit drugs; 8.3% met criteria for an alcohol use disorder. Additional characteristics appear in Table 1.

Transitions to and from at-risk alcohol use

Of 34,544 adults with complete data regarding alcohol use at time 1, 28% reported at-risk use. Among those reporting at-risk use at time 1, 73% reported at-risk use and 27% did not, at time 2 two to four years later. At time 1, among the 72% who did not report at-risk use, 15% reported at-risk use and 85% did not, at time 2 two to four years later.

Factors associated with transitions to and from at-risk alcohol use

The main risk factor for transitioning to at-risk alcohol use was younger age at 18–20 at time 1. Being male, never married, becoming divorced or separated, being in good or excellent health, smoking, drug use, and meeting criteria for an alcohol use disorder at time 1, and being in the military at time 1 but not at time 2, were also risk factors for transitioning to at-risk use (Table 2). Transitions to at risk use were less likely among black persons, among those reporting more stressful life experiences (statistically significant for all categories except 6 or more), among those reporting new children at time 2, and among those unemployed at both time points (Table 2).

The main factor associated with transitioning to lower risk alcohol use from at-risk use was also age, with younger age associated with being less likely to transition (Table 3). Males, and those with an alcohol use disorder at time 1, tobacco or other drug use were also less likely to transition to lower risk alcohol use (Table 3). Black and Hispanic persons, those

with alcohol use disorder treatment in the past year, and those with new children at time 2 were more likely to transition to lower risk use (Table 3).

DISCUSSION

This study assessed the transition to and from at-risk and lower risk alcohol use (including none) using data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) collected in 2001–2002 and 2004–2005. Over one-quarter of adults with at-risk alcohol use are not drinking at-risk amounts two to four years later. On the other hand, 15% of adults who are not drinking at-risk amounts report at-risk use two to four years later. Thus millions of adults in the U.S. transition to and from at-risk alcohol use over a relatively short time.

To our knowledge, although others have reported transitions to and from a diagnosis of alcohol use disorder (Dawson et al., 2005), as well as more complex analyses of latent classes and transitions (Auerbach & Collins, 2006; Casswell et al., 2002; Delucchi et al., 2004), a large population-based study of alcohol use assessing the same participants over time has not been reported. At least one study examined the issue in people with HIV infection and alcohol use disorder; about half continued to drink risky amounts or increased their drinking over time (Bertholet, Cheng, Samet, Quinn, & Saitz, 2010). However, Roizen et al. reported results of a study with a sample of 521 non-institutionalized white men who reported drinking at study entry and no exposure to treatment at follow-up approximately four years later (Roizen et al., 1978). Of participants reporting only one current problem from drinking at study entry, 48% reported no problems at follow-up; of participants with six or more problems at entry, 14% reported no problems at follow-up (Roizen et al., 1978). Roizen et al. coined this transition from “problem drinking,” “spontaneous remission,” “improvement in a patient’s condition in the absence of effective treatment” (Roizen et al., 1978). A study from 2017 utilized NESARC data to examine change in prevalence of high-risk drinking and alcohol use disorder between 2001–2002 and 2012–2013, and found significant increases in the subgroups of women, older adults, racial/ethnic minorities, and socioeconomically disadvantaged (Grant et al., 2017). Dawson et al. also examined changes in alcohol consumption patterns between 2001–2002 and 2012–2013, and found greater increases of drinking in women compared to men, with a larger increase in drinking seen in racial-ethnic minorities (Dawson, Goldstein, Saha & Grant, 2015). While these increases in prevalence of nationally-representative subgroups may suggest associations with increased risk of transitioning to and from at-risk drinking, the studies are limited by their use of prevalence in two different groups of individuals, rather than incidence within the same individuals. Other studies have reported changes in drinking patterns within smaller cohorts, including a study in northern Finland showing alcohol use to be stable in middle-aged people and that gender differences in predictors exist (Vladimirov et al, 2016); a population-based cohort study in Spain demonstrating that overall alcohol consumption tends to decrease over time (Soler-Vila et al., 2014); and another study that examined correlates of changes in alcohol use following a stressful experience during military deployment (Trautmann et al., 2015). These data, while informative and consistent with ours, do not speak to the issue of transitions in and out of the broader category of at-risk alcohol use as they are restricted to transitions to and from having consequences of consumption.

Our findings suggest while many factors are associated with these transitions, young age (e.g. 18–20) is the strongest predictor – favoring transitions to at-risk use, and hindering transitions to lower risk use. It should be noted the group most likely to transition to at-risk drinking from time 1 to time 2 were below the minimum legal drinking age of 21 at time 1 and above the legal drinking age at time 2. The same applies to those least likely to transition to low-risk drinking at time 2. This finding is consistent with the study results of Capaldi et al. They assessed alcohol use by 205 men from high crime neighborhoods annually from ages 18–19 to 28–29 and reported increases in volume of alcohol used to around age 23 followed by a sharp decrease (Capaldi, Feingold, Kim, Yoerger, & Washburn, 2013). In a subsequent study of some of the same participants then in their 30s the pattern of decreased alcohol volume in their 20s was largely sustained (Capaldi, Tiberio, Washburn, Yoerger, & Feingold, 2015). Britton et al. found in 2015 that in a sample of 59,397 men, mean alcohol consumption increased sharply during adolescence, declined and plateaued during mid-life, and then declined after age 60, with a similar pattern seen in women (Britton, Ben-Shlomo, Benzeval, Kuh, & Bell, 2015).

Other relevant studies we identified have focused on the development of heavy drinking and consequences among youth. During young adulthood, individuals tend to transition from “large-effect” drinking (a latent class described as likely to drink and get drunk) to less severe drinking status (Jackson, Sher, Gotham, & Wood, 2001). The number of individuals drinking heavily peaks at age 21 and 22 and then steadily decreases thereafter (Muthén & Muthén, 2000). Bennett et al. also found ages 21–28 to be the peak ages for “maturing out” of “problem” drinking (Bennett, McCrady, Johnson, & Pandina, 1999). A study conducted by Donovan et al. found college aged problem drinkers were likely to have transitioned to non-problem drinking six years later (Donovan, Jessor, & Jessor, 1983). Similarly, Stahlbrandt et al. found trajectories towards lower alcohol consumption over time among college students living in campus housing (Stahlbrandt, Leifman, Johnsson, & Berglund, 2010).

Aside from age, other predictors had smaller effects on transitions to and from at-risk drinking. Risk factors for worsening or not improving were male sex, not ever being married (and for worsening, becoming divorced or separated), being in the military, being in good or excellent health, smoking, drug use, and alcohol dependence. Being unemployed at both times was protective. Being black and having children were protective against transitioning to at-risk use and to lower risk use; having more stressful experiences was protective for transitioning to at-risk use; being Hispanic and receiving alcohol use disorder treatment were protective and increased transitions to lower risk use. These findings (with the exception of the associations with stressful experiences and with being unemployed at both times, for which we have no explanation) are generally consistent with those for predictors of recovery from alcohol use disorder (Capaldi et al., 2013; Dawson et al., 2005; Donovan et al., 1983; Jackson et al., 2001; Roizen et al., 1978).

Some limitations to consider when interpreting the results of the current study are loss to follow-up (20%) and limitations of self-report accuracy, though detailed validated tools were used to assess drinking amounts. Regression to the mean could also account for some of the changes over time, however, this is unlikely to be a major explanation of our findings. The

assessment of alcohol consumption examines past-month drinking only. This measurement method may misrepresent an individual's overall level of drinking, as drinking is known to increase during certain months and times of the year. However, short and longer term measures of drinking are correlated in individuals (Sobell & Sobell, 1992). Additionally the risk factors identified are associations and are not necessarily causal, and some could be a result of Type I error in this hypothesis generating analysis unadjusted for multiple testing. Secular trends could certainly affect transitions. The data are a decade old; however, we chose this dataset because of its value in assessing the same people at two points in time and there is little reason to suspect transitions would differ in more recent data. Despite these limitations the study included a large representative sample of the population and a high response rate, validated assessments, and a limited number of analyses with results consistent with prior literature.

Findings have implications for prevention, including screening and brief intervention and understanding self-change. While some individuals will transition from at-risk to lower risk or no use on their own, some individuals at lower risk will transition to at-risk use later. Young age (18–20) and being below the legal drinking age of 21 was the strongest predictor of the transition to at-risk use and is also the strongest negative predictor of transition to low risk use, transitions to a time when they were of legal age. Interventions targeted at individuals in their 20s as it becomes legal for them to drink may alter these trajectories favorably (National Institute on Alcohol Abuse and Alcoholism, 2015). Other identified associations could also be the focus of clinical and public health interventions. Regardless, although at-risk drinking is an appropriate target for improvement, changes in at-risk drinking occur, and they do in some more than others, important considerations for clinical care and public health messages.

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Table 1.

Baseline characteristics of NESARC participants (n=34,653)

Characteristic	%
Age	
18–20 years	5.9
21–25 years	8.9
26–29 years	7.0
30–39 years	20.1
40–49 years	20.8
50–65 years	22.2
65+ years	15.2
Sex	
Male	47.9
Female	52.1
Race/ethnicity	
White, non-Hispanic	70.9
Black, non-Hispanic	11.0
Other, non-Hispanic	6.5
Hispanic	11.6
Marital status	
Never married	20.5
Married	59.8
Other (e.g. widowed, divorced, separated)	19.7
Employed	66.0
In college	10.2
In military	12.4
Overall health	
In excellent health	31.1
In good health	55.1
In fair health	10.2
In poor health	3.6
Ever smoked	43.3
Ever used drugs	23.1
Alcohol use	
Did not drink	33.6
Used low risk amounts of alcohol	38.6
At-risk use ^a	27.8
Alcohol use disorder	
DSM IV alcohol dependence	3.7

Characteristic	%
DSM IV alcohol abuse	4.6
Number of stressful life experiences^b	
6	4.2
4-5	9.2
2-3	32.3
1	24.8
0	29.5
Family history of problem drinking	53
Receipt ever of alcohol use disorder treatment	1.3

Abbreviations: NESARC, National Epidemiologic Survey on Alcohol and Related Conditions; DSM IV, Diagnostic and Statistical Manual of Mental Disorders, 4th Edition

^a >14 US standard (14g) drinks per week or >4 drinks per occasion for men; >7 and >3, respectively, for women; no drinking, low risk amounts and at-risk add to 101% due to rounding (33.7%, 38.5% and 27.8%, respectively).

^b Examples of stressful life experiences include death or serious injury of a family member or close friend, employment troubles, financial crisis.

Table 2.

Significant predictors of transition from low-risk (or no) alcohol use to at-risk alcohol use^a from time 1 (2001–2002) to time 2 (2004–2005) among NESARC participants (n=25,315)

Characteristic	aOR (95% CI)
Age	
18–20 years	21.1 (15.3–29.1)
21–25 years	9.0 (6.7–12.2)
26–29 years	8.0 (5.9–10.9)
30–39 years	6.2 (4.8–8.0)
40–49 years	3.8 (3.0–4.8)
50–65 years	2.3 (1.8–3.0)
>65 years	1.0
Male sex	
	1.4 (1.3–1.6)
Race/ethnicity	
Black, non-Hispanic	0.80 (0.69–0.93)
Other, non-Hispanic	0.63 (0.48–0.82)
Hispanic	0.94 (0.79–1.11)
White, non-Hispanic	1.0
Marital status	
Never married	1.4 (1.2–1.6)
Widowed, divorced, or separated	1.3 (1.2–1.5)
Married	1.0
Change in marital status	
Married at time 2, not at time 1	1.1 (0.9–1.3)
Widowed at time 2, not at time 1	1.4 (0.9–2.1)
Divorced or separated at time 2, not at time 1	1.9 (1.4–2.5)
No change in marital status	1.0
Change in employment status	
Employed time 1, not time 2	0.84 (0.70–1.01)
Not employed time 1, employed time 2	1.00 (0.84–1.12)
Not employed at either time	0.78 (0.68–0.89)
Employed time 1 and time 2	1.00
Change in military status^b	
In military time 1, not at time 2	1.3 (1.1–1.5)
In military time 2, not at time 1	0.8 (0.4–1.6)
In military neither time	1.0
Change in having children	
Had children, or any adopted/foster/step children came to live with respondent after time 1 (reported in time 2)	0.68 (0.58–0.81)
None	1.00

Characteristic	aOR (95% CI)
Overall health	
In excellent health	1.3 (1.0–1.8)
In good health	1.3 (1.0–1.8)
In fair health	1.0 (0.73–1.4)
In poor health	1.0
Tobacco use	
Ever smoked	1.5 (1.3–1.6)
Never smoked	1.0
Other drug use	
Ever used drugs	1.4 (1.2–1.5)
Never used drugs	1.0
Alcohol use disorder	
DSM IV alcohol dependence	10.8 (5.2–22.5)
DSM IV alcohol abuse	12.1 (8.7–16.9)
Alcohol use but no disorder	3.8 (3.4–4.3)
Abstinent	1.0
Number of stressful life experiences^c	
6	0.82 (0.64–1.05)
4–5	0.81 (0.67–0.97)
2–3	0.76 (0.67–0.85)
1	0.80 (0.71–0.90)
0	1.0

Abbreviations: NESARC, National Epidemiologic Survey on Alcohol and Related Conditions; aOR, adjusted odds ratio; CI, confidence interval; DSM IV, Diagnostic and Statistical Manual of Mental Disorders, 4th Edition

^a >14 US standard (14g) drinks per week or >4 drinks per occasion for men; >7 and >3, respectively, for women

^b Only 7 people were in the military at time 1 and time 2

^c Examples of stressful life experiences include death or serious injury of a family member or close friend, employment troubles, financial crisis.

All characteristics in the above table were assessed at time 1, with the exception of change in marital, employment and military status (assessed at both times) and having children assessed at time 2.

* Statistically significant results have been bolded.

Table 3.

Significant predictors of transition from at-risk alcohol use^a to low-risk (or no) alcohol use from time 1 (2001–2002) to time 2 (2004–2005) among NESARC participants (n=8,989)

Characteristic	aOR (95% CI)
Age	
18–20 years	0.14 (0.10–0.20)
21–25 years	0.21 (0.16–0.27)
26–29 years	0.24 (0.18–0.32)
30–39 years	0.30 (0.23–0.38)
40–49 years	0.32 (0.25–0.41)
50–65 years	0.38 (0.30–0.48)
>65 years	1.00
Sex	
Male	0.70 (0.63–0.78)
Female	1.00
Race/ethnicity	
Black, non-Hispanic	1.72 (1.45–2.03)
Other, non-Hispanic	1.48 (1.09–2.02)
Hispanic	1.37 (1.15–1.65)
White, non-Hispanic	1.00
Tobacco use	
Ever smoked	0.85 (0.76–0.95)
Never smoked	1.00
Other drug use	
Ever used drugs	0.84 (0.73–0.95)
Never used drugs	1.00
Alcohol use disorder	
DSM IV alcohol dependence	0.38 (0.30–0.48)
DSM IV alcohol abuse	0.50 (0.41–0.62)
No alcohol use disorder	1.00
Alcohol use disorder treatment	
Receipt of alcohol use disorder treatment	1.79 (1.23–2.59)
No treatment	1.00
Change in having children	
Had children, or any adopted/foster/step children came to live with respondent after time 1 (reported in time 2)	1.69 (1.40–2.04)
None	1.00

Abbreviations: NESARC, National Epidemiologic Survey on Alcohol and Related Conditions; aOR, adjusted odds ratio; CI, confidence interval; DSM IV, Diagnostic and Statistical Manual of Mental Disorders, 4th Edition

^a>14 US standard (14g) drinks per week or >4 drinks per occasion for men; >7 and >3, respectively, for women

All characteristics in the above table were assessed at time 1 except having children, which was assessed at time 2.

* Statistically significant results have been bolded.

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