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Drinking problems and mortality risk in the United States

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ABSTRACT

Objective: We examine the links between 41 problems related to alcohol consumption and the risk of death among adults in the United States.
Method: We use Cox proportional hazards models and data from the nationally representative prospective National Health Interview Survey-Linked Mortality Files (NHIS-LMF).
Results: Drinking problems are relatively common among moderate and heavy drinkers and these problems are associated with increases in the risk of death. The strongest associations between problem drinking and mortality involved cases in which physicians, family members, or friends intervened to suggest reduced drinking. Losing one's job because of drinking problems within their lifetime (HR = 1.36, 95% confidence interval [CI]: 1.11, 1.65) was strongly linked to mortality risk. Social risks were equally or more strongly linked to mortality than physiological consequences of alcohol abuse such as lifetime reports of needing a drink to stop shaking or getting sick (HR = 1.23, 95% CI: 1.09, 1.40). Most importantly, these associations were evident despite statistical controls for alcohol consumption levels and demographic, social, economic, behavioral, health, and geographic factors.
Conclusions: Our results highlight the independent and additive effects of alcohol-related problems and alcohol consumption levels on the risk of death. We recommend that studies examining the mortality risks of alcohol consumption take into account drinking status and also specific drinking-related problems, paying particular attention to social problems related to alcohol use or abuse.

1. Introduction

Although there is extensive literature on the association between alcohol use and mortality (Di Castelnuovo et al., 2006; Ronksley et al., 2011), few studies have examined the associations between specific alcohol-related problems and mortality. Dawson (2000a) provides some of the only evidence that alcohol dependence is linked to an increased risk of death above and beyond the level of alcohol consumption. This research is important because it shows that use and abuse, while certainly correlated with one another, denote independent pathways through which alcohol-related behaviors can influence mortality. To date, however, no existing research has examined each specific alcohol problem and corresponding DSM indicator as an independent mortality risk.

Dawson (2000a) examined the risk of death associated with alcohol dependence, classified according to the definitions given in the Diagnostic and Statistical Manual (DSM) at that time, the DSM-IV (APA, 1994), among adults aged 25 and older, using the 1988 National Health Interview Survey matched to the National Death Index (NDI) through 1995. She constructed her alcohol dependence measure from 17 of 41 alcohol-related indicators and showed that rates of alcohol dependence increased with increasing consumption; it was 9% among light drinkers, 24% among heavy drinkers, and 42% among very heavy drinkers. Compared to lifetime abstainers, dependent drinkers suffered increased risk of death. For example, moderate and dependent drinkers were 32% and very heavy and dependent drinkers were 65% more likely to die over the follow-up period. Compared to nondependent drinkers, dependent drinkers were more likely to have long and heavy drinking histories, drink greater volumes of alcohol, engage in heavy episodic drinking (HED), and have more health problems, including more major limitations, hospitalizations, and bed days (Dawson, 2000a). However, individuals can experience drinking problems without dependence. According to recent estimates, 90% of excessive drinkers are not alcohol dependent (Esser et al., 2014). Thus, calculating mortality risk for the complete list of 41 individual problems among all drinkers may capture a broader scope of drinking's health consequences.

Further, Dawson's informative results suggest that it may be useful to calculate mortality risk for the updated DSM-V, and over a longer follow-up period. The current DSM version lists 11

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domains of DSM-V criteria for substance use disorder (SUD) that describe current or lifetime physiological, psychological, behavioral, and social consequences of drinking (American Psychiatric Association [APA], 2013b). While the DSM-IV defined abuse and dependence separately, the DSM-V defines one SUD with categorizations of mild, moderate, and severe. Meeting SUD criteria may indicate a cluster of drinking problems that differ from the individual problems. Health-damaging behaviors such as problem drinking earlier in life can increase risk of disease and death later in life (Graham, 2002; Kuh et al., 2003; Montez and Hayward, 2011) and many assume that the primary effects of alcohol consumption are physiological and damage specific organs. However, exposure to various risks early in life may initiate biological, psychological, and social chains of risk, which can be mediated by various factors, including socioeconomic status (Kuh et al., 2003). Problem drinking may reduce physiological or psychological resilience and increase susceptibility to death through a variety of causes, including heart disease, stroke, cancer, liver disease, chronic alcoholism, and external causes of death (suicide, homicide, motor vehicle accidents, and unintentional injury; Brady, 2006; Dawson, 2001, 2011; Single et al., 1999; Skog, 2002).

In particular, social conflict related to drinking problems may be one of the main mechanisms linking excess alcohol consumption to increased mortality risk. Drinking can cause social problems at home, school, and work, and with social and sports activities (Ames et al., 1997), family, friends, and coworkers (Barnes and Farrell, 1992), and the legal system (Caetano, 1997). Social resources—including ties to family, friends, school, work, and the community—protect against the risk of death (Berkman and Syme, 1979; Seeman, 1996). Thus, social disruptions such as the end of a relationship, decreased social interactions, or the loss of support from colleagues because of alcohol-related problems may be mechanisms through which chronic alcohol use leads to elevated risk of death. Furthermore, drinking is linked to emotional problems, depression, and lack of personal control (Holahan et al., 2003; Nigg et al., 2006; Windle and Windle, 1996).

There are also beneficial physiological and psychological effects of light to moderate consumption. Light to moderate alcohol consumption can enhance mood, reduce stress, lower anxiety, and decrease the risk of depression, which can in turn contribute to a stronger sense of sociability, social integration, and cohesion (Peele and Brodsky, 2000). Light to moderate alcohol consumption can also reduce the risk of heart disease through increased levels of HDL cholesterol, apolipoprotein A1, and adiponectin, and reduced levels of fibrinogen (Agarwal, 2002; Brien et al., 2011). Because low and even moderate levels of alcohol have been linked to salutary health profiles in previous research, it is important to control for current and past drinking levels to examine the influence of specific alcohol problems above and beyond current drinking levels.

In identifying the relationships between drinking problems and mortality, this study seeks to determine whether drinking's health consequences depend on the social consequences of drinking (in addition to consumption patterns). This paper addresses four central aims. First, we describe the prevalence of specific drinking problems across drinking statuses and consumption levels among a representative sample of U.S. adults. Second, to examine the association between specific drinking problems and mortality, we are the first to use information on 41 specific alcohol-related problems from adults in 1988 and their subsequent mortality nearly 20 years later. Third, we examine the association between *clusters* of drinking problems, as defined by the DSM-V criteria, and mortality. Finally, we determine the *mediating* effects of SUD on the association between drinking status and mortality.

2. Methods

2.1. Data

The National Institute on Alcohol Abuse and Alcoholism sponsored the 1988 National Health Interview Survey (NHIS) Alcohol Supplement, a nationally representative survey of the noninstitutionalized population focusing on alcohol use and related problems experienced over the past year (NCHS, 1989, 2010). The Alcohol Supplement contains 43,809 adults aged 18 and over. Because our focus is on current legal drinkers, we limit our analyses to individuals with known survival status who are aged 21 and above.

The 1988 NHIS Alcohol Supplement allows us to investigate the mortality risk of 41 drinking problems. The questions from this supplement classify individuals as current drinkers (12 drinks in the last year), former drinkers (12 drinks in a previous year but not in the last year), lifetime abstainers (less than 12 drinks in lifetime), and lifetime infrequent drinkers (less than 12 drinks in any one year). The supplement asked current drinkers about problems in the last 12 months, yielding 20,748 respondents for current problems, and current and former drinkers whether they had experienced each problem in their lifetime, resulting in 28,542 respondents for lifetime problems. We exclude lifetime infrequent drinkers and lifetime abstainers, except some analyses which use lifetime abstainers as a reference group for current drinkers. We also exclude 1051 individuals from our analyses because they did not respond to questions on the frequency or the occasion-specific volume of their drinking over the past year, which prevented us from determining the average volume of drinks they consumed. The analytic sample is thus 19,697 for problems in the last year and 27,491 for lifetime problems. Models including current drinkers ($N = 19{,}697$) and lifetime abstainers ($N = 7859$) produce a sample size of 27,556.

In 2010, the National Center for Health Statistics (NCHS) linked the NHIS to the National Death Index (NDI) through probabilistic record matching to identify individuals who died between the time of the interview and the end of 2006. NHIS collects all of the 13 NDI matching variables, including social security number; first and last name; middle initial; day, month, and year of birth; sex; race; father's surname; state of birth and residence; and marital status. We drop less than 1% of records that do not include enough information for accurate record linkage, termed ineligible, from our analyses, and then incorporate the new NCHS-produced weights for the eligible sample (NCHS, 2009). Of the past year problem and lifetime problem analytic samples, 3365 and 5836 adults died within this period, respectively.

This dataset is ideal for our research in three ways. First, it contains detailed information from a large, representative sample related to alcohol consumption and problem drinking behaviors. Second, these problem behaviors align well with the DSM-V criteria for SUD, allowing us to investigate the relationship between clinically defined alcohol dependency and mortality. Third, the relatively long follow-up exposes potential lagged effects of alcohol use and problem behaviors on the risk of death (Rehm et al., 2010).

2.2. Methods

2.2.1. Alcohol consumption and problem drinking. For current drinkers, we calculate alcohol volume (drinks per day on the days that individuals drink multiplied by the number of days that individuals drink per year, divided by 366 [because 1988 was a leap year]) from self-reports of current drinkers, which studies have generally found to be reliable and valid (Del Boca and Darkes, 2003). We follow Breslow and Graubard's (2008) coding strategy, which groups drinkers into four categories based on volume: those who drink less than 1 drink, 1 to less than 2, 2 to less than 3, and 3 or more drinks per day, on average. Former drinkers are included together in one category.

NCHS asked current drinkers how many times in the past 12 months they had experienced 41 different problems with drinking (see Chyba and Washington, 1993). To examine the mortality risk of individual problems, we dichotomize each problem, coding those reporting one or more times as 1 and those reporting none or never as 0. For problems ever experienced in one's lifetime, current and former drinkers responded whether they had (coded 1) or had not (coded 0) experienced each of the 41 problems.

We followed the method of Dawson (2000a) to operationalize the 11 criteria for DSM-IV alcohol abuse and dependence, then updated the measures to be consistent with the 11 DSM-V criteria for SUD. The newly-released DSM-V drops legal problems and drinking for relief from diagnostic criteria, adds new criteria for craving and social consequences of drinking, and no longer distinguishes between abuse and dependence as it groups together all SUDs. It does specify severity, categorizing disorders as mild, moderate, or severe according to the number of criteria met by subjects (APA, 2013a). We operationalized the new "craving" criterion by using responses to three questions: In the past 12 months how many times have you (1) Needed a drink so badly you could not think of anything else? (2) Felt uneasy if alcohol was not around in case you wanted a drink? (3) Had a strong desire or urge to drink? A respondent who had experienced any of these problems at least twice in the past year was classified as having met the "cravings" criterion. The "social" criterion was operationalized using two questions: In the past 12 months how many times have you (1) Had a spouse or someone you live with threaten to leave you? (2) Had family, friends, or coworkers suggest that you stop or cut down on your