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Health Risk Factors Associated with Lifetime Abstinence from Alcohol in the 1979 National Longitudinal Survey of Youth Cohort

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Abstract

Background—The choice and definition of a comparison group in alcohol-related health studies remains a prominent issue in alcohol epidemiology due to potential biases in the risk estimates. The most commonly used comparison group has been current abstainers, however, this includes former drinkers who may have quit drinking due to health problems. Lifetime abstention could be the best option but measurement issues, selection biases due to health and other risk factors, and small numbers in populations are important concerns. This study examines characteristics of lifetime abstention and occasional drinking that are relevant for alcohol-related health studies.

Methods—This study used data from the National Longitudinal Survey of Youth 1979 cohort of 14-21 year olds followed through 2012 (n=7,515). Definitions of abstinence and occasional drinking were constructed based on multiple measurements. Descriptive analyses were used to compare the definitions, and in further analysis, lifetime abstainers (n=718) and lifetime minimal drinkers (n=1,027) were compared with drinkers across demographics and early-life characteristics (i.e., religion, poverty, parental education and family alcohol problems) in logistic regression models.

Results—Using a strict measurement of zero drinks from adolescence to the fifties, only 1.7% of the sample was defined as lifetime abstainer compared to a broader definition allowing a total of one drink over the lifetime that included 9.5% and to lifetime minimal drinking (a total of three drinks or less a month), which accounted for 13.7%. Factors significantly associated with lifetime abstention and lifetime minimal drinking included religion, poverty, having no family alcohol problems, Hispanic ethnicity, foreign-born and female gender. Importantly, work-related health limitations in early life were significantly associated, but not childhood physical and mental health problems.

Conclusion—Alcohol-related health studies should utilize lifetime classifications of drinkers and abstainers, and in doing so, should account for early-life socioeconomic adversity and childhood health factors or consider these as unmeasured confounders.

Keywords

abstainer; alcohol; early life; health; life course

INTRODUCTION

A fundamental epidemiological question for alcohol-related health studies is whether exposure to alcohol increases the risk for an acute or chronic health condition (morbidity), or mortality. This relationship is contingent upon a researcher's definition and measurement of exposure (drinkers) and non-exposure (abstainers). A rich history of methodological studies defines and measures alcohol "exposure" in ways that accounts for dosage and time (Fillmore et al. 2007, Kerr et al. 2011, Roerecke et al. 2011, Rehm et al. 2001) but only recently has there been more attention paid to defining and measuring the "unexposed": those who abstain from alcohol (Rehm et al. 2008, Kydd and Connor 2015, Huang et al. 2011, Fillmore et al. 1998, Wannamethee and Shaper 1988, Andréasson 1998).

How researchers define and measure abstinence is an important issue in alcohol-related health studies for several reasons. First, there are mixed findings where alcohol has been identified as a risk factor for some health problems (i.e., liver cirrhosis, injuries) (Becker et al. 1996) and a protective factor for other problems (i.e., cardiovascular disease) (Fillmore et al. 2006, Rimm et al. 1996, Hines and Rimm 2001). Second, selection of an appropriate control group in studies of health outcomes in relation to alcohol consumption patterns has been debated in the field for many years (Stockwell et al. 2016). The determination of an appropriate non-drinking control group is critical in estimating the risks or benefits among drinkers. Finally, it is important to determine which factors (e.g., poor prior health) may influence individuals to continue to abstain from alcohol. Failure to account for these precursors of decisions not to drink in alcohol-related health studies may lead to overestimated or even spurious relationship between alcohol and health benefits.

The most commonly used definition for the unexposed group has been current abstinence from alcohol, which includes both former drinkers and lifetime abstainers. The key measurement distinction is in the duration of being in the "unexposed" category—not consuming alcohol within the past month or past year, compared to abstinence from alcohol over the lifetime. This distinction goes beyond duration of abstinence to other individual characteristics as well. Former drinkers have often quit drinking due to health or social problems related to their drinking (Cryer et al. 2001, Lown et al. 2007), and have higher risks for mortality compared to lifetime abstainers (Gmel et al. 2003), thus making the two groups quite distinct from each other (Gmel et al. 2003). Inclusion of former drinkers in the unexposed or control group may bias results towards finding health benefits from alcohol (Shaper et al. 1988, Shaper 1995). Individuals who have consistently abstained from alcohol over the life course may also be different from drinkers in ways relevant to health outcomes and other health behaviors, for example, persistent life-course socioeconomic disadvantage (Caldwell et al. 2008), religions proscribing alcohol and self-reported degree of religiosity (Michalak et al. 2007) and demographic characteristics such as being female, older ages, and Hispanic have been associated with abstinence from alcohol (Rehm et al. 2008).

In relation to health, lifetime abstainers are more likely to be health conscious (Cryer et al. 2001, Huang et al. 2011, Michalak et al. 2007), suffer from serious childhood (Lown et al. 2008) or adult health problems (Lown et al. 2007, Cryer et al. 2001), and be physically inactive (Fine et al. 2004). A British study found that non-drinkers at age 16 had more health conditions than drinkers; and that among never drinkers at age 23 or 26, having a longstanding illness predicted remaining an abstainer at ages 34 and 42 (Ng Fat et al. 2014). Long-term childhood cancer survivors were almost twice as likely to be current abstainers compared to their siblings (Lown et al. 2008, Michalak et al. 2007). Lifetime abstinence was also associated with lower odds of lifetime major depression and anxiety disorder (OR=0.55) compared to current non-binge drinkers (Marti et al. 2015).

The implications of exposure group choice in alcohol-related health studies are important to consider. The protective health factors associated with drinking may be misleading when studies include former drinkers in the definition of abstainers, as most studies have (Fillmore et al. 2006). Findings from studies that measured only lifetime abstention suggest a systematic bias from mis-classification of the former drinkers in a lifetime context. Further, it has also been argued that when lifetime abstainers are used as the control group and compared with current drinkers in mortality studies, the findings may be biased towards beneficial effects from drinking since those who quit drinking due to ill health “sick quitters” were removed from the drinking risk group while lifetime abstainers with ill health cannot similarly select out of that group (Kerr and Ye 2010, Liang and Chikritzhs 2011).

Mis-measurement issues associated with defining lifetime abstainers, former, and current-drinkers have been documented in one U.S. study where 53% of those reporting never drinking in 1992 had reported some drinking in earlier surveys (Rehm et al. 2008). Corrections in the classification of abstainer status resulted in higher estimates of alcohol-attributable mortality (Rehm et al. 2008). In the 1958 British Birth Cohort study, two-thirds of the respondents at age 45 (n=153) who said they had never drank alcohol had reported drinking alcohol at an earlier assessment (Caldwell et al. 2006).

Lifetime occasional drinkers have been proposed as an alternative control group due to their low-level alcohol consumption over the life-course and likelihood of being more similar to drinkers than lifetime abstainers in regard to other risk behaviors and characteristics (Shaper et al. 1988). In this UK study, there were also few lifetime abstainers in comparison to a larger group of lifetime occasional drinkers, providing more power/sample size as a comparison group to drinkers. However, Fillmore and colleagues point to potential problems of how to define occasional drinking and how “light” is light drinking (Fillmore et al. 2007). Alcohol-related health studies could benefit from clarification of what defines occasional drinking and consideration of whether this group is more similar to drinkers or lifetime abstainers in the U.S. context.

The present study extends the prior literature by examining abstinence over the life course using data from a nationally-representative panel of U.S. youth followed for over thirty years—the 1979 National Longitudinal Survey of Youth (NLSY79). Specifically, this study captures lifetime abstinence and lifetime occasional drinking from ages 18 to 55 based on a series of questions on drinking including drinking initiation and repeated drinking measures

through mid-life. Furthermore, variables in the earliest NLSY79 surveys allow the present study to evaluate relationships between early-life factors relevant to health outcomes and the choice of lifetime drinking or non-drinking assessed at later time points. Early-life health problems and socioeconomic disadvantage are hypothesized to increase the likelihood of lifetime abstinence, and thus making them distinct from drinkers. Furthermore, we consider the hypothesis that lifetime occasional drinkers are more similar to drinkers than to lifetime abstainers, making them a potentially more appropriate reference group in alcohol-related health studies.

MATERIALS AND METHODS

The NLSY79, an on-going study conducted by the U.S. Bureau of Labor, used a stratified, clustered design to select a nationally representative panel of individuals born between 1957 and 1964. A sample of 6,111 non-institutionalized, civilian youths ages 14-21; and an oversample of 5,295 civilian Hispanic, Black, and economically disadvantaged youths were selected. Respondents were re-interviewed annually from 1979 through 1994 and every two years since then. The initial NLSY79 response rate was 90%, and retention rates during follow-up assessments were 80% or better during the first 16 survey waves and remained above 70% in more recent waves (Bureau of Labor Statistics 2012). Respondents were aged 47 to 55 years in 2012. Survey weights for each year adjust the sample to be representative of U.S. youth ages 14 to 21 in 1979 (Bureau of Labor Statistics 2006).

Measures

Dependent variables—lifetime alcohol abstinence and occasional drinking—

Questions related to alcohol use were asked in survey years 1982-1985, 1988, 1989, 1994, 2002, and every other year from 2006-2012. Because of the intermittent years that alcohol data were collected and changes in wording of alcohol questions across survey years, we derived our lifetime measure of abstinence from two sets of drinking questions. First, from 1982 (ages 18-24) to 1989 (ages 24-32), “Have you ever had a drink of an alcoholic beverage?” was asked. We pooled responses to create a new variable, early abstainers, indicating abstinence from alcohol through 1989 (n=143). Second, in all years with alcohol questions, respondents who reported drinking in the last 30 days were asked their alcohol quantity (i.e., number of drinks on an average drinking day) and frequency (i.e., total number of days drank alcohol in last month). We constructed a total alcohol volume for each alcohol survey year based on these quantity and frequency measures. Then we created a grand total volume across six survey years between 1994 and 2012. After excluding respondents with more than three missing data points, we considered a grand total volume of zero to indicate long-term abstinence from 1994 to 2012. Finally, we combined abstinence at 1989 and total volume of zero drinks from 1994 to 2012 to form our alcohol abstinence variable (abstainers). A total of 126 respondents met these criteria. See Figure 1.

Given the inconsistencies in reporting lifetime abstinence (Rehm et al. 2008, Caldwell et al. 2006) and to allow for some flexibility in drinking behaviors across the life-course, we created a more relaxed definition of abstinence, referred to as near-abstainers, as having a total of one drink or less across all alcohol survey years from 1982 to 2012 (allowing up to 3

missing values). Excluding the strict abstainers, a total of 592 respondents reported having one drink or less across these years.

Occasional drinking was created as an alternative measure to lifetime abstinence and drinking. We defined occasional “light” drinking as having only 1 drink up to three times per month (hereafter refer to as having three or less drinks per month) over the life-course. Respondents could report up to 1 drink on an average drinking day (quantity) and 3 days or less of drinking in the last 30 days (frequency) across all alcohol survey years (1982-2012) and also miss up to 3 survey years. A total of 309 respondents met the definition of occasional drinker.

Key explanatory variables—Three variables were used to capture early-life adversity. Living in poverty was used as a binary indicator based on income and family size data from the 1979 survey. We conducted sensitivity analyses to assess whether multiple years of poverty served as a better measure (i.e., similar assessments 1979-1982), but results from single versus multiple year constructs did not vary in their association with the dependent variable and covariates. Any missing poverty data in 1979 were replaced with 1980 or 1981 survey responses. Additionally, from the 1979 survey, we used two variables to indicate if respondents lived separately from their mother or father.

In 1988, respondents were asked whether they had a relative who was an alcoholic or a problem drinker at any time. If respondents answered yes, then they were allowed to list up to 6 relatives. We created three separate binary variables (yes/no) to capture whether relatives were a biological parent or sibling; step/adoptive/foster parent or sibling; and other relative (i.e., grandparent, aunt/uncle or cousin).

Beginning in 1998, NLSY administered a health module to respondents at the first interview after they turned age 40. Respondents were asked, “Have you ever had, or has a doctor ever told you that you have (condition)?” If respondents said yes, then they were asked the date of first diagnosis. We grouped health conditions into physical health (i.e., hypertension, diabetes, cancer, chronic lung disease, heart attack or other heart problems, and arthritis) and mental health (i.e., emotional/nervous/psychiatric) problems. To capture childhood health problems, we calculated age of diagnosis from their birthdate and date of diagnosis. Respondents who were first diagnosed at age 18 or younger were considered to have had a childhood health problem.

We used an alternative construct for early life health problems. In the baseline 1979 survey, respondents were asked three questions on work-related health limitations: (1) “[Are you/ Would you be] limited in the kind of work you [could] do on a job for pay because of your health?”; (2) “[Are you/ Would you be] limited in the amount of work you [could] do because of your health?”; and (3) For those not working for pay, “Would your health keep you from working on a job for pay now?” Respondents reporting yes to any of these questions were considered to have had an early life health problem. Prior studies have found strong correlations of this construct with disability, health impairments, and chronic health conditions (Walsemann et al. 2008, Burkhauser et al. 2002, Besen and Pranksy 2014), but may under-report based on objective measures of health.

Independent variables—These include gender, foreign- or U.S.-born and birth cohort in two groups: 1957-1960 and 1961-1964. Self-reported race/ethnicity from 1979 was categorized into mutually exclusive groups: (1) White, (2) Black, (3) Hispanic, (4) Native American, and (5) Other racial/ethnic groups including Asian, Hawaiian, and Pacific Islander. Mother's and father's highest level of education served as a proxy for family socioeconomic status (SES) (Krieger et al. 1997). Parental education was categorized into less than high school, high school degree or equivalent, and greater than high school degree, and a missing category. In 1979, respondents were asked in what religion they were raised, and over 70 different religious dominations were reported. Following Michalak and colleagues' groupings (Michalak et al. 2007), we categorized religions based on their proscription against alcohol: "wet" (more tolerant of alcohol), "moderate", and "dry" (least tolerant of alcohol). For example, religious groups classified into the "wet" category included Catholic, Judaism, Spiritualist, and no religion.

Analyses

The analytic sample was restricted to respondents reporting a valid answer to the question "have you ever had a drink of alcohol" (n=11,266). We also limited the sample to those who had participated in the age 40+ health module (n=8,465), from which we derived childhood health diagnoses. We excluded respondents who were missing more than 5% of covariates and those who participated in less than 9 of the 12 surveys with alcohol questions. The final sample size for analysis was 7,515. Respondents in the final analytic sample did significantly vary from those not in the analytic sample. Men, Whites and other racial/ethnic groups, older respondents, and those with lower SES (based on parent education and poverty) were less likely to be included in the final analytic sample than women, Blacks, Hispanics, younger respondents, and persons with higher SES. There was no difference by childhood health when using the proxy work-related health limitations (which was measured at baseline whereas all others were measured in later survey years). However, this does not rule out the possibility that those who dropped out of the study may have been less healthy than those who remained in the study.

In constructing our main outcome variable, we compared abstainers (zero drinks across all 12 survey years) to near abstainers (one drink across 12 survey years) and occasional light drinkers (three drinks or less per month across 12 survey years) by demographic characteristics and covariates. Since the results showed minimal differences between the three groups, we constructed two separate "abstainer" variables: (1) lifetime abstainer (combining abstainers and near abstainers to allow a total of one drink or less across 12 survey years) and (2) a lifetime minimal drinker (combining lifetime abstainers and occasional drinkers to allow zero drinks to a maximum of 3 drinks per month across 12 survey years). A total of 718 respondents were defined as lifetime abstainers and 1,027 were defined as lifetime minimal drinkers.

A series of logistic regression models were used to examine the predictors of lifetime abstinence and lifetime minimal drinking. Model 1 included covariates representing demographics and family SES. Model 2 built upon Model 1 by adding the explanatory factors of religion, early life adversity, family alcoholism, and childhood health problems.

Given the evidence for gender differences in abstinence from prior literature (Rehm et al. 2008), we conducted additional models on a women's sub-sample. There were too few men for a separate analysis. All analyses were conducted using STATA version 14 (Stata Corp. 2015). We accounted for clustering in the sampling design with maximum likelihood estimation using robust standard errors and used NLSY custom weights to adjust for oversampling and attrition.

RESULTS

Sample characteristics

The analytic sample was roughly balanced by gender and birth cohort. Only 4% were foreign-born. The majority of respondents were White and more than 70% had a parent with at least a high school degree. About 31% reported being raised in a "dry" (alcohol intolerant) religion, 31% in a "moderate" religion, and 38% in a "wet" religion. In regards to early adversity, 13% lived in poverty in 1979, and about a quarter lived away from either their mother or father. Twenty-five percent of respondents reported a biological parent or sibling with an alcohol problem and 32% had another relative (i.e. grandparent, aunt/uncle, or cousin) with an alcohol problem. Prevalence of childhood health problems was small with only 2% reporting a diagnosis of a physical health problem and 0.5% a diagnosis of a mental health problem by age 18. The prevalence of work-related health limitations in 1979, as a proxy for early life health, was 6.4%.

Defining lifetime alcohol abstinence

Table 1 compares the strict (zero drinks) and lenient or near (one drink) constructs of alcohol abstinence. Results showed no significant differences between the two constructs by gender, birth cohort, family SES, religion, poverty status, or childhood health problems. Respondents who were U.S.-born ($p<0.05$), lived separately from their mother ($p=0.05$), or reported having a biological parent/sibling ($p<0.001$), step/adoptive/foster parent/sibling ($p<0.01$) or other relative ($p=0.05$) with alcohol problems were less likely to report zero drinks compared to a total of one drink or less. Furthermore, respondents with work-related health limitations at baseline were more likely to report zero drinks ($p=0.05$).

Next, we compared the occasional light drinking group to the strict alcohol abstainer group. Similar to the prior comparison of zero drinks to one drink, few differences were found between abstainers and occasional drinkers. Respondents who were foreign-born ($p<0.05$), in a less dry religion ($p<0.01$), living in poverty ($p<0.05$), or reported having a biological parent/sibling ($p<0.05$) or step/adoptive/foster parent/sibling ($p<0.05$) with alcohol problems were more likely to report zero drinks compared to those reporting occasional drinking. There were no significant differences by early life health problems.

Compared to drinkers, strict abstainers (zero drinks) were significantly more likely to be female ($p<0.001$), foreign-born ($p<0.001$), born in an older cohort (1957-1960; ($p<0.05$)), and non-White ($p<0.001$). Lower family SES (whether mother's or father's education level) was significantly related to lifetime abstinence ($p<0.05$). Respondents raised in a "wet" or "moderate" religion were significantly less likely to be an abstainer ($p<0.001$). Early

childhood adversities (i.e., poverty) were also significantly related to lifetime abstinence ($p<0.001$). Having a biological ($p<0.001$) or step/adoptive/foster family member ($p<0.01$) or other relative ($p<0.01$) with an alcohol problem was significantly associated with being a drinker. While experiencing a physical or mental health problem in childhood was not significantly related to being an abstainer, reporting a work-related health limitation was significantly related ($p<0.001$).

As a result of the minimal differences between abstainers and near-abstainers and between abstainers and occasional drinkers, we therefore considered two constructs of lifetime alcohol intake: lifetime abstainers—respondents who reported zero and up to a single drink over a thirty year span (between 1982 and 2012; $n=718$) and lifetime minimal drinkers—respondents who in addition to zero drinks, reported a total of only one drink and up to 3 drinks per month between 1982 and 2012 ($n=1,027$). Thus, lifetime minimal drinkers are made up of near abstainers plus occasional drinkers.

Predicting lifetime alcohol abstinence

Results from logistic regression models predicting lifetime alcohol abstinence (abstainers and near-abstainers) compared to lifetime drinkers are presented in Table 2. In the full sample, Model 1 indicated significant differences by gender, being foreign-born, birth cohort, race/ethnicity, and mother's and father's education level. After adding in explanatory factors in Model 2, respondents who were women, foreign-born, and in the 1957-1960 birth cohort remained at higher odds of being a lifetime abstainer. Race/ethnicity effects were strongly affected by Model 2 factors. Blacks had higher odds of lifetime abstention in Model 1, but this relationship became non-significant Model 2 where the significant effects of religion and early life adversity were included. For Hispanics, no differences were seen in Model 1, but significantly increased odds (Odds ratio (OR): 1.49) emerged in Model 2.

In Model 2 early poverty was a significant predictor (OR: 1.40). While having any alcoholic relative had lower odds of being an abstainer, only having a biological parent or sibling was significant (OR: 0.76). While odds of having a childhood health problem, either physical or mental were higher, as expected, effects were not significant. However, respondents with a work-health limitation were 1.81 times more likely to be an abstainer than a drinker.

These same models were estimated separately for women. We found mostly similar patterns in women as seen in the full sample for both models (See Table 2). Focusing on Model 2 differences, similar, but non-significant, effects were seen for birth cohort and Hispanic ethnicity while parent's education remained significant where having a mother with greater than a high school diploma or a father with at least a high school diploma was negatively associated with lifetime abstinence. Poverty was also a significant predictor of abstinence. Similar to the whole sample, having a biological family member with alcohol problems significantly predicted being a drinker for women. The odds of being an abstainer were 1.5 times higher among women having work-related health limitations in early life than those who did not but this was only marginally significant.

Predicting lifetime minimal drinking

Table 3 examines factors related to our broader definition of lifetime minimal drinking, a definition that includes occasional light drinking. Similar factors predicting lifetime abstinence also predict lifetime minimal drinking, such as gender, being foreign-born, birth cohort, race/ethnicity, and father's education level. After adding in explanatory factors in Model 2, respondents who were women, foreign-born, and in the 1957-1960 birth cohort remained at higher odds of being a lifetime minimal drinker versus being a lifetime drinker. Race/ethnicity effects were strongly affected by Model 2 factors. Blacks had higher odds of lifetime minimal drinking in Model 1, and in contrast to the lifetime abstinence model, this relationship remained significant in Model 2 even after accounting for religion and early life adversity. For Hispanics, no differences were seen in Model 1, but significant differences with increased odds (OR: 1.70) emerged in Model 2 similar to the lifetime abstinence model.

In Model 2 early poverty was a significant predictor (OR: 1.24) for lifetime minimal drinking. Having a biological parent or sibling was associated with lower odds of being a lifetime minimal drinker. While odds of having a childhood health problem, either physical or mental were higher as expected, effects were not significant. However, respondents with a work-health limitation were 1.8 times more likely to be a lifetime minimal drinker than a drinker.

For women, there were similar patterns as seen in the full sample for both models (See Table 3). Also factors that predicted lifetime abstinence were the same as those for lifetime minimal drinking except that having another relative with alcohol problems significantly predicted being a drinker for women. The odds of being an abstainer were 1.7 times higher among women having work-related health limitations in early life than those who did not.

DISCUSSION

This study contributes to a more detailed understanding of factors influencing lifetime abstinence from alcohol and lifetime minimal drinking through longitudinal data analysis of a cohort of U.S. youth that were followed from ages 14-21 till 47-55. Few studies have tracked or examined patterns of non-use or occasional light drinking across such a substantial part of the lifecourse (Caldwell et al. 2006, Ng Fat et al. 2014). No studies have investigated consistent patterns of reporting no drinks versus essentially abstinent individuals reporting only a single drink and occasional drinking of three drinks or less a month across a span of thirty years. Understanding patterns of abstinence is critical for alcohol-related health studies where abstainers have often served as the unexposed (or control) group in comparison to exposed (or drinking) group/s.

Very few abstainers (zero drinks from 1982-2012) were identified. Specifically, those never reporting having any drink over a thirty year period (from ages 18 to 55) comprised only 1.7% of sample. We believe this strict definition is too small for stable, meaningful analysis. Given a detailed study with multiple early age measurements, a definition allowing a single drink to be reported at no more than one time point may be more comparable to the typical cross-sectional retrospective measure of lifetime abstention and such a quantity would be highly unlikely to have any meaningful health impact. In a retrospective assessment, those

who never had more than one drink could view themselves as an abstainer. Our broadened definition to allow one drink over the thirty-years resulted in a group that had very similar characteristics to the group defined as the zero drink criteria. Key differences were that U.S.-born individuals and those with alcoholic relatives are less likely to be in the strict abstinence group.

A strength of the present study is that it capitalized on the repeated alcohol measures in the NLSY79 data to create an occasional light drinking group. Few studies have examined this group because of the lack of longitudinal data to adequately capture light drinking patterns over the lifetime as well as inconsistencies associated with self-reported abstinence and retrospective drinking patterns (Rehm et al. 2008). We defined occasional drinkers as those who consumed 3 drinks or less per month and had one drink at most per drinking occasion over the thirty-year study period. This group made up an even smaller proportion of the total sample (4.1%) compared to the near-abstainers' one-drink over the lifecourse group (7.8%) but more than the abstainers' zero-drink group (1.7%). Contrary to our hypothesis, occasional drinkers shared more similar characteristics to the strict abstainers than to lifetime drinkers, which is consistent with Rehm and colleagues' finding that people falsely identify as abstainers even though they report some very light drinking in the past. Given these shared demographic and alcohol-related characteristics, we considered a relaxed definition of lifetime minimal drinking to capture a range of abstinence from the strictest sense of zero drinks to light drinking of no more than 3 drinks per month over the thirty-year period. This combined group of lifetime minimal drinkers comprised 13.6% of the total sample, similar to cross-sectional estimates of lifetime abstention in the U.S. (Kerr et al. 2016). Lifetime minimal drinkers are a group that is unlikely to show any health benefits from alcohol intake, given the small quantities consumed.

Using these broader conceptualizations of near abstinence, several important differences with lifetime drinkers were found after controlling for other early life factors. Lifetime abstainers and lifetime minimal drinkers were more likely to have been raised within dry denominations such as Baptist or Mormon and less likely to have been brought up in wet denominations such as Catholicism, as would be expected but not previously documented, to our knowledge. Two key characteristics distinguished lifetime abstainers and minimal drinkers from drinkers: 1) they were raised in households with incomes below the poverty line; and 2) they were less likely to have close biological relatives with alcohol problems. Findings related to early poverty are consistent with other studies that report abstainers are more likely to have lower SES (Kerr et al. 2016, van Oers et al. 1999), but demonstrates that lower SES in childhood has a long-term impact on abstaining from alcohol through the lifecourse. The characteristic of biological relatives with alcohol problems supports the role of genetic and/or epigenetic influences on alcohol use, although early environmental modeling is also a possible mechanism (Rose et al. 2001). Further, while Hispanics were more likely to be in both the lifetime abstainer and minimal drinker groups, Blacks were only more likely to be in the minimal drinker group after controlling for Model 2 covariates.

The effects of early life health problems can affect one's decision to remain abstinent from alcohol through the lifecourse, and thus tainting the comparison of lifetime abstainers, who already have poor health, to drinkers in alcohol-related health studies. We tried to examine

this phenomenon by controlling for retrospective reports of childhood onset of a physical or mental health problem. However, childhood (until age 18) health and mental health problems were rare in this general population sample, and were not found to be significantly related to lifetime abstinence, despite previous studies suggesting a relationship (Evans-Polce et al. 2016) or a reduced drinking relationship (Lown et al. 2008). These factors did have positive odds ratios for lifetime abstinence, suggesting we should not rule out a potential influence. Using an alternative measure for early life health problems, we did find that the odds of being a lifetime abstainer were 1.8 times higher among those with a work-related health limitation (occurring between the ages 14-21) than those without a health limitation. The prevalence of this early life health problem was also significantly higher among all abstainer groups compared to drinkers. Thus, early negative health experiences of lifetime abstainers and occasional drinkers may bias findings in analyses of alcohol-related health outcomes such that if early-life health problems are not accounted for findings may show protective effects of moderate drinking. Further, potential biases from the “sick quitter” phenomenon might yet be a concern for those experiencing severe illnesses as an adult, which was not studied here.

Study limitations include potential misclassification of lifetime abstinence as discussed in detail earlier. Although the availability of multiple measures over 30 years is likely to result in considerably lower misclassification, the potential remains because 30-day measures are primarily used and not every year is assessed. Further, the study contributes to our understanding related to classifying abstainers strictly, or by using a minimally broader definition. Measurement issues may also be relevant for health problem assessment as a list of diagnosed conditions was self-reported retrospectively. Biases in reporting due to social stigma and related factors may also be relevant for education, income, family alcohol problems, religion, and foreign nativity measures. The small number of strict abstainers in this sample necessitated our use of broader definitions allowing only one reported drink (near-abstainer) and up to 3 drinks per month (occasional drinker) over the 30-year study period. While these strict and more relaxed abstinent groups were found to be very similar across study measures, it is possible that modelled results would differ under the stricter definition in another sample. Generalization of findings are limited to the U.S. late baby boomer cohort born 1957-64 since alcohol use is known to be influenced by cohort effects (Kerr et al. 2009).

This study of lifetime drinking and abstinence assessed the importance of key areas of influence including family religion, poverty, parental educational attainment and family alcohol problems. Findings indicate that lower childhood SES increases the likelihood of lifetime abstinence as measured by both early life poverty and parent’s education. These indicators of childhood adversity are potentially important risk determinants for health and social problems but are factors that are rarely measured in health outcome studies. Working in the opposite direction, but with a less clear or well-established effect on health, having alcoholic relatives was related to lower odds of lifetime abstinence. Finally, lifetime abstinence and lifetime minimal drinking were associated with early life health problems. Ignoring these potential influences represents a potential for bias toward finding protective effects from moderate drinking (or reduced effects sizes on estimates of harmful drinking), even in studies where lifetime abstainers are used as controls.

Given these confounders with lifetime abstinence, lifetime occasional drinkers would seem to be a more appropriate control group. However, as this study shows, lifetime occasional drinkers are a small group and they are more similar to abstainers than drinkers based on early demographic and alcohol-related characteristics. A more relaxed definition of lifetime abstinence that accounts for this light/occasional drinking serves as a meaningful step towards understanding who lifetime abstainers are, and allowing for inconsistencies in people's reports of alcohol use. Thus as this study shows, lifetime abstainers, broadly defined, can be an appropriate control group to drinkers in alcohol-related health studies with the caveat of controlling for key early life influences.

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Figure 1.
Selection Criteria: Defining Abstainers

Table 1

Descriptive Statistics by Lifetime Drinking Status from 1982 to 2012, NLSY 1979

<i>weighted % (unweighted n)</i>	Abstainer ^a		Near Abstainer ^b		Occasional Drinker ^c		Drinkers	
	(n=126)		(n=592)		(n=309)		(n=6,488)	
Gender								
Women	67.55%	(89)	73.4%	(443)	76.7%	(244)	49.0%	(3,147)***
Men	32.5%	(37)	26.6%	(149)	23.3%	(65)	51.0%	(3,341)
Foreign Born								
No	88.9%	(102)	95.0%	(543)*	95.0%	(284)*	96.0%	(6,068)***
Yes	11.0%	(24)	5.0%	(49)	5.0%	(25)	4.0%	(420)
Birth Cohort								
1957-1960	60.9%	(71)	53.9%	(292)	56.1%	(155)	48.0%	(2,929)*
1961-1964	39.1%	(55)	46.1%	(300)	43.9%	(154)	52.0%	(3,559)
Race/Ethnicity								
White	54.3%	(37)	52.3%	(171)	50.7%	(93)	63.7%	(2,771)***
Black	25.0%	(48)	27.3%	(271)	21.9%	(124)	13.1%	(1,778)
Hispanic	11.7%	(34)	6.5%	(97)	6.9%	(50)	6.1%	(1,163)
Native American	6.1%	(4)	7.2%	(30)	9.1%	(19)	5.2%	(253)
Other	2.9%	(3)	6.8%	(23)	11.4%	(23)	11.8%	(523)
Mother's Education								
<High School	46.3%	(76)	42.4%	(295)	36.4%	(140)	29.0%	(2,591)**
High School	30.8%	(29)	37.7%	(190)	41.8%	(105)	44.4%	(2,426)
>High School	15.9%	(12)	14.6%	(60)	18.6%	(49)	21.5%	(1,064)
Missing	7.0%	(9)	5.3%	(47)	3.2%	(15)	5.1%	(407)
Father's Education								
<High School	36.6%	(60)	39.4%	(248)	37.7%	(121)	29.0%	(2,135)*
High School	23.9%	(21)	28.3%	(146)	33.8%	(99)	33.2%	(1,894)
>High School	22.4%	(16)	17.7%	(70)	20.4%	(51)	28.4%	(1,363)
Missing	17.0%	(29)	14.6%	(128)	8.2%	(38)	9.4%	(916)
Religion by Alcohol Proscription								
Dry	53.5%	(60)	56.2%	(333)	40.8%	(139)**	28.1%	(2,188)***
Moderate	19.9%	(21)	25.8%	(122)	38.8%	(86)	31.5%	(1,558)
Wet	26.6%	(44)	18.0%	(137)	20.4%	(84)	40.4%	(2,723)
1979 Poverty Status								
Not In Poverty	73.7%	(72)	77.1%	(375)	83.7%	(219)*	87.6%	(4,926)***
In Poverty	26.3%	(54)	23.0%	(217)	16.3%	(90)	12.4%	(1,562)
1979 Family Structure ^d								
Lives separately from Mother	16.4%	(21)	29.6%	(150)	27.5%	(76)	23.1%	(1,396)**
Lives separately from Father	26.3%	(39)	33.7%	(209)	33.6%	(111)	28.2%	(2,037)

<i>weighted % (unweighted n)</i>	Abstainer^a		Near Abstainer^b		Occasional Drinker^c		Drinkers	
	(n=126)		(n=592)		(n=309)		(n=6,488)	
Alcoholic Relatives^d								
Biological parent/sibling	10.9%	(18)	24.3%	(137) [*]	21.1%	(71) [*]	26.2%	(1,690) ^{***}
Step/Adopt/Foster parent/sib	0.8%	(2)	4.5%	(28) [*]	3.5%	(11)	4.9%	(303) ^{**}
Other Relative	18.8%	(21)	29.6%	(156)	28.4%	(86)	32.8%	(2,071) ^{**}
Early Life Health Problems^d								
Physical Health Problem	2.8%	(2)	2.3%	(14)	2.7%	(11)	1.7%	(95)
Mental Health Problem	1.7%	(1)	0.3%	(1)	1.3%	(4)	0.4%	(26)
Work-related Health Limitations	17.7%	(15)	9.7%	(51) [*]	10.1%	(27)	5.8%	(378) ^{***}

Notes:

^a Respondents reported not drinking alcohol (asked in 1982-1989) and zero drinks (from 1994-2012);

^b Respondents reported a total of one drink or less (1982-2012);

^c Respondents reported drinking three drinks or less per month;

^d Each measure for family structure, alcoholic relatives and childhood health problems are dichotomous variables. All statistical tests show comparisons to Abstainers.

^{*} p<.05,

^{**} p<.01,

^{***} p<.001

Table 2

Logistic Regression Models of Lifetime Abstainers Compared to Drinkers, NLSY 1979

	Full Sample (n=7,515)				Women Only (n=3,929)			
	Model 1		Model 2		Model 1		Model 2	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Gender								
Women	Ref		Ref					
Men	0.39	0.32, 0.49	0.40	0.32, 0.50				
Foreign Born								
No	Ref		Ref		Ref		Ref	
Yes	0.62	0.42, 0.93	0.55	0.37, 0.83	0.56	0.35, 0.90	0.49	0.30, 0.79
Birth Cohort								
1957-1960	Ref		Ref		Ref		Ref	
1961-1964	0.73	0.64, 0.94	0.79	0.64, 0.98	0.75	0.59, 0.94	0.79	0.61, 1.02
Race/Ethnicity								
White	Ref		Ref		Ref		Ref	
Black	2.00	1.61, 2.48	1.23	0.95, 1.60	1.94	1.51, 2.48	1.16	0.86, 1.57
Hispanic	0.98	0.73, 1.31	1.49	1.05, 2.09	0.94	0.67, 1.31	1.37	0.93, 2.03
Native American	1.35	0.87, 2.09	1.04	0.65, 1.65	1.06	0.63, 1.78	0.79	0.46, 1.36
Other	0.63	0.40, 0.99	0.67	0.42, 1.06	0.59	0.34, 1.03	0.64	0.37, 1.12
Mother's Education								
<High School	Ref		Ref				Ref	
High School	0.77	0.61, 0.99	0.83	0.65, 1.06	0.80	0.60, 1.07	0.87	0.65, 1.16
>High School	0.70	0.50, 0.99	0.77	0.55, 1.09	0.46	0.29, 0.72	0.51	0.32, 0.80
Missing	0.76	0.50, 1.14	0.73	0.48, 1.10	0.77	0.48, 1.23	0.74	0.45, 1.19
Father's Education								
<High School	Ref		Ref		Ref		Ref	
High School	0.76	0.53, 0.98	0.81	0.62, 1.05	0.66	0.49, 0.90	0.69	0.50, 0.94
>High School	0.73	0.53, 1.00	0.82	0.59, 1.14	0.66	0.45, 0.98	0.73	0.49, 1.09
Missing	1.11	0.84, 1.47	1.11	0.82, 1.52	0.93	0.68, 1.29	0.91	0.64, 1.30
Religion by Alcohol Proscription								
Dry			1.93	1.45, 2.56			2.17	1.55, 3.04
Moderate			Ref				Ref	
Wet			0.52	0.38, 0.71			0.60	0.41, 0.87
1979 Poverty Status								
Not In Poverty			Ref				Ref	
In Poverty			1.40	1.10, 1.77			1.38	1.05, 1.81
1979 Family Structure								
Lives separately from Mother			1.14	0.92, 1.41			1.18	0.93, 1.50
Lives separately from Father			0.89	0.74, 1.06			0.91	0.74, 1.13
Alcoholic Relatives								

	Full Sample (n=7,515)				Women Only (n=3,929)			
	Model 1		Model 2		Model 1		Model 2	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Biological parent/sibling			0.76	0.60, 0.97			0.71	0.54, 0.93
Step/Adopt/Foster parent/sib			0.71	0.43, 1.17			0.65	0.37, 1.13
Other Relative			0.81	0.64, 1.01			0.89	0.69, 1.16
Childhood Health Problems								
Physical Health Problem			1.20	0.61, 2.36			1.16	0.55, 2.47
Mental Health Problem			1.32	0.29, 6.05			2.17	0.40, 11.94
Work-related Health Limitations			1.81	1.26, 2.60			1.50	0.97, 2.32

Notes: Logistic regression models using weighted data. OR=Odds ratios; CI=Confidence intervals; Lifetime abstainers are defined as strict abstainers (zero drinks) and near-abstainers (total of one drink or less), n=718.

Table 3

Logistic Regression Models of Lifetime Minimal Drinkers Compared to Drinkers, NLSY 1979

	Full Sample (n=7,515)				Women Only (n=3,929)			
	Model 1		Model 2		Model 1		Model 2	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Gender								
Women	Ref		Ref					
Men	0.35	0.29, 0.42	0.35	0.29, 0.42				
Foreign Born								
No	Ref		Ref		Ref		Ref	
Yes	0.67	0.48, 0.95	0.60	0.42, 0.85	0.60	0.39, 0.91	0.51	0.33, 0.79
Birth Cohort								
1957-1960	Ref		Ref		Ref		Ref	
1961-1964	0.75	0.64, 0.89	0.79	0.65, 0.94	0.72	0.59, 0.87	0.77	0.61, 0.95
Race/Ethnicity								
White	Ref		Ref		Ref		Ref	
Black	2.10	1.75, 2.53	1.40	1.12, 1.74	2.03	1.64, 2.52	1.37	0.85, 1.78
Hispanic	1.07	0.81, 1.40	1.70	1.22, 2.35	1.03	0.75, 1.43	1.60	0.94, 2.38
Native American	1.59	1.11, 2.28	1.27	0.87, 1.86	1.45	0.95, 2.20	1.16	0.45, 1.80
Other	0.82	0.58, 1.16	0.84	0.60, 1.20	0.66	0.43, 1.02	0.68	0.37, 1.05
Mother's Education								
<High School	Ref		Ref				Ref	
High School	0.83	0.68, 1.02	0.84	0.71, 1.08	0.83	0.65, 1.06	0.88	0.65, 1.13
>High School	0.80	0.60, 1.08	0.84	0.62, 1.13	0.57	0.39, 0.83	0.59	0.32, 0.87
Missing	0.71	0.49, 1.02	0.68	0.47, 0.99	0.72	0.46, 1.12	0.68	0.45, 1.07
Father's Education								
<High School	Ref		Ref		Ref		Ref	
High School	0.79	0.63, 0.98	0.82	0.66, 1.03	0.70	0.54, 0.90	0.71	0.51, 0.93
>High School	0.69	0.52, 0.92	0.76	0.57, 1.01	0.64	0.46, 0.90	0.68	0.49, 0.96
Missing	0.95	0.73, 1.23	0.91	0.69, 1.20	0.80	0.60, 1.08	0.76	0.64, 1.05
Religion by Alcohol Proscription								
Dry			1.49	1.19, 1.88			1.50	1.56, 1.97
Moderate			Ref				Ref	
Wet			0.44	0.34, 0.57			0.45	0.41, 0.61
1979 Poverty Status								
Not In Poverty			Ref				Ref	
In Poverty			1.24	1.00, 1.52			1.18	1.05, 1.51
1979 Family Structure								
Lives separately from Mother			1.09	0.90, 1.31			1.14	0.94, 1.41
Lives separately from Father			0.99	0.85, 1.16			0.99	0.75, 1.19
Alcoholic Relatives								

	Full Sample (n=7,515)				Women Only (n=3,929)			
	Model 1		Model 2		Model 1		Model 2	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Biological parent/sibling			0.72	0.59, 0.89			0.67	0.54, 0.85
Step/Adopt/Foster parent/sib			0.70	0.45, 1.08			0.63	0.38, 1.02
Other Relative			0.80	0.66, 0.97			0.78	0.69, 0.98
Childhood Health Problems								
Physical Health Problem			1.26	0.72, 2.21			1.08	0.58, 2.08
Mental Health Problem			2.45	0.83, 7.24			3.15	0.40, 13.93
Work-related Health Limitations			1.82	1.32, 2.50			1.71	1.17, 2.52

Notes: Logistic regression models using weighted data. OR=Odds ratios; CI=Confidence intervals; Lifetime minimal drinkers are defined as lifetime abstainers (total of one drink or less) and occasional drinkers (three or less drinks per month); n=1,027.