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Educational differences in alcohol consumption and heavy drinking: An age-period-cohort perspective

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ABSTRACT

Background: Low socioeconomic status (SES) has been associated with lower alcohol consumption, but also with heavier drinking. To explain this contradictory relationship, we examined SES differences in drinking patterns from an age-period-cohort (APC) perspective.

Methods: Data are from seven waves of the U.S. National Alcohol Surveys from 1979 to 2010. As a proxy for SES, educational attainment was used. Past-year alcohol volume was calculated from frequency (never-to-every day) and usual quantity (1–2, 3–4, or 5–6 drinks). Past-year frequency of heavy episodic drinking was labelled as total days of 5+ drinks. Gender-stratified APC fixed-effects models were conducted controlling for demographics and adjusting for survey design and weights.

Results: Significant APC effects by education were found, but the direction varied by alcohol measure. Education and total volume were positively associated across APC. Cross-over effects for age occurred with a positive education-heavy drinking relationship in young adulthood and negative relationship in mid-adulthood. Cohort-by-education effects showed greater heavy drinking among less educated women in 1956–60 cohort and more educated men and women in younger cohorts (post-1976).

Conclusions: Higher SES is consistently associated with total volume across age, period, and cohort, but less consistently with heavy drinking. While there are currently significant intervention efforts to reduce heavy drinking in young adulthood, our study suggests the need for age-specific strategies targeting lower-SES groups in mid-adulthood and cohort-specific strategies for lower-SES women in the baby boomer cohort and higher-SES men and women in younger birth cohorts.

1. Introduction

Social inequalities have widened over time, giving way to much starker health differentials by socioeconomic status (SES) (Bleich et al., 2012; U.S. Department of Health and Human Services, 2014). How these inequalities play out with alcohol is unclear. The effect of SES on alcohol is not always in the negative direction, as with other health behaviors, but differs by drinking measure. Higher SES is associated with total alcohol consumption; while lower SES is more common with abstinence (Huckle et al., 2010; Kerr et al., 2016). Moreover, findings are mixed for heavy episodic drinking (typically 5+ drinks in one sitting) with some studies showing a positive relationship with SES and others a negative relationship (Huckle et al., 2010; Patrick et al., 2012; Substance Abuse and Mental Health Services Administration (SAMHSA), 2014).

An age, period, and cohort (APC) framework can offer a unique perspective to further understand alcohol-SES relationship by pinpointing which SES subgroups are at highest risk for alcohol

consumption and heavy drinking by age (younger vs. older), over time (1950s vs. 2000s), and if there are variations by birth cohorts (Baby Boomers vs. Generations X/Y). Typically, epidemiological trends of drinking examine age trends (younger ages are at higher risk) or time period (changes in consumption over time). By employing an APC framework, we can isolate how disparities in SES may affect the alcohol-cohort relationship while accounting for alcohol-age relationship and alcohol-period relationship. If there are clear SES differences within birth cohorts, whether lower or higher SES places subgroups at elevated risk for alcohol-related harms, then we should target our prevention and intervention efforts to these groups.

The alcohol research field has benefited from an age-period-cohort approach. Age trends show total consumption and excessive drinking is highest in the early twenties and then declines with older age (SAMHSA, 2014). Trends on alcohol consumption and heavy drinking increased in the early 1980s, followed by a decline in the 1990s, and have slowly increased again in the 2000s (Kerr et al., 2013a; SAMHSA, 2014). Yet the cohort lens offers an additional aspect that traditional

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epidemiological studies of age or time-series overlook. Birth cohorts may experience alcohol-related risks and outcomes that differ from a prior or subsequent cohort as a result of the specific social and environmental conditions experienced by persons born in the same time and aging through the life course together (Kerr et al., 2007; Keyes et al., 2011).

Using the National Alcohol Survey (NAS), Kerr et al.'s APC study found significantly higher heavy drinking among 1956–1960 female birth cohort, the 1976–1980 male birth cohort, and the 1981–1985 male and female birth cohorts (Kerr et al., 2009; Kerr et al., 2013a). Other APC studies have also reported increasing consumption patterns among women in younger birth cohorts and overall higher trends for both men and women in the 1980s birth cohort, but a downward shift for the 1990s cohort (Bjork et al., 2008; Keyes and Miech, 2013; Meng et al., 2014). Several mechanisms have been suggested to explain cohort effects in drinking behaviors including social norms; social transmission of alcohol behaviors at the population level; and policies and economic factors that shape the availability of alcohol and consequences from drinking (Keyes et al., 2011; Neve et al., 1993). Using a health disparities framework, this study will extend the previous APC studies by examining whether socioeconomic status (SES) via the role of education is a potential mechanism for explaining cohort effects. While there have been significant improvements in health and overall reduced mortality over time, prior health studies have shown wider SES differences in smoking and preventable deaths among more recent birth cohorts even after accounting for age and period effects (Maralani, 2014; Masters et al., 2012; Yang, 2008). To our knowledge, no APC studies have focused on examining drinking trends by SES.

Given the paradoxical role of SES on drinking (low SES-low consumption; mixed findings of SES on heavy drinking), we aim to examine the role of SES on age-period-cohort trends in alcohol consumption and heavy drinking. Furthermore, educational attainment, as a proxy for SES, has steadily increased over time, in particular, high school graduation rates and post-secondary enrollment in the last half century (Murnane, 2013); however, widening inequalities of educational attainment and the associated health benefits of education also play a role (Walsemann et al., 2013). Using pooled data from seven cross-sectional National Alcohol Surveys (NAS) covering 1979–2010, the current study examines educational differences in alcohol consumption and heavy drinking by age, period, and birth cohort. We expect that educational differences in drinking behaviors are likely to be greater among younger age groups and to increase across birth cohorts rather than across time periods.

2. Material and methods

2.1. Data

The NAS is a population-based survey of randomly selected U.S. adults aged 18 years and over that is conducted approximately every five years starting in 1979. We pooled seven waves of NAS data from 1979 (n = 1772; response rate [RR] = 71%), 1984 (n = 5221; RR = 72%), 1990 (n = 2058; RR = 70%), 1995 (n = 4925; RR = 77%), 2000 (n = 7612; RR = 58%), 2005 (n = 6919; RR = 56%), and 2010 (n = 7969; RR = 52%). Over the years, key changes have occurred in sampling design (i.e., multi-stage clustered design to random-digit-dialing in 2000), survey mode (i.e., in-person to telephone interviews in 2000 which resulted in a lower response rate), and oversampling of African Americans and Hispanics in all surveys except in 1979 and 1990 (Kerr et al., 2004; Kerr et al., 2013a). Prior methodological studies have shown no significant differences between NAS survey waves in population alcohol estimates (Greenfield et al., 2000; Midanik and Greenfield, 2003; Midanik et al., 2001), but the different survey modes may influence period effects (Kerr et al., 2004).

All surveys are weighted to the U.S. adult population for the year in which the data were collected, taking into account age, gender, race/ethnicity, and geography.

2.2. Measures

2.2.1. Alcohol consumption and heavy drinking

Total alcohol consumption was measured using beverage-specific quantity-frequency measures. For each beverage type (i.e., wine, beer, and spirits), respondents were asked about frequency of drinking in the last 12 months from never to every day. Respondents were also asked about usual quantity, “When you drink..., how often do you have 1–2, 3–4, or as many as 5 or 6 (glasses/12-ounce cans or bottles/drinks)?” Past-year alcohol consumption was calculated by recoding responses for each beverage-specific frequency and quantity to a standard volume algorithm (in parentheses): “nearly every time” (0.9), “more than half the time” (0.7), “less than half the time” (0.3), “once in a while” (0.1), and “never” (0) (Kerr et al., 2009; Kerr et al., 2013a). Heavy episodic drinking (HED) was a count of the number of days in the past year on which 5+ drinks were consumed across each beverage type, with a maximum of 365 days (Kerr et al., 2009; Kerr et al., 2013a).

2.2.2. Educational attainment

Education was grouped into less than high school (< HS), high school graduate or equivalent (HS), some college (SC), and college graduate or higher (college+). With rising levels of education in the 20th century, the value of education and its benefits on overall earnings and occupational attainment have changed such that the distinction between < HS and HS graduate is more important among earlier birth cohorts, while college enrollment (SC) and college completion (college+) are more important for later birth cohorts (Mare, 1995). However, it is difficult to convert education to a standardized value across birth cohorts, so we make the assumption that education has the same meaning across time similar to previous APC studies (Masters et al., 2012; Wilson et al., 2011). In preliminary analyses, we found distinct differences in alcohol patterns between SC and college+, especially for women; thus, we maintain SC and college+ as separate categories.

2.2.3. Age-period-cohort

Age, period, and cohort were based on respondents' age, NAS year, and respondents' birth year. Age was grouped into seven categories starting with 21–24 and 25–30 year olds (to represent peak alcohol use in young adulthood), and then ten-year age groups thereafter until the oldest group of 71+. Given the skewed variation of alcohol use by age, with younger age groups at higher ranges and older age groups at lower ranges, we used the mid-point of 41–50 age group as the reference. Period is represented by the seven NAS years with 2010 as the reference. Birth cohort was categorized into 15 groups starting with 1900–1920, followed by five-year groupings from 1921–1925 to 1981–1985, and ending with 1986–1989. The 1956–1960 birth cohort is the reference group.

2.2.4. Covariates

To account for alcohol variations by demographics, we controlled for race/ethnicity (African-American, Asian, Hispanic, White, and Native American and all others), marital status (married, widowed, divorced/separated, and never married), religion (Catholic, no religion, and all others), employment status (employed, retired, and not employed), and annual income (\$0–20K, \$20K–40K, \$40–70K, \$70K+, missing). U.S. states were categorized into dry-to-wet environments with dryer states in the South, moderately wet states in Mid-Atlantic, Pacific Coast, and South Coast, and wetter states in New England and North Central areas (Kerr, 2010).

Given our focus on education, studies often use an age cutoff of 25

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