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Age Differences in Long-Term Patterns of Change in Alcohol Consumption Among Aging Adults

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Abstract

Objectives—To estimate patterns of long-term, within-person, changes in alcohol consumption among adults of different ages and assess key predictors of alcohol-use patterns over time.

Method—Data came from 3,617 adults, interviewed up to four times between 1986 and 2002. Multilevel multinomial logit models estimated the odds of abstinence and heavy drinking relative to moderate drinking.

Results—The odds of abstinence increased and the odds of heavy drinking decreased during the study period. Older adults experienced faster increases in abstinence than younger adults. However, data extrapolations suggest that current younger adults are more likely to be abstinent and less likely to be heavy drinkers during late life than current older adults. Time-varying health, social, and lifestyle factors account for some of these patterns.

Discussion—Drinking behavior in our aging population appears to be on a relatively promising course, perhaps reflecting the effectiveness of public health efforts.

Keywords

alcohol use; aging; longitudinal analysis

Alcohol use is thought to be responsible for approximately 85,000 deaths per year in the United States and is widely regarded as a high-priority public health concern for virtually all segments of the population (Mokdad, Marks, Stroup, & Gerberding, 2004). To help address this concern, substantial effort has been spent on monitoring levels of alcohol use in the population (Serdula, Brewer, Gillespie, Denny, & Mokdad, 2004). One consistent pattern found in these ongoing surveillance studies is an age-related decline in alcohol use, starting in young adulthood. For example, according to the Centers for Disease Control and Prevention's (CDC) National Center for Health Statistics, the prevalence of current drinkers drops from about 69.5% among adults aged 25 to 44, to about 37.3% among adults aged 75 and older (Adams & Schoenborn, 2006). Similarly, rates of heavier drinking drop from 6.6% among adults aged 18 to 24, to about 2.1% among adults aged 75 and older (Adams & Schoenborn, 2006).

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However, because age differences in alcohol use observed in cross-sectional data are based on one-time comparisons of individuals of different ages, these data tell us little about the changes in alcohol use that might be expected within individual adults as they grow older (i.e., aging-related changes). Furthermore, it is currently not clear how patterns of aging-related changes in alcohol use may vary between adults of different ages or what factors shape these patterns of change. This lack of knowledge with regard to patterns of alcohol use during the aging process is potentially problematic given the unprecedented population aging that is currently underway in the United States and other developed countries (Breslow, Faden, & Smothers, 2003).

The purpose of this study is to address these gaps by examining within-person changes in alcohol use among adults of various ages followed over a 16-year period. A limited number of prior longitudinal studies on alcohol use among adults have begun to address these questions. For instance, an analysis of 20 years of data from the National Health and Nutrition Examination Survey (NHANES) I study (1971-1992) has shown evidence of steady declines in the amount of alcohol consumed by individuals as they grew older and has shown that declines in consumption were less steep among younger, compared with older, cohorts of adults (Moore et al., 2005). Based on these findings, the investigators of this study concluded that, compared with older cohorts, recent cohorts of adults are likely to consume more alcohol as they age, perhaps leading to a future increase in the negative health effects of alcohol use in our aging population (Moore et al., 2005).

One key shortcoming of past research on aging-related changes in alcohol use is that important, and potentially clinically relevant, differences in specific levels of alcohol use have not been fully considered. In particular, treating alcohol consumption as a continuous variable in linear models may be problematic in that it fails to account for potentially meaningful distinctions in the courses of change of different types of drinking behavior, such as abstinence and heavy drinking. For example, given recent evidence of potential health benefits associated with moderate levels of alcohol consumption (Beulens et al., 2007; Mukamal, Chiuve, & Rimm, 2006), many aging adults aiming to lead healthier lifestyles during old age may be inclined to limit their heavy drinking but may not go so far as to transition to complete abstinence. This study accounts for the possibility of distinct patterns of aging-related changes in different types of drinking behavior by operationalizing alcohol use into a discrete variable that distinguishes between abstinence, moderate drinking, and heavy drinking. This approach also helps to deal with potential problems caused by the nonnormal distribution of alcohol use in the population, which is typically heavily skewed toward abstinence (Adams & Schoenborn, 2006).

Moreover, distinguishing between potentially disparate patterns of alcohol use also allows for the examination of variability in the effects of key covariates on different levels of drinking behavior. In particular, although health, social, and behavioral factors are thought to be associated with alcohol use (Berkman, Glass, Brissette, & Seeman, 2000; Bucholz, Sheline, & Helzer, 1995), we currently know little about the extent to which these factors may be associated in potentially different ways with abstinence and heavy drinking during the aging process. For example, due to the widespread use of alcohol to buffer the effects of stress (Krause, 1995; Lipton, 1994), one might expect that declining health and the loss of social ties (e.g., widowhood) or social roles (e.g., retirement), which are commonly experienced during later life, would lead to increases in heavy drinking or a slowing of aging-related declines in heavy drinking. However, it is not clear that these same health and social transitions would also be expected to reduce the likelihood of transitions to abstinence. Indeed, evidence suggests that the development of health problems actually increases the likelihood of abstinence from alcohol (Krause, 1991).

In addition, aging-related lifestyle transitions may also have variable effects on abstinence and heavy drinking. For example, as adults attempt to manage the inevitable physical and social losses associated with aging by reducing their participation in overt risk behaviors such as cigarette smoking (Husten et al., 1997), it is likely that they will also reduce their heavy drinking. However, because moderate drinking is not considered by many to be a particularly risky behavior, the likelihood of complete abstinence may not be expected to increase appreciably as part of an aging-related lifestyle transition into less-risky behaviors. However, reductions in physical activity that are commonly observed during the aging process (Shaw & Spokane, 2008) may be expected to be associated with reductions in both heavy and moderate drinking to the extent that reductions in physical activity and drinking behaviors are jointly part of a trend of narrowing one's domains of activity during later life (Baltes & Baltes, 1990).

Method

Sample

Data for this study come from four waves of the Americans' Changing Lives Survey, a nationwide panel study of adults aged 24 and above at baseline (House, 2008). The original sample for the Americans' Changing Lives study sought to represent the continental United States' household population aged 25 and older. A multistage stratified area probability sampling procedure was used, with oversampling of Blacks and those aged 60 and older. The study began in 1986 with face-to-face interviews of a probability sample of 3,617 adults. The overall response rate was 68% in 1986. Approximately, 83% of surviving baseline respondents (N = 2,867) were again administered face-to-face interviews in 1989. Further follow-up interviews, conducted in-person or over the telephone, took place in 1994 with 2,562 respondents (83% of survivors) and in 2001-02 with 1,787 respondents (about 76% of survivors). The final analytic sample included a total of 10,833 observations of the original 3,617 respondents, for an average of 3.0 observations per respondent. Additional details about the sampling and data collection procedures for this study are available at www.icpsr.umich.edu.

Measures

Time-varying outcome measure—The outcome variable in this study is alcohol use, measured as the quantity of alcoholic drinks consumed per month. This measure was computed from responses to three questions. First, respondents were asked "Do you ever drink beer, wine, or liquor?". Second, respondents answering "Yes" to this question were then asked "During last month, on how many days did you drink (beer, wine, or liquor)?" Finally, respondents were asked "On days that you drink, how many cans of beer, glasses of wine, or drinks of liquor do you have?" A measure of drinks per month was calculated by multiplying the number of days in a month that a respondent reported drinking by the number of drinks consumed per day of drinking.

As the distribution of responses was heavily skewed, with the majority of respondents reporting no drinking (50.8%), and to acknowledge potential differences between moderate and heavier drinking, we categorized respondents as abstainers, moderate drinkers, and heavy drinkers at each wave. Following federal guidelines, which define heavy drinking as consuming more than 2 drinks per day for men and more than 1 drink per day for women, we defined *heavy drinking* as consuming more than 60 drinks per month for men and consuming more than 30 drinks per month for women (USDA & USDHHS, 2005). *Moderate drinking* was defined as any consumption of alcohol that did not meet the criteria for heavy drinking. *Drinking abstinence* was defined as zero drinks per month reported at a given wave.

Time-varying predictors—Several time-varying predictors that are expected to change over time during the aging process, and may help to explain aging-related patterns of alcohol use, were also included. In particular, we included a set of variables representing health, social integration, and lifestyle factors that are thought to be associated with alcohol use but whose roles in shaping patterns of alcohol use during the aging process has not been fully examined.

We included two variables representing health. Self-rated ill health was measured with responses to a single item asking respondents to evaluate their current health on a 5-point scale ranging from 1 = *excellent* to 5 = *poor*. Functional impairment was measured with a 4-level Gutman-type scale ranging from 1 = *no impairment* to 4 = *severe impairment* (i.e., confinement to a bed or chair).

Social integration was measured with marital status, coded as a dummy variable distinguishing between respondents who were *married* (0) or *not married* (1), as well as a measure of social isolation adapted from Berkman and Syme's (1979) Social Network Index (see also Seeman et al., 1993). This measure was created by computing a mean of responses to questions regarding frequency of speaking with others, getting together with others, involvement in meetings or programs, and attendance at religious services. This scale ranged from 1 to 6 and was coded such that higher scores represent more social isolation (i.e., less social integration).

Last, lifestyle factors included work status, indicating whether an individual was *working for pay* (0) or *not working* (1) at a given wave; smoking status, distinguishing between *current smokers* (0) and *nonsmokers* (1); and leisure-time physical activity, measured with responses to three questions regarding frequency of yard work, exercise, and walking. This scale ranged from 1 to 4 and was reverse coded such that higher scores represent more sedentary behavior (i.e., less physical activity). This particular physical activity measure has been used in several other published studies (e.g., House et al., 2000; Lantz, House, et al., 1998; Lantz, Lynch, et al., 2001; Musick, House, & Williams, 2004; Musick & Wilson, 2003).

Time-constant predictors—Baseline age was measured continuously in years. In addition, our analyses controlled for race (1 = *non-Hispanic White*; 0 = *other*), gender (1 = *male*; 0 = *female*), and education level, measured as a continuous variable representing the total number of years of completed schooling at that time.

Data Analysis

The analyses for this study took advantage of the longitudinal data by employing multilevel regression models, with occasions of measurement nested within individuals (Hox, 2002). The analyses were conducted with Hierarchical Linear Modeling (HLM) software (Raudenbush & Bryk, 2002). As the dependent variable was originally operationalized as an ordinal variable based on count data with a large number of zeros (50.8% of all observations), nonlinear analyses were appropriate. In particular, a series of multilevel multinomial logit models were estimated. We chose to specify the middle category—moderate drinking—as the reference category. Doing so allowed us to estimate the odds of the two drinking extremes, abstinence and heavier drinking, relative to the odds of moderate drinking.

Our models were estimated in three steps. The basic model was specified to estimate the odds that a respondent was abstinent or engaged in heavier drinking, relative to moderate drinking, at the intercept, while also estimating changes in these odds over time. As time was centered on its mean, the intercept in this case is at the mean follow-up time, 63 months since baseline. This initial model also adjusted for the effects of attrition. Attrition was

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accounted for with two dummy variables: one identifying respondents who died before the fourth wave and the other identifying respondents who dropped out of the study for other reasons, either temporarily or permanently.

In the next model, baseline age was added to test for age differences in these drinking patterns at the intercept, as well as age differences in the trajectories of these drinking patterns over the course of the 16-year follow-up period. To control for other variables that may confound the association between baseline age and alcohol use, gender, race, and education were also included in this second model, both as predictors of alcohol use at the intercept and as interactions with time.

Finally, the time-varying predictors were added to the model, as were interactions between these predictors and baseline age. Each of these variables is thought to be correlated with alcohol use in cross-sectional studies and is also expected to change within individuals as they age. Therefore, these models tested the extent to which aging-related within-persons variation in health, social integration, and lifestyle factors were associated with within-persons variations in different types of alcohol use. These models were also used to assess the extent to which these time-varying factors helped to account for changes in alcohol use as adults of different ages grew older.

Although the data for this study includes oversamples of Blacks and older adults, we chose not to weight the data when testing our models on the following grounds. First, although there is a consensus for weighting data in generating descriptive statistics for a given target population, there is no such agreement in multivariate analyses (Gelman, 2006). Second, the attributes (i.e., race, age) on which unequal selection probabilities were based were explicitly included in the multivariate analyses. When sampling weights are solely a function of independent variables included in the model, unweighted estimates are preferred because they are unbiased, consistent, and have smaller standard errors than weighted estimates (Winship & Radbill, 1994).

Results

Before reviewing the results of our HLM analyses, descriptive statistics of the sample on key variables are presented across alcohol consumption categories. These statistics are based on weighted data and are presented as percentages for categorical variables and as means for continuous variables in Table 1. Approximately, 21% of the original sample died sometime during the follow-up period and the 23% were nonrespondent at one or more waves. At baseline, about 41% of the sample had abstained from alcohol use in the previous month, 50% reported moderate use, and almost 9% reported heavy use. Furthermore, the sample was 47% male, 79% White, and had an average age at baseline of 47.11 years (SD = 16.44). The average level of education in this sample at baseline was 12.37 years of schooling (SD = 3.13). ANOVA and chi-square analyses were used to test the associations between alcohol consumption categories and baseline characteristics. Each of the key measures at baseline varied significantly across the drinking categories.

Alcohol use changes over time

The results from the first multilevel model appear in the first and third columns of Table 2. Model 1a shows estimates of the association between time and the odds of abstaining from alcohol use versus engaging in moderate drinking. The coefficient associated with time since baseline was positive (b = .317; $p \leq .001$), indicating a pattern of increasing odds of alcohol abstinence within individuals over the course of the 16-year study. The odds ratio associated with this coefficient was 1.374, which means that the odds of abstaining from alcohol use, relative to moderate use, increased by about 37% for every 5.4 years of advancing age among these adults (i.e., 1 standard deviation of time since baseline = 5.4 years).

Model 1b shows estimates of the association between time and the odds of heavy versus moderate alcohol use. These estimates also show evidence of a decline in drinking as adults grow older, with the odds of heavy drinking having decreased over time ($b = -.203$; $p \leq .01$). Here, the odds ratio of 0.816 indicates that with every 5.4 years of advancing age, the odds of heavy drinking decreased by about 18%.

Age differences in alcohol use changes over time

In the second and fourth columns of Table 2, baseline age was included to test for age differences in the patterns of change in alcohol use during this period. According to Model 2a, the odds of abstinence were higher ($b = .530$; $p \leq .001$) and the positive association between time and the odds of abstinence was stronger ($b = .078$; $p \leq .01$) among currently older adults compared with younger adults. This more expeditious transition toward abstinence among current older adults is depicted in the top panel of Figure 1. This figure was created simply by using our model estimates to show the predicted odds of abstinence at various time points during the study period for two baseline ages. Any baseline ages could be chosen for this purpose, but we chose age 25 to represent a relatively young cohort and age 65 to represent an older cohort.

The bottom panel of Figure 1 presents the predicted odds of abstinence relative to moderate drinking for these same baseline ages but with age presented on the horizontal axis. The solid lines in this panel are the same trajectories presented in the top panel. However, in this bottom panel, we also predict the odds of abstinence up to age 95 for baseline age group. These additional estimates represent an extrapolation beyond the current study period of 54 years for those aged 25 at baseline and 14 years for those aged 65 at baseline. This extrapolation was accomplished using the same time slopes used for graphing the solid lines; however, when extrapolating, we extended the time period simply by solving for additional points in time beyond the study period. This method assumes that the rate of change in alcohol use remains constant during the years that extend beyond our available data.

What these extrapolations show is that, despite their slower rate of transition to abstinence during the study period, the younger adults appear to be on course toward abstinence from alcohol earlier in the life course compared to current older adults. For example, at age 65 the extrapolated odds of abstinence for the younger age group are 4.063, whereas the estimated odds of abstinence for the older age group are 1.456. In addition, choosing an arbitrary odds of 2.0, one can see that the younger group reaches this point somewhere between the ages of 51 and 53, whereas the older group does not reach this same point until approximately ages of 67 to 69.

Model 2b shows slightly lower, but nonsignificant, odds for heavy drinking among older adults and no differences in the rate with which these odds decline over time. These relatively parallel trajectories of decline in the odds of heavy drinking among younger and older adults are plotted in the top panel of Figure 2.

In the bottom panel of this figure, we plot these estimates against age, while extrapolating up to the age of 95 for both cohorts. The results of this handling of the data suggest that given their equivalent patterns of decline during the study period, current younger adults appear to be on course towards lower odds of heavy drinking as they enter old age compared to current older adults. For example, at age 65 the extrapolated odds for heavy drinking are .027 for the currently younger adults, while the estimated odds are .082 for the older adults. Furthermore, choosing an arbitrary odds of .05, one can see that the currently younger adults reach this point between the ages of 45 and 47, whereas the older adults reach this point between the ages of 77 and 79.

Time-varying predictors of alcohol use

The results of analyses incorporating time-varying predictors appear in Table 3. Model 1a indicates that the odds of abstinence were greatest when an adult had poor self-rated health ($b = .173$; $p \leq .001$), more functional limitations ($b = .201$; $p \leq .001$), was less socially isolated ($b = -.079$; $p \leq .05$), was not smoking ($b = .262$; $p \leq .001$), and was more sedentary ($b = .116$; $p \leq .001$). Moreover, when each of these time-varying predictors were included in the model, the association between time and the odds of abstinence was reduced by about 25% (from .407 to .307) but remained significant ($p \leq .001$).

Model 1b of Table 3 shows the associations between these time-varying factors and the odds of heavy drinking. In particular, this model shows that the odds of heavy drinking were not associated with self-rated health or functional impairment but were associated with social isolation ($b = .241$; $p \leq .001$) and being unmarried ($b = .130$; $p \leq .05$). Also, this model suggests that the odds of heavy drinking are lower when adults are not smoking ($b = -.369$; $p \leq .001$). With the addition of these time-varying predictors to the model, the observed decline in heavy drinking over time diminished by about 29% (from −.204 to −.144) and was no longer statistically significant.

The interactions tested in Models 1a and 1b indicate some age differences in the associations between these time-varying predictors and drinking behavior. More specifically, the positive interactions of social isolation and marital status with baseline age ($b = .110$; $p \leq .001$, and $b = .090$; $p \leq .01$) suggest that social isolation and being unmarried were inversely associated with the odds of abstinence among younger adults but positively associated with abstinence among older adults.

In addition, Model 1a indicates that the baseline age by time interaction was no longer statistically significant after accounting for the time-varying covariates, having been reduced by about 37% (from .078 to .049). This suggests that compared with younger adults, current older adults may grow increasingly likely to abstain from alcohol over time, in part because they are developing more health problems, becoming more socially isolated, and reducing their levels of smoking and physical activity, each of which are associated with elevated odds for abstinence.

Only one age difference in the associations between time-varying predictors and heavy drinking was found. In particular, the association between social isolation and heavy drinking was especially strong among older adults ($b = .117$; $p \leq .05$).

Discussion

Studies monitoring alcohol use trends in the United States have provided evidence of declines in per capita consumption during the latter years of the 20th century (Greenfield, Midanik, & Rogers, 2000). Nevertheless, questions remain about whether these declines will be sustained. Moreover, results from one of the few longitudinal studies of a national sample of adults (NHANES) suggest that recent cohorts of adults can be expected to drink more than earlier cohorts during old age and have raised concerns about the potential for an increase in alcohol-related health problems when current young and middle-aged adults reach old age (Moore et al., 2005). These concerns echo the beliefs of some other scholars who suggest that the prevalence of alcohol problems during late life is likely to increase in future cohorts of aging adults who, unlike current cohorts of older adults, were not exposed to influences such as prohibition and related cultural beliefs opposing alcohol consumption during the early decades of the 20th century (Blow, 1998).

Our findings, however, indicate that these concerns about relatively high levels of alcohol consumption among future cohorts of aging adults may not be warranted. Like previous research, our findings show evidence of normative declines in drinking with advancing age (Karlamangla, Zhou, Reuben, Greendale, & Moore, 2006; Levenson, Aldwin, & Spiro, 1998; Moore et al., 2005). At the same time, however, our data, which cover a time frame that is about 10 years later than previous studies, also show meaningful differences in the ways in which abstinence and heavy drinking patterns vary across age groups.

For example, our data provide evidence of higher rates of abstinence from alcohol and faster movement toward abstinence over the course of the study, among currently older compared with younger adults. What is important to note, however, is that the multinomial modeling approach we used tested for nonlinear changes in the odds of abstinence, with results showing accelerated increases in the odds of abstinence among both younger and older adults. While the rate of acceleration was found to be higher among current older adults during the study period, when we carried these trajectories forward to age 95, we found that younger cohorts are likely to turn to abstinence from alcohol earlier in the life course compared with current older adults. Indeed, as shown in Figure 1, at age 65 the predicted odds of abstinence are approximately 2.79 times higher in the younger compared with the older group (4.063 vs. 1.456). This is clearly a much different conclusion regarding future alcohol use patterns among the aging population than has been reached in some previous studies that have concluded that declines were less steep among more recent, compared with older cohorts of adults (Glynn, Bouchard, LoCastro, & Laird, 1985; Moore et al., 2005).

Regarding heavy drinking, our data show no evidence of discernable age differences in the odds of heavy drinking during the study period. That is to say, the odds of heavy compared with moderate drinking followed essentially the same pattern for adults of all ages during the course of this study. As indicated in Figure 2, such a lack of age differences would seem to foretell a relatively lower likelihood of heavy drinking during old age among future cohorts. Indeed, the estimates from our model indicate that the odds of heavy drinking at age 65 are expected to be approximately 1/3 as high among adults aged 25 at baseline compared with those who were age 65 at baseline (0.027 vs. 0.082).

These findings of future cohorts of older adults being increasingly likely to turn to abstinence, and less likely to engage in heavy drinking, compared with current cohorts of older adults are seemingly consistent with reports of general declines in per capita alcohol consumption in the United States during the late 20th century (Greenfield et al., 2000). Such findings may reflect the increasingly wide availability of information on the health-related effects of alcohol coupled with other public health and social movements aimed toward limiting alcohol consumption that emerged in the 1980s (Greenfield et al., 2000; Levenson et al., 1998).

Still, a word of caution is in order when interpreting our findings in terms of cohort differences in alcohol use during later life, as these analyses remain vulnerable to the potential confounding of aging, period, and cohort effects. In particular, we not only used our model estimates derived from observations made between 1986 and 2002 to compare and contrast trajectories of adults of different baseline ages but also used these estimates to extrapolate beyond the study period to compare distinct birth cohorts across common age ranges. We cannot be certain that such extrapolations are accurate until the youngest adults in our study actually reach old age.

Time-Varying Predictors

Beyond just describing the patterns of change in drinking behavior predicted among adults of various ages, our study also sought to gain a better understanding of the factors that might be driving these changes. According to our findings, growing older is linked with an increasing odds for abstaining from alcohol in large part because of expected age-related changes in life that promote abstinence, such as worsening health, increasing social isolation, declining tobacco use, and declining physical activity. The fact that many seemingly negative health, social, and lifestyle transitions (with the exception of declining smoking) are associated with increases in abstinence relative to moderate drinking would seem to argue against the notion that aging adults are using alcohol to buffer the stress associated with adverse age-related changes. Instead, it appears as if many aging adults are choosing to abstain from alcohol when these negative transitions occur, perhaps in an effort to counterbalance, or compensate for, these losses with the prospect of obtaining some protective benefits to health and well-being from refraining from alcohol (Baltes & Baltes, 1990).

These health, social, and lifestyle transitions also appear to explain much, if not all, of the observed baseline age differences in rates of progression toward abstinence. That is, our findings of higher rates of movement towards abstinence among older adults in this study seem to be merely due to the fact that these older adults are increasingly likely to develop health, social, and lifestyle profiles that are associated with abstinence. As such, and given that future cohorts of aging adults will likely be better able than current older adults to avoid or delay these negative age-related transitions, our projected elevated rates of abstinence among future older adults are probably overestimates.

Declines in heavy drinking were also largely explained by the time-varying health, social relationship, and lifestyle factors. Our findings, however, failed to provide evidence of an association between health and heavy drinking. Instead, these findings indicate that smoking not only has a particularly strong association with this decline in heavy drinking, as smoking is positively associated with heavy drinking, but also is known to decline substantially with advancing age (Glynn et al., 1985). This finding suggests the possibility that some of the observed decline in heavy drinking may be part of a more general trend toward less risky behavior with advancing age. However, given the positive association between social isolation and heavy drinking, our findings also indicate that declines in social integration that are typical in late life (Shaw, Krause, Liang, & Bennett, 2007) may actually work to suppress a potentially more expeditious age-related decline in heavy drinking.

These findings, however, must be interpreted within the context of important study limitations. For instance, it is important to note that the estimated associations for our time-varying predictors reflect the associations between the predictors and outcome at the same point in time. As a result, the causal directions of these associations are uncertain. To address this issue, a lagged approach was considered, whereby associations are estimated between a time-varying predictor at one point in time and an outcome at a subsequent observation period (e.g., Shaw & Spokane, 2008). However, this approach was deemed unfeasible due to our study's substantial variation with respect to the durations of its between-wave gaps.

In addition, it is important to recognize that the current findings represent patterns of alcohol use based only on the number of drinks consumed per month. Patterns of other types of consumption, such as episodic heavy drinking, are also worth studying. Unfortunately, however, the data necessary for constructing measures of additional types of alcohol consumption were not available in the Americans' Changing Lives study.

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Notwithstanding these limitations, our assessment of these data leads us to conclude that drinking behavior in our aging population is on a relatively promising course, at least with respect to heavy drinking. This may be an indication of the effectiveness of public health efforts to reduce drinking behavior. The expected course of change with respect to abstinence—which appears to be on the rise relative to moderate drinking—is more difficult to interpret. Given the potential health benefits of moderate drinking (Beulens et al., 2007), this increase in abstinence may be viewed as problematic. However, assuming that future cohorts of our aging population succeed in living longer, healthier, more socially engaged and more active lives, the predicted increase in abstinence may be somewhat attenuated, as many of these advances in health, social, and lifestyle factors are inversely associated with the odds of abstinence.

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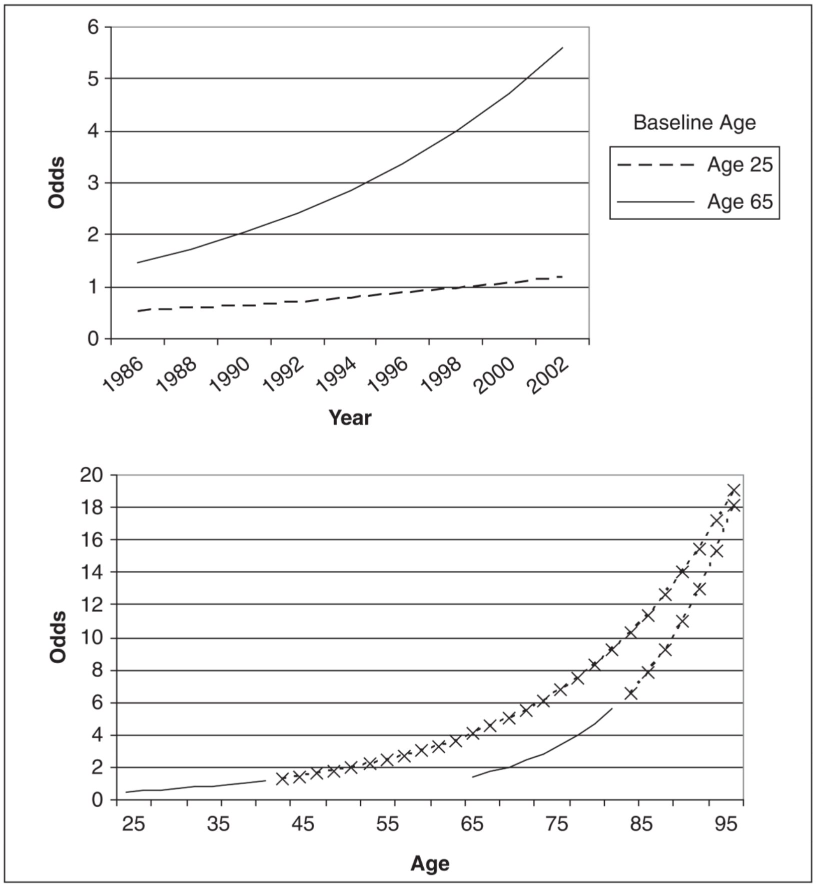

Figure 1.

Odds of abstinence versus moderate drinking

Note: Dashed lines with x-markers are extrapolated beyond the current observation period.

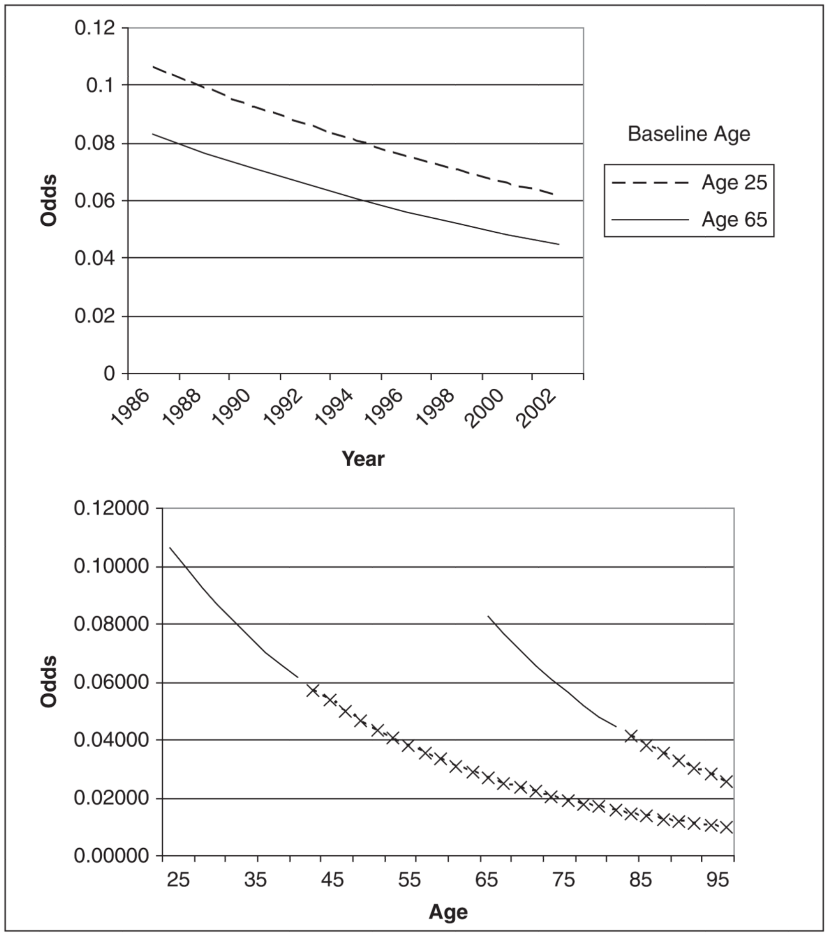

Figure 2.

Odds of heavy drinking versus moderate drinking

Note: Dashed lines with x-markers are extrapolated beyond the current observation period.

Table 1

Descriptive Statistics for Key Measures at Baseline, by Drinking Category, Weighted

	Unweighted sample size				
	Total	**Abstainer**	**Moderate drinker**	**Heavy drinker**	
Measures	***N* = 3,617**	***N* = 1,331**	***N* = 1,075**	***N* = 1,211**	***p*** [e]
Age, *M* (*SD*)	47.11 (16.44)	51.86 (17.29)	43.78 (15.10)	43.83 (14.08)	.000
White, %	0.79 (0.41)	0.74 (0.44)	0.83 (0.37)	0.81 (0.39)	.000
Male, %	0.47 (0.50)	0.34 (0.47)	0.54 (0.50)	0.71 (0.45)	.000
Education, *M* (*SD*)	12.37 (3.13)	11.40 (3.36)	13.14 (2.65)	12.49 (3.32)	.000
Died before 2002, %	0.21 (0.41)	0.29 (0.45)	0.16 (0.36)	0.20 (0.40)	.000
Nonrespondent at any wave, %	0.23 (0.42)	0.23 (0.42)	0.22 (0.42)	0.27 (0.45)	.002
Self-rated ill health, *M* (*SD*)[a]	2.30 (1.07)	2.57 (1.12)	2.11 (0.97)	2.16 (1.07)	.000
Functional impairment, *M* (*SD*)[b]	1.27 (0.70)	1.46 (0.89)	1.14 (0.49)	1.14 (0.51)	.000
Social isolation, *M* (*SD*)[c]	3.23 (1.03)	3.13 (1.12)	3.27 (0.95)	3.54 (0.95)	.000
Nonmarried, *M* (*SD*)	0.31 (0.46)	0.31 (0.46)	0.30 (0.46)	0.36 (0.48)	.000
Nonworking, *M* (*SD*)	0.34 (0.48)	0.49 (0.50)	0.25 (0.43)	0.23 (0.42)	.000
Nonsmoking, *M* (*SD*)	0.70 (0.46)	0.76 (0.43)	0.68 (0.47)	0.48 (0.50)	.000
Sedentariness, *M* (*SD*)[d]	2.17 (0.78)	2.31 (0.83)	2.05 (0.72)	2.14 (0.72)	.000

[a]Range: 1 to 5, with higher scores equal to worse health.

[b]Range: 1 to 4, with higher scores equal to more impairment.

[c]Range: 1 to 6, with higher scores equal to more isolation.

[d]Range: 1 to 4, with higher scores equal to less activity.

[e]*F* test for mean differences across drinking categories.

Table 2

Multilevel Multinomial Regression Estimating Changes in Alcohol Use Over Time

	Abstinence vs. moderate use						Heavy use vs. moderate use					
	Model 1a			Model 2a			Model 1b			Model 2b		
Independent variables	**Coefficient**	***p***	**OR**	**Coefficient**	***p***	**OR**	**Coefficient**	***p***	**OR**	**Coefficient**	***p***	**OR**
Intercept	0.042	.458	1.043	0.473	.000	1.604	−2.599	.000	0.074	−2.616	.000	0.073
Time-constant predictors												
Baseline age				0.530	.000	1.700				−0.119	.108	0.887
Time-varying predictor												
Time since baseline	0.317	.000	1.374	0.407	.000	1.502	−0.203	.002	0.816	−0.204	.018	0.815
Interaction												
Baseline age × Time				0.078	.009	1.081				−0.011	.877	0.989
Random effects	Variable	*p*		Variable	*p*		Variable	*p*		Variable	*p*	
Intercept	2.823	.000		2.412	.000		1.514	>.50		1.518	>.50	
Time slope	0.012	>.50		0.009	>.50		0.029	>.50		0.026	>.50	

Note: OR = odds ratio. These models control for attrition and mortality status, gender, race, and education. In addition, all predictors were standardized as *z* scores before creating the interaction terms. The inferences drawn from these models use the robust standard errors produced by hierarchical linear modeling because they are somewhat tolerant of violations to the assumption of normally distributed response variables (Hox, 2002).

Table 3

Multilevel Multinomial Regression Estimating Changes in Alcohol Use Over Time

	Abstinence vs. moderate use			Heavy use vs. moderate use		
	Model 1a			Model 1b		
Independent variables	**Coefficient**	***p***	**OR**	**Coefficient**	***p***	**OR**
Intercept	0.496	.000	1.642	−2.671	.002	0.069
Time-constant predictors						
Baseline age	0.349	.000	1.417	−0.031	.733	0.970
Time-varying predictors						
Time since baseline	0.307	.000	1.360	−0.144	.115	0.866
Self-rated ill health[a]	0.173	.000	1.189	−0.021	.737	0.979
Functional impairment[b]	0.201	.000	1.222	−0.140	.078	0.870
Social isolation[c]	−0.079	.013	0.924	0.241	.000	1.272
Nonmarried	−0.060	.081	0.942	0.130	.027	1.139
Nonworking	0.033	.372	1.034	0.071	.286	1.074
Nonsmoking	0.262	.000	1.300	−0.369	.000	0.691
Sedentariness[d]	0.116	.001	1.123	0.107	.073	1.113
Interaction						
Baseline age × Time	0.049	.124	1.050	−0.004	.963	0.996
Baseline age × Self-rated ill health	−0.016	.637	0.984	−0.096	.131	0.908
Baseline age × Functional impairment	0.049	.218	1.050	0.047	.590	1.048
Baseline age × Social isolation	0.110	.001	1.116	0.117	.035	1.124
Baseline age × Nonmarried	0.090	.008	1.094	−0.034	.539	0.996
Baseline age × Nonworking	−0.075	.059	0.928	−0.045	.508	0.956
Baseline age × Nonsmoking	−0.005	.899	0.995	−0.041	.394	0.959
Baseline age × Sedentariness	−0.036	.298	0.965	−0.000	.995	1.000
Random effects	Variable	*p*		Variable	*p*	
Intercept	2.314	.000		1.430	>.50	
Time slope	0.014	>.50		0.044	>.50	

Note: OR = odds ratio. Models control for attrition and mortality status, gender, race, and education. In addition, all predictors were standardized as *z* scores before creating the interaction terms. The inferences drawn from these models use the robust standard errors produced by hierarchical linear modeling because they are somewhat tolerant of violations to the assumption of normally distributed response variables (Hox, 2002).

[a]Range: 1 to 5, with higher scores equal to worse health.

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[d]Range: 1 to 4, with higher scores equal to less activity.