Twenty-Year Alcohol-Consumption and Drinking-Problem Trajectories of Older Men and Women*

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ABSTRACT. Objective: The aim of this study was to describe older adults' 20-year alcohol-consumption and drinking-problem trajectories, identify baseline predictors of them, and determine whether older men and women differ on late-life drinking trajectory characteristics and predictors. **Method:** Two-group simultaneous latent growth modeling was used to describe the characteristics and baseline predictors of older community-residing men's (n = 399) and women's (n = 320) 20-year drinking trajectories. Chi-square difference tests of increment in fit of latent growth models with and without gender invariance constraints were used to determine gender differences in drinking trajectory characteristics and predictors. **Results:** Unconditional quadratic growth models best described older individuals' within-individual, 20-year drinking trajectories, with alcohol consumption following an average pattern of delayed decline, and drinking problems an average pattern of decline followed by leveling off. On average, older men declined in alcohol consumption somewhat later than did older women. The best baseline predictors of more rapid decline in alcohol consumption and drinking problems were drinking variables indicative of heavier, more problematic alcohol use at late middle age. **Conclusions:** The course of alcohol consumption and drinking problems from late middle age onward is one of net decline, but this decline is neither swift nor invariable. Gender differences in the timing of decline in drinking suggest that ongoing monitoring of alcohol consumption may be especially important for older men. Further research is needed to identify factors known at late middle age that prospectively explain long-term change in late-life use of alcohol. (*J. Stud Alcohol Drugs, 72,* 308–321, 2011)

EARLY RESEARCH ON ALCOHOL AND AGING implied that alcohol consumption and drinking problems invariably decline over the course of later life and, therefore, need not be considered key factors involved in late-life health and social functioning (Ahlstrom, 2008). However, there is scarce evidence to support this view, and it has been drawn from studies with important design and analytic limitations. Furthermore, there has been almost no research to identify predictors of late-life decline in alcohol consumption and drinking problems. From a public health perspective, it is important to identify factors known at late middle age that prospectively influence older adults' subsequent drinking trajectories; this might inform development of interventions aimed at promoting healthier late-life drinking practices.

This study builds on others' and our previous work in this area (Brennan et al., 2010; Moos et al., 2009, 2010) by using latent growth modeling to describe the 20-year drinking trajectories of men and women as they mature from late middle age (about age 55–65) through "later" old age (about age 75–85). In addition, it extends earlier research by determining whether key demographic, health-related, coping, and social context characteristics known at late middle age predict the level and shape of older individuals' subsequent 20-year drinking trajectories. Because so little is known about older women's drinking behavior as distinct from that of older men, this study also addresses whether gender modifies the characteristics and predictors of 20-year late-life drinking trajectories.

Change in alcohol consumption and drinking problems with age

Many cross-sectional studies, encompassing broad age ranges, have shown an association between older age and lower alcohol consumption and levels of drinking problems (Barnes, 1979; Breslow and Smothers, 2004; Dawson et al., 1995; Eigenbrodt et al., 2001; Johnson et al., 1998; Knupfer and Room, 1964; Livingston and Room, 2009). Longitudinal studies also have generally shown that older age predicts lower alcohol consumption as well as faster decline in alcohol use and drinking problems (Glynn et al., 1985; Karlamangla et al., 2006; Levenson et al., 1998; Moore et al., 2005; but see Kerr et al., 2004). Most longitudinal studies confined to older (i.e., age ≥ 50) samples also have identified a decline over time in participants' alcohol use and drinking problems (e.g., Adams et al., 1990; Fillmore et al., 1991; Platt et al., 2010). However, some have shown stability or, less frequently, an increase in older adults' alcohol consumption and problematic alcohol use (Glynn et al., 1985; Gordon and Kannel, 1983; Stall, 1986a; Temple and Leino, 1989).

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Although these studies have made significant contributions toward better understanding late-life drinking behavior, they have design and analytic limitations that can be improved upon. First, most of these studies focus exclusively on the drinking patterns of older men. Second, most draw conclusions about late-life drinking patterns from data obtained at only two measurement points. Third, almost all of them focus on group-level, average change between measurement points in alcohol consumption and drinking problems. In this regard, our own research shows that there is group-level, moderate decline in alcohol consumption and drinking problems over 10- and 20-year intervals (Moos et al., 2004a, 2004b, 2009) but that, early in the course of old age (from about age 60 to about age 70), within-individual alcohol consumption shows modest rates of decline and that there is significant variability in this pattern (Brennan et al., 2010).

Predictors of late-life drinking trajectories

Predictors of late-life drinking trajectories may include distal historical and social influences, as well as more proximal biological, psychological, and social effects (Douglass et al., 1988; Stall, 1987). Macro-historical contexts (e.g., Prohibition) and social demographic characteristics may place formative stamps on late-life drinking trajectories. Large longitudinal surveys encompassing a broad adult age range and comprising multiple age cohorts are required to disentangle historical period, cohort, and aging-related effects on adult drinking trajectories. These have yielded relatively consistent evidence for historical period effects—but equivocal findings about age and cohort effects—on adult drinking trajectories (Karlamangla et al., 2006; Kerr et al., 2004; Moore et al., 2005).

With respect to social demographic characteristics, older age, lower income, and being female, unmarried, and non-White are generally associated with lower levels of alcohol consumption. Men and unmarried individuals experience steeper declines in alcohol consumption over time than do women and married individuals (Moore et al., 2005; but see Johnstone et al., 1996; Karlamangla et al., 2006).

Few studies have examined biological, psychological, and social factors proposed by Douglass et al. (1988) and Stall (1987) to influence late-life drinking trajectories. With regard to biological influences, older men identify health problems as a key reason that they cut down on or quit drinking (Stall, 1986b; Walton et al., 2000). Consistent with this, Glass et al. (1995) showed that significant negative health events predicted decline in older adults' alcohol consumption over a 3-year interval. Other longitudinal studies have shown that individuals who engage in potentially risky health behaviors, such as heavier drinking and smoking, subsequently decrease their alcohol consumption more quickly than do lighter drinkers and nonsmokers (Kerr et al., 2004; Moore et al., 2005).

With regard to psychological factors, coping strategies may help explain late-life drinking trajectories. Use of substances to reduce tension, including "drinking to cope," is associated with slower decline in alcohol consumption during early adulthood (Trim et al., 2008). Heavier reliance on avoidance coping predicts poorer drinking outcomes, and this effect may be stronger for men than for women (Brennan and Moos, 1996; Cooper et al., 1988, 1992; Timko et al., 2005).

Proximal social influences may also affect the course of late-life drinking. Because frequent socializing affords more drinking opportunities, socially engaged individuals may maintain higher levels of alcohol consumption and drinking problems than do less socially engaged individuals. Friends' attitudes about and use of alcohol influence younger adults' drinking patterns (e.g., Poelen et al., 2007; Trim et al., 2008) and may continue to do so well into later life (Alexander and Duff, 1988).

Consistent with Douglass et al.'s (1988) and Stall's (1987) suppositions, we showed in previous research an association between overall health burden and lower alcohol consumption, and fewer drinking problems, at 10- and 20-year follow-ups (Moos et al., 2009). We showed also that baseline drinking beyond recommended guidelines, smoking, and heavier reliance on avoidance coping foreshadow within-individual decline in alcohol consumption during "early" late life (i.e., from about age 60 to about age 70; Brennan et al., 2010). Here, we consider whether these baseline characteristics also have significant effects on 20-year drinking trajectories of individuals aging into very late life (i.e., age 75–85).

Method

Sample

Data for this study were drawn from a longitudinal investigation of late-life drinking behavior among community residents ages 55–65 at initial assessment. Participants in this research provided informed consent. The project was approved by the Institutional Review Board of Stanford University.

The overall baseline sample (n = 1,884) excluded lifelong nondrinkers and was comparable to community samples of similar age with regard to health characteristics. Participants were followed 1, 4, 10, and 20 years after baseline, with follow-up rates of 94%, 94%, 93%, and 86%, respectively. (For further details, see Brennan and Moos, 1990; Moos et al., 1990, 2009.)

This study focuses on the surviving 719 participants who completed the 20-year follow-up. This sample comprised 55.5% (n = 399) men and 44.5% (n = 320) women. Baseline mean age in the sample was 60.8 (SD = 3.20). At baseline, 74% of participants were married, 93% were White, and average family income was about $44,000.

Mortality and attrition resulting from nonparticipation

Between baseline assessment and the 20-year follow-up, 1,045 individuals were unable to participate in the study because of death (n = 969) or incapacitating illness (n = 76). Death and incapacitating illness were reported by family members or care providers. Almost all (90%) mortality cases were confirmed by death certificate, the remainder by another official source (e.g., the Social Security Death Index).

At baseline, nonsurviving participants were less likely than surviving participants to be female (30% vs. 45%), married (66% vs. 74%), and White (89% vs. 93%); they also had lower annual family income ($32,000 vs. $44,000). There was no difference between nonsurvivors and survivors on baseline amount of alcohol consumed, but nonsurvivors had slightly more (1.8 vs. 1.1) drinking problems.

Between baseline and the 20-year follow-up, 120 individuals survived but declined to participate further in the study or could not be located for follow-up. At baseline, these surviving nonparticipants were more likely than surviving participants to be female (54% vs. 45%) but were less likely to be married (64% vs. 74%) and White (86% vs. 93%) and had lower annual family income ($35,000 vs. $44,000). The surviving nonparticipants consumed slightly less alcohol (0.97 vs. 1.1 drinks per day) than did surviving participants, but there was no difference between these groups in baseline drinking problems.

Measures

Drinking behavior

Alcohol consumption: Alcohol consumption was calculated with items from the Health and Daily Living form (Moos et al., 1992), which assess typical frequency and quantity of consumption of wine, beer, and hard liquor in the past month. Separately for each beverage type, we multiplied participants' weekly frequency of consuming that beverage type (ranging from "less than once a week" to "every day") by the quantity (number of drinks) of that beverage when it was consumed. We obtained the sum of these three frequency-by-quantity products and divided it by 7, to calculate the total number of drinks per day consumed by participants.

Drinking problems: Number of drinking problems was assessed with the Drinking Problem Index (Finney et al., 1991), a 17-item survey tapping negative physical, psychological, and social consequences of alcohol consumption. The Drinking Problem Index has high internal consistency and good construct validity, sensitivity, and specificity (Bamberger et al., 2006; Brennan and Moos, 1990; Finney et al., 1991; Kopera-Frye et al., 1999).

Baseline predictors of drinking trajectories. In addition to demographic data, these included health problems, a count of the number of 13 medical conditions (e.g., cancer, diabetes) and 13 serious physical ailments (e.g., trouble breathing, back pain) that began more than 1 year ago, assessed with items from the Life Stressors and Resources Inventory (Moos, 2002; Moos and Moos, 1994).

Health risk behaviors were assessed with Health and Daily Living items and included smoker (0 = *no;* 1 = *yes*) and drinking beyond recommended alcohol-consumption guidelines (>2 drinks per day; 0 = *no;* 1 = *yes*). The >2 cutpoint was based on alcohol-consumption guidelines of the U. S. Department of Health and Human Services and U.S. Department of Agriculture (2005), as well as the National Institute on Alcohol Abuse and Alcoholism (1995).

Individuals who endorsed smoking, alcohol consumption, or tranquilizer use as a way of reducing tension were classified as using substances for tension reduction (0 = *no;* 1 = *yes*). The Coping Responses Inventory (CRI; Moos, 1993; 2004) was used to assess participants' avoidance and approach coping. To calculate percentage use of avoidance coping, we summed participants' scores on the CRI avoidance coping subscales, then divided them by summed responses to the CRI avoidance and CRI approach coping subscales.

Two Drinking Problem Index items assessed friends' and family members' negative reactions to participants' drinking during the past year. Total number of visits with family members and friends assessed participants' social interaction. A four-item friends' approval of drinking measure indicated how many of a participant's friends approved of and engaged in social and heavier drinking.

Summary of analyses

We used Mplus statistical software (Version 5.12; Muthén and Muthén, 1998–2007) to analyze the data. First, to summarize overall group-level change in alcohol consumption and drinking problems, we calculated means, standard deviations, and cross-wave correlations among these drinking variables separately for men and women.

Next, we conducted two-group simultaneous latent growth modeling (Muthén and Khoo, 1998; Muthén and Muthén 1998–2007) to describe participants' 20-year drinking trajectories, identify effects of key baseline variables on trajectory growth characteristics, and determine differences between men and women on the trajectory characteristics and their predictors. Figure 1 summarizes the latent growth model examined in this study. Participants' drinking trajectories comprised measured information about their drinking behavior at five assessment points (DB0–DB20). This information was linked to latent growth parameters I, S, and Q using the time metric of years since baseline assessment (0, 1, 4, 10, and 20 years), controlling for baseline chronological age. Latent growth characteristic I represents "intercept," the estimated average initial level of drinking behavior; S represents "slope," its estimated average linear growth rate; and Q represents "quadratic," the estimated quadratic growth rate,

interpretable as acceleration or deceleration of growth, in drinking behavior. Variance in each of the I, S, and Q growth parameters is also important but, for simplicity, not shown in Figure 1. Measured variable *X* represents baseline variables hypothesized to influence the level and shape of participants' 20-year drinking trajectories.

Following Muthén and Khoo (1998), we first simultaneously modeled men's and women's unconditional mean, linear, and quadratic growth models to determine which of these had best overall fit to participants' longitudinal alcohol-consumption and drinking-problem data. We used comparative fit (CFI), root mean square error of approxima-

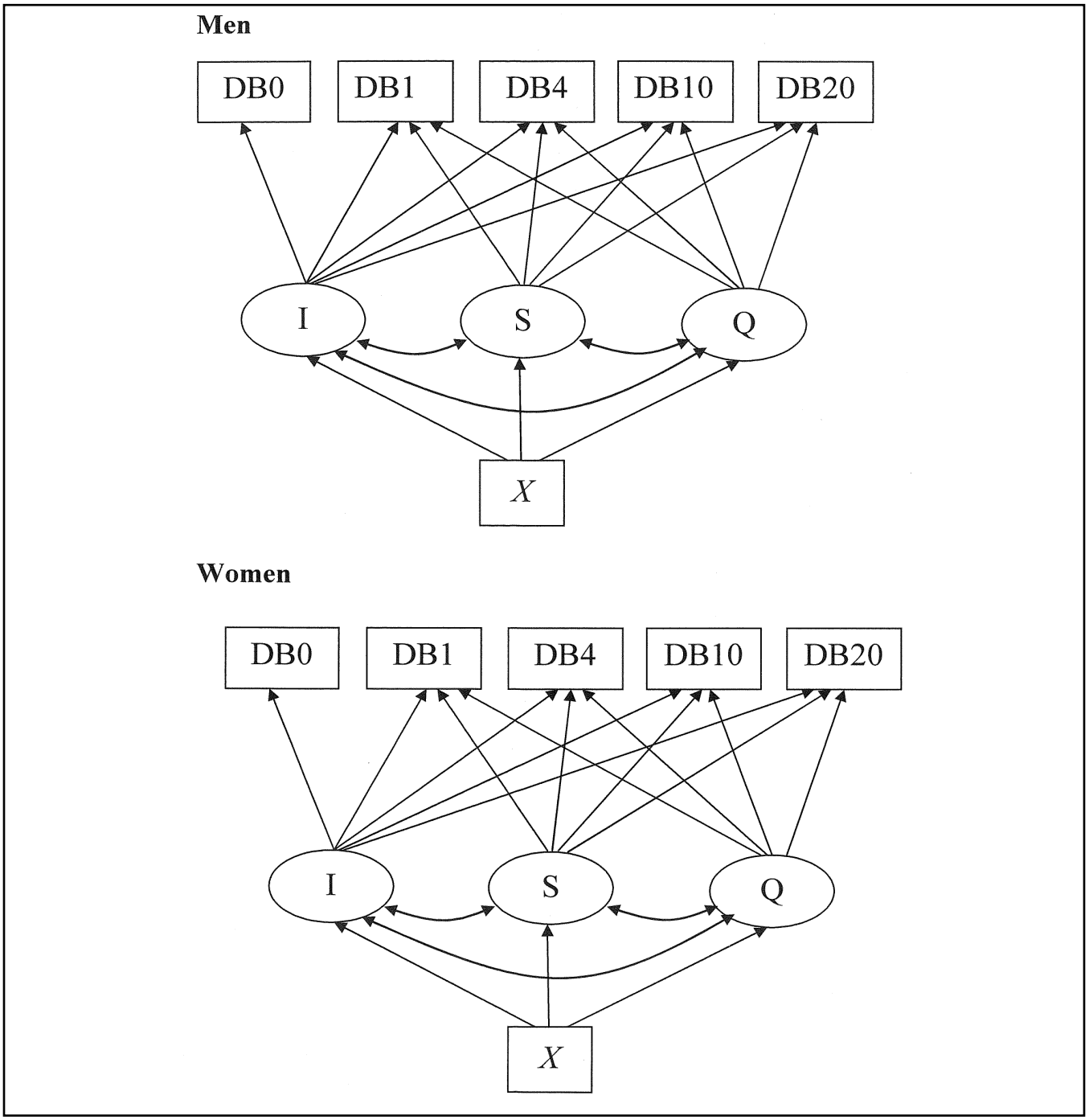

FIGURE 1. Two-group simultaneous latent growth model: 20-year drinking trajectories of older men and women. DB0, DB1, DB4, DB10, DB20 = measured drinking behavior (alcohol consumption, drinking problems) variables assessed at baseline and 1, 4, 10, and 20 years later; I = estimated average initial level of drinking behavior; S = estimated average linear growth rate; Q = estimated quadratic growth rate; X = baseline variables hypothesized to influence I, S, and Q growth parameters.

tion (RMSEA), and standardized root mean square residual (SRMR) indices to assess overall model fit. CFI reflects better fit as it more closely approaches 1, RMSEA when it is ≤.05, and SRMR when it is ≤.08 (MacCallum et al., 1996; Preacher et al., 2008).

After determining unconditional growth models with best fit, we conducted two-group simultaneous growth models that incorporated baseline predictors of the latent growth model parameters. Each baseline predictor was centered on its group mean (Kraemer and Blasey, 2004). We retained in summary multivariate predictive models those predictors that, considered alone, had a statistically significant ($p < .05$) effect on one or more of the growth parameters among either men or women. Baseline chronological age was statistically controlled in each predictive model. To determine whether gender had statistically significant moderating effects on trajectory growth characteristics and on effects of their predictors, we conducted chi-square difference tests to ascertain increment in fit of latent growth models with and without gender invariance constraints placed on parameter estimates in question (Muthén and Muthén, 1998–2007; Preacher et al., 2008).

Results

Descriptive statistics: 20-year patterns of alcohol consumption and drinking problems

Table 1a summarizes group-level change in drinks per day over the 20-year interval for men and women. Complete abstinence from alcohol was not characteristic of these men and women, at any assessment point. For example, at baseline, only about 14% of the men and 9% of the women had abstained from consuming alcohol in the last month; 20 years later, this was the case for about 22% of the men and 23% of the women. Thus, the means on drinks per day shown in Table 1a indicate that, on average, participants drank lightly at baseline and continued to do so over each of the four subsequent assessments.

Table 1a. Sample descriptive statistics: Means and standard deviations

	Men (n = 399)		Women (n = 320)	
Variable	*M*	*SD*	*M*	*SD*
Alcohol consumption				
DPDAY0	1.52	1.90	1.11	1.24
DPDAY1	1.41	1.61	1.01	1.15
DPDAY4	1.65	1.41	1.15	0.97
DPDAY10	1.67	1.63	1.08	0.95
DPDAY20	1.10	1.58	0.76	1.11
Drinking problems				
DRKPRB0	1.34	2.38	0.83	1.97
DRKPRB1	1.29	2.57	0.59	1.65
DRKPRB4	1.11	2.24	0.47	1.39
DRKPRB10	0.83	1.89	0.30	1.07
DRKPRB20	0.57	1.51	0.28	0.95

Compared with women, men drank somewhat more and showed more variability in number of drinks per day at each assessment point. Over the four assessment points covering baseline to 10 years, men reduced, then very slightly increased their average drinks per day, but, by the 20-year assessment, had declined markedly in alcohol consumption. On average, women continued to drink lightly across the four initial assessments covering baseline to 10 years, and were drinking significantly less than one drink per day by the 20-year assessment. Men consistently experienced more drinking problems, and more variance in levels of drinking problems, than did women. In both groups, drinking problems declined over the entire 20-year interval.

Cross-wave correlations showed that alcohol-consumption levels were relatively stable over time, although somewhat more stable for women (rs range from .56 to .83) than for men (rs range from .31 to .68) (Table 1b). Drinking problems were also fairly stable for both women (rs range from .42 to .74) and men (rs range from .24 to .79).

Unconditional growth models of drinking trajectories

Alcohol consumption. Table 2 shows unconditional 20-year growth models, simultaneously fit on men's and women's alcohol consumption. As indicated by fit indices, an unconditional linear growth model described the data better than did an unconditional mean model (i.e., CFI and SRMR for the unconditional linear model were .94 and .07, compared with .86 and .10 for the unconditional mean model). However, an unconditional quadratic growth model fit the data better still, with a CFI of .99 and SRMR of .03. A chi-square difference test confirmed that the improved fit of

Table 1b. Sample descriptive statistics: Correlations[a]

	Alcohol Consumption				
	DPDAY0	DPDAY1	DPDAY4	DPDAY10	DPDAY20
DPDAY0	–	*.83*	*.80*	*.71*	*.58*
DPDAY1	.53	–	*.80*	*.71*	*.56*
DPDAY4	.59	.68	–	*.78*	*.58*
DPDAY10	.31	.46	.57	–	*.65*
DPDAY20	.35	.45	.52	.57	–
	Drinking Problems				
	DRKPRB0	DRKPRB1	DRKPRB4	DRKPRB10	DRKPRB20
DRKPRB0	–	*.65*	*.65*	*.57*	*.42*
DRKPRB1	.79	–	*.70*	*.63*	*.60*
DRKPRB4	.69	.77	–	*.74*	*.53*
DRKPRB10	.56	.57	.61	–	*.64*
DRKPRB20	.28	.24	.40	.41	–

Notes: DPDAY0 = drinks per day at baseline; DPDAY1 = drinks per day at Year 1; DPDAY4 = drinks per day at Year 4; DPDAY10 = drinks per day at Year 10; DPDAY20 = drinks per day at Year 20; DRKPRB0 = drinking problems at baseline; DRKPRB1 = drinking problems at Year 1; DRKPRB4 = drinking problems at Year 4; DRKPRB10 = drinking problems at Year 10; DRKPRB20 = drinking problems at Year 20. [a]Correlations for men are in the lower left of the diagonal (in Roman text) and correlations for women are in the upper right of the diagonal (in *italics*).

TABLE 2. Unconditional growth models: 20-year alcohol consumption and drinking problems among older men and women

	Alcohol Consumption					
	Men			Women		
Growth model characteristics	Uncon. mean	Uncon. linear	Uncon. quadratic	Uncon. mean	Uncon. linear	Uncon. quadratic
Growth factor means						
Initial status	1.52**	1.64**	1.43**[a]	1.07**	1.14**	1.07**[a]
Linear growth rate		-0.23**	0.67**[a]		-0.14**	0.19*[a]
Quadratic growth rate			-0.42**[a]			-0.18**[a]
Estimated variance of growth factor means						
Initial status	1.36**	1.64**	1.85**[a]	0.83**	1.05**	1.20**[a]
Linear growth rate		0.37**	2.25**		0.12**	0.90**
Quadratic growth rate			0.46**			0.23**
Covariance of growth factor means						
I with S		-0.31**	-0.92**		-0.22**	-0.64**
I with Q			0.27*			0.21**
S with Q			-0.89**			-0.40**
Residual variances						
Drinks per day, baseline	2.15**	1.98**	1.85**	0.41**	0.33**	0.27**
Drinks per day, 1 year	1.12**	1.05**	0.95**	0.34**	0.29**	0.26**
Drinks per day, 4 years	0.56**	0.53**	0.49**	0.17**	0.17**	0.16**
Drinks per day, 10 years	1.51**	1.46**	1.22**	0.26**	0.23**	0.19**
Drinks per day, 20 years	1.69**	0.65**	0.00[§]	0.79**	0.51**	0.00[§]
Fit indices overall model						
χ^2 (*df*)	299.27** (26)	147.69** (20)	35.67** (14)			
CFI	.86	.94	.99			
RMSEA	.17	.13	.07			
SRMR	.10	.07	.03			
	Drinking Problems					
Growth factor means						
Initial status	1.04**	1.30**	1.35**[a]	0.38**	0.56**	0.70**[a]
Linear growth rate		-0.38**	-0.64**		-0.16**	-0.61**
Quadratic growth rate			0.12			0.20**
Estimated variance of growth factor means						
Initial status	2.68**	4.85**	4.96**[a]	0.92**	1.79**	2.24**[a]
Linear growth rate		1.11**	2.58**		0.21**	2.31**
Quadratic growth rate			0.33			0.36**
Covariance of growth factor means						
I with S		-1.93**	-2.38**		-0.52**	-1.53**
I with Q			0.20			0.43**
S with Q			-0.67			-0.86**
Residual variances						
Drinks per day, baseline	2.24**	1.47**	1.37**	2.49**	1.87**	1.65**
Drinks per day, 1 year	2.43**	1.34**	1.33**	1.27**	0.92**	0.74**
Drinks per day, 4 years	1.48**	1.37**	1.36**	0.68**	0.48**	0.52**
Drinks per day, 10 years	1.72**	1.75**	1.63**	0.28**	0.34**	0.16**
Drinks per day, 20 years	2.92**	0.71**	0.26[§]	0.49**	0.33**	0.27
Fit indices overall model						
χ^2(*df*)	681.89** (26)	120.28** (20)	70.01 (13)			
CFI	.66	.95	.97			
RMSEA	.27	.12	.11			
SRMR	.30	.06	.04			

Notes: Shared superscripts indicate statistically significant difference ([a]$p < .01$) according to chi-square difference tests comparing models constrained to be gender invariant with unconstrained models. Uncon. mean = unconditional mean growth model; uncon. linear = unconditional linear growth model; uncon. quadratic = unconditional quadratic growth model; I = intercept; S = slope; Q = quadratic; CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual. [§]residual variance fixed at zero for model convergence.
*$p < .05$; **$p < .01$.

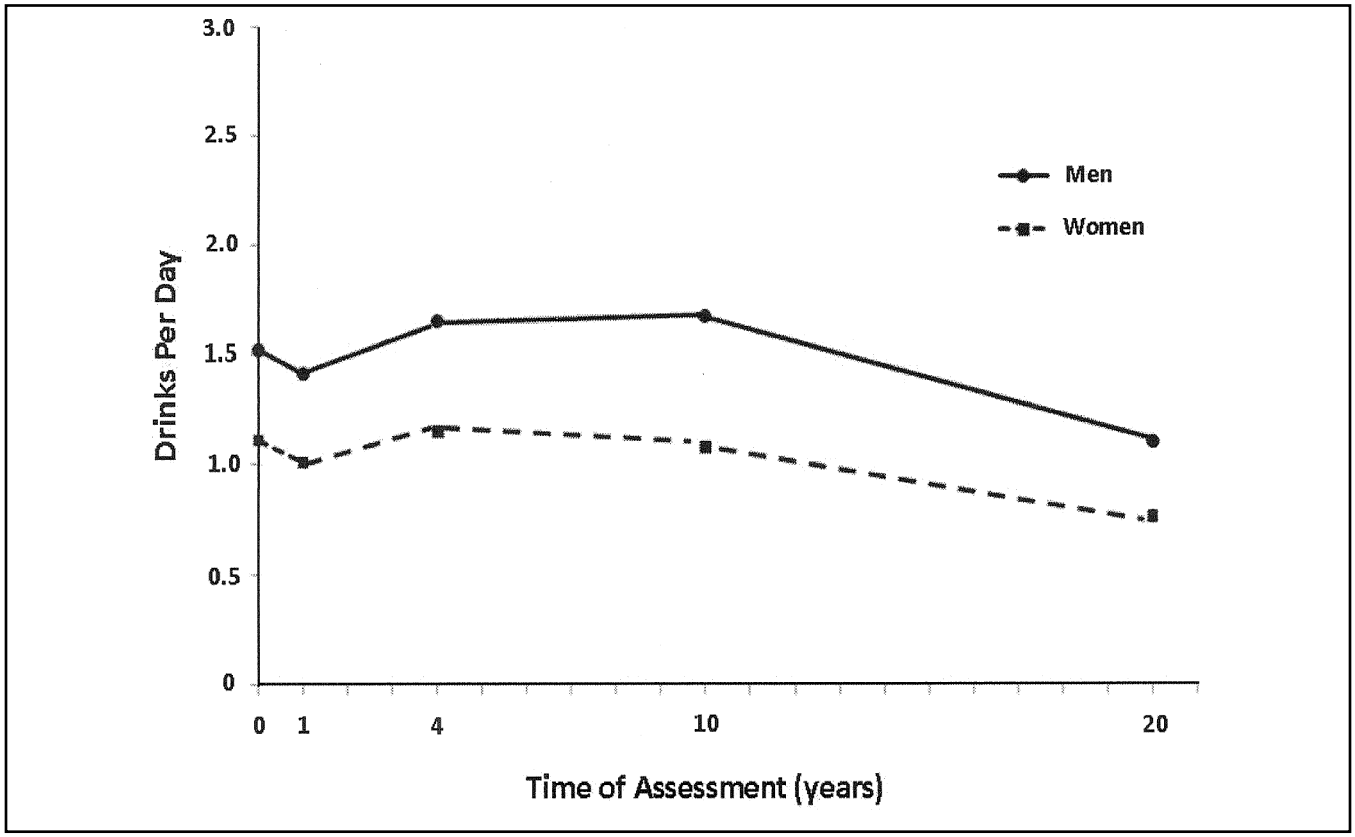

FIGURE 2. Twenty-year alcohol-consumption trajectories of older men and women

the quadratic over the linear growth model was statistically significant.

Consistent with Table 1a and Figure 2, the estimated quadratic growth model in Table 2 shows that men and women were drinking lightly at baseline, about 1.43 drinks for men and 1.07 for women, but that there was variability around this average level of drinking (1.85 for men, 1.20 for women). On average, both men and women remained relatively stable or slightly increased their alcohol consumption over the first several years of the study, as indicated by the linear growth rate of 0.67 for men and 0.19 for women. However, among men there was an accelerated decline in alcohol consumption from the 10- to the 20-year follow-up (quadratic growth term = -0.42). A less pronounced accelerated decline from the 10- to 20-year assessments (quadratic growth term = -0.18) was characteristic of women's alcohol consumption.

Chi-square difference tests showed statistically significant differences between men and women on initial level of alcohol consumption, $\chi^2\Delta(1) = 11.7$, $p < .01$; linear growth rate, $\chi^2\Delta(1) = 7.8$, $p < .01$; and quadratic growth rate, $\chi^2\Delta(1) = 9.8$, $p < .01$. This confirmed the gender differences implied in Figure 2, wherein, compared with men, women initially and consistently consumed less alcohol, were less likely to slow in linear rate of decline, and had a slower acceleration of alcohol-consumption reduction from the 10- to the 20-year assessment.

Drinking problems. Table 2 also shows unconditional growth models of drinking problems, simultaneously fit for men and women. The unconditional mean model provided poor fit to the data (i.e., CFI = .66; SRMR = .30); this was improved on by an unconditional linear growth model (CFI = .95; SRMR = .06), but improved most by an unconditional quadratic growth model, in which CFI = .97 and SRMR = .04. The increment in improved fit of the quadratic over the linear growth model was statistically significant, as indicated by chi-square difference test.

As shown in Table 2 and Figure 3, on average, men and women had few drinking problems at baseline (initial status means of 1.35 for men and 0.70 for women), but there was considerable variance in initial levels of drinking problems (variance of initial status was 4.96 for men and 2.24 for women). Both men and women experienced a significant decline over time in drinking problems (linear growth rate = -0.64 for men; -0.61 for women), then showed decelerated decline (quadratic growth rate = 0.12 for men; 0.20 for women) from the 10-year to the 20-year assessments. Chi-square difference tests indicated statistically significant differences between men and women on the initial status growth factor, $\chi^2\Delta(1) = 18.4$, $p < .01$, and its variance, $\chi^2\Delta(1) = 38.5$, $p < .01$.

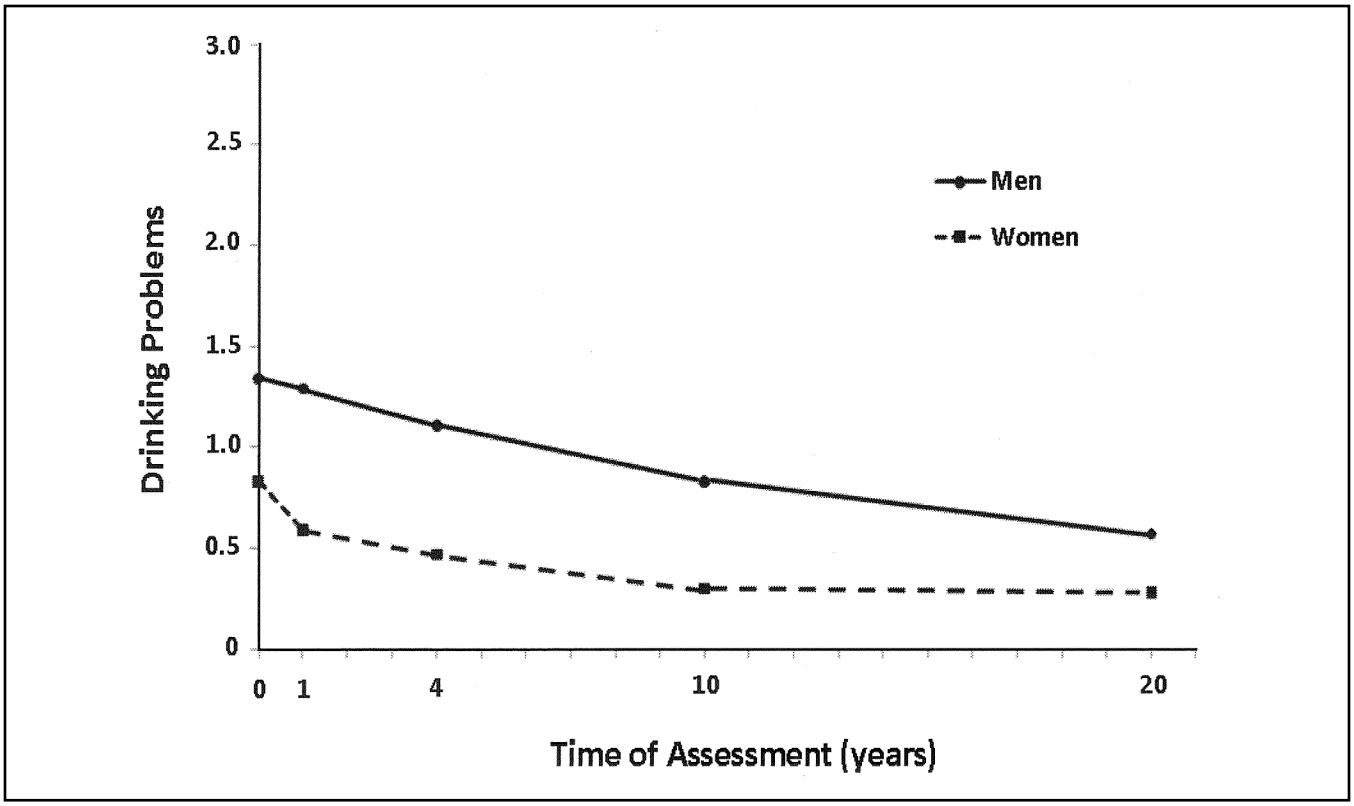

FIGURE 3. Twenty-year drinking-problem trajectories of older men and women

Predictors of 20-year drinking trajectories

Alcohol consumption. The overall fit of the multivariate predictive model of 20-year alcohol consumption was good, with a CFI of .95, RMSEA of .10, and SRMR of .03 (Table 3). Several baseline variables independently predicted the level and shape of participants' 20-year alcohol-consumption trajectories. At baseline, men with more health problems tended to drink somewhat less than did men with fewer health problems. However, baseline health problems did not influence men's subsequent rate of change in alcohol consumption and had no influence on the level and course of women's 20-year alcohol consumption.

Drinking beyond guidelines was associated with higher initial levels of alcohol consumption and foreshadowed faster decline in alcohol consumption, for both men and women. In both groups, drinking beyond guidelines also predicted a decelerated rate of decline in alcohol consumption from the 10- to 20-year assessments.

Baseline use of substances to reduce tension, having more friends who approved of drinking, and negative reactions to drinking by family and friends were each independently associated with initial higher levels of alcohol consumption among men and women. However, none of these factors affected rate of change in participants' 20-year alcohol consumption, with the exception of negative social reactions, which predicted faster linear rate of decline in men's alcohol consumption. There were no statistically significant gender differences in the predictors of 20-year alcohol-consumption trajectories.

Drinking problems. Several baseline variables helped predict level and change in drinking problems among men and women, in a well-fitting overall model (CFI = .97; SRMR = .02). Older age at baseline was associated with fewer drinking problems among both men and women. However, age did not predict subsequent rates of change in men's and women's drinking problems.

Baseline health problems were associated with a statistically significant linear decline in men's drinking problems, but this was not the case for women. However, this apparent gender difference was not statistically significant, as indicated by chi-square difference test, $\chi^2\Delta(1) = 0.07$, N.S. For men, being married at baseline was associated with initial lower levels of drinking problems; this initial status regression coefficient for marital status was significantly different for men and women, $\chi^2\Delta(1) = 4.44$, $p < .05$.

Drinking beyond guidelines at baseline was associated with more initial drinking problems for both men and women, more linear decline in drinking problems, and deceleration of decline in drinking problems later in the 20-year interval, especially among women. However, there were no statistically significant differences in the way that baseline

TABLE 3. Multivariate summary models: Baseline predictors of men's and women's 20-year alcohol-consumption and drinking-problems trajectories

Growth model characteristics	Alcohol Consumption					
	Men			Women		
	Estimate	*SE*	*t*	Estimate	*SE*	*t*
Initial status mean	*1.86***	*0.12*	*15.44*	*1.89*	*0.09*	*20.94*
Initial status regression coefficient						
Age	0.02	0.02	1.36	0.00	0.01	0.19
Health problems	-0.06**	0.02	-2.91	-0.03	0.02	-1.67
Drinking beyond guidelines	1.18**	0.07	17.72	1.12**	0.06	18.91
Substance to reduce tension	0.12	0.06	1.88	0.11**	0.04	2.57
Friends approve drinking	0.06*	0.03	2.33	0.07**	0.02	3.52
Friends' negative reaction	0.12**	0.03	3.69	0.06	0.03	1.74
Linear growth rate mean	*0.45*	*0.31*	*1.41*	*-0.54***	*0.16*	*-3.36*
Linear growth rate regression						
Age	-0.04	0.04	-0.83	0.00	0.02	0.16
Health problems	0.08	0.05	1.47	0.01	0.03	0.36
Drinking beyond guidelines	-0.97**	0.18	-5.52	-1.00**	0.11	-9.20
Substance to reduce tension	0.05	0.16	0.31	-0.02	0.08	-0.29
Friends approve drinking	0.09	0.07	1.29	0.03	0.03	0.88
Friends' negative reaction	-0.16*	0.08	-1.90	-0.01	0.06	-0.08
Quadratic growth rate mean	*-0.32**	*0.14*	*-2.28*	*0.14*	*0.08*	*1.74*
Quadratic growth rate regression						
Age	0.01	0.02	0.54	-0.01	0.01	-0.75
Health problems	-0.02	0.02	-1.04	-0.01	0.01	-0.42
Drinking beyond guidelines	0.36**	0.08	4.50	0.39**	0.06	7.12
Substance to reduce tension	-0.04	0.07	-0.60	-0.02	0.04	-0.44
Friends approve drinking	-0.04	0.03	-1.14	-0.01	0.02	-0.56
Friends' negative reaction	0.05	0.04	1.38	-0.02	0.03	-0.73
Covariance of growth factor means						
I with S	-0.07	0.22	-0.32	-0.10	0.06	-1.70
I with Q	-0.01	0.09	-0.12	0.02	0.03	0.64
S with Q	-0.78*	0.34	-2.33	-0.28**	0.08	-3.50
Residual variance						
Drinks per day, baseline	1.42**	0.13	1.54	0.16**	0.03	5.83
Drinks per day, 1 year	1.18**	0.10	11.24	0.33**	0.03	10.14
Drinks per day, 4 years	0.52**	0.06	8.49	0.18**	0.02	8.53
Drinks per day, 10 years	1.20**	0.14	8.81	0.19**	0.03	6.20
Drinks per day, 20 years	0.00§	0.00	–	0.00§	0.00	–
Initial status	0.46**	0.09	5.41	0.39**	0.04	9.55
Linear growth	1.89**	0.77	2.47	0.60**	0.17	3.47
Quadratic growth	0.43**	0.15	2.85	0.19**	0.04	4.60
χ^2 (*df*)	179.74 (38)					
CFI	.95					
RMSEA	.10					
SRMR	.03					

Continued

drinking beyond guidelines affected men's and women's 20-year drinking-problem trajectories.

Using substances to reduce tension was associated with higher initial levels of drinking problems among both men and women, and with more decline over time in drinking problems among women, but this was not a statistically significant gender difference. Among men only, more use of avoidance coping at baseline foreshadowed an accelerated decline in drinking problems from the 10- to the 20-year assessment. Friends' approval of drinking was associated with more drinking problems at baseline for both men and women and, for women, a faster rate of decline in drinking problems. However, effects of friends' approval of drinking did not significantly differ for men and women.

Discussion

Older men's and older women's late-life drinking trajectories

Group-level descriptive statistics and within-individual latent growth modeling showed that, over a 20-year interval, there was overall net decline in level of alcohol consumption and number of drinking problems in this community sample of older adults. This is consistent with earlier cross-sectional studies and longitudinal group-level analyses of older adults' drinking patterns (e.g., Adams et al., 1990; Fillmore et al. 1991; Moos et al., 2004a, 2004b, 2009). However, the growth characteristics and variability of these individuals'

TABLE 3. *Continued*

Growth model characteristics	Drinking Problems					
	Men			Women		
	Estimate	*SE*	*t*	Estimate	*SE*	*t*
Initial status mean	*2.61***	*0.23*	*11.29*	*1.69***	*0.18*	*9.28*
Initial status regression coefficient						
Age	-0.07*	0.03	-2.32	-0.50*	0.03	-2.03
Marital status	-0.42**[a]	0.14	-3.03	-0.08[a]	0.08	-0.93
Health problems	-0.02	0.04	-0.60	-0.01	0.03	-0.24
Drinking beyond guidelines	0.81**	0.12	6.68	0.84**	0.12	7.37
Substance to reduce tension	0.56**	0.12	4.86	0.37**	0.09	4.23
Percentage avoidance coping	0.01	0.11	0.08	-0.02	0.08	-0.21
Friends approve drinking	0.19**	0.05	3.80	0.09*	0.04	2.33
Linear growth rate mean	*-1.20***	*0.36*	*-3.32*	*-1.58***	*0.26*	*-6.19*
Linear growth rate regression						
Age	0.03	0.05	0.68	0.06	0.04	1.80
Marital status	0.17	0.22	0.79	0.11	0.12	0.92
Health problems	-0.04*	0.06	-0.66	-0.02	0.04	-0.48
Drinking beyond guidelines	-0.44*	0.19	-2.29	-0.74**	0.16	-4.50
Substance to reduce tension	-0.15	0.18	-0.83	-0.24*	0.12	-1.98
Percentage avoidance coping	0.29	0.17	1.74	0.09	0.12	0.83
Friends approve drinking	-0.10	0.08	-1.24	-0.12*	0.05	-2.23
Quadratic growth rate mean	*0.20*	*0.16*	*1.27*	*0.54***	*0.11*	*4.96*
Quadratic growth rate regression						
Age	-0.01	0.02	-0.47	-0.03	0.02	-1.70
Marital status	0.01	0.09	0.14	-0.06	0.05	-1.22
Health problems	0.02	0.03	0.63	0.01	0.02	0.38
Drinking beyond guidelines	0.10	0.08	1.16	0.23**	0.07	3.27
Substance to reduce tension	-0.05	0.08	-0.66	0.06	0.05	1.06
Percentage avoidance coping	-0.14*	0.07	-1.90	-0.03	0.05	-0.62
Friends approve drinking	0.03	0.03	0.87	0.04	0.02	1.73
Covariance of growth factor means						
I with S	-1.72**	0.39	-4.41	-0.85**	0.20	-4.18
I with Q	0.12	0.16	0.75	0.22**	0.08	2.74
S with Q	-0.59*	0.42	-1.40	-0.70**	0.21	-3.36
Residual variance						
Drinking problems, baseline	1.32**	0.16	8.01	1.61**	0.16	10.15
Drinking problems, 1 year	1.37**	0.15	9.47	0.79**	0.09	8.52
Drinking problems, 4 years	1.35**	0.13	10.36	0.49**	0.05	9.07
Drinking problems, 10 years	1.65**	0.19	8.68	0.17	0.06	2.89
Drinking problems, 20 years	0.00[§]	0.00	–	0.00[§]	0.00	–
Initial status	3.48**	0.31	11.37	1.47**	0.16	9.03
Linear growth	2.17**	0.95	2.29	1.68**	0.48	3.51
Quadratic growth	0.33*	0.20	1.69	0.34**	0.09	3.69
χ^2 (*df*)	109.16** (42)					
CFI	.97					
RMSEA	.07					
SRMR	.02					

Notes: Shared superscripts indicate statistically significant difference ([a]$p < .05$) according to chi-square difference tests comparing models constrained to be gender invariant with unconstrained models. I = intercept; S = slope; Q = quadratic; CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual. [§]Residual variance fixed at zero for model convergence.
*$p < .05$; **$p < .01$.

20-year drinking trajectories also show that as individuals in this sample progressed from earlier to later old age, decline in alcohol consumption and drinking problems was neither swift nor invariable.

Best-fitting latent growth models of this sample's 20-year alcohol consumption showed an overall pattern of delayed decline. That is, the linear growth parameters indicated that during the "earlier" part of late life (i.e., from about age 60 to about age 70) many individuals maintained relatively stable levels of alcohol consumption, and some even slightly increased their drinking, counter to the group-level net trend toward less alcohol consumption by the 20-year follow-up. The significant negative quadratic growth parameters of these models suggest that decline in alcohol consumption was most pronounced during the "later" part of late life (i.e., from about age 70 onward). However, there was significant variability, especially for women, in the latent growth factor means, highlighting the fact that that these 20-year alcohol-

consumption trajectories were not uniformly experienced by the individuals in our sample.

Significant gender differences in initial status growth parameters were consistent with the well-documented life-span pattern of men generally drinking more—and more often—than women do. However, the average within-person trajectories of alcohol consumption differed for men and women. Specifically, men's decline in alcohol consumption appeared to occur somewhat later, but then to decline more rapidly, than did women's reduced alcohol consumption. However, the variability in mean growth factors cautions against concluding that this difference reflects consistent differences between men's and women's drinking patterns. Future studies should consider whether older women as a group consistently differ from older men in timing and rate of decline in late-life alcohol consumption.

The shape of 20-year drinking-problem trajectories differed from that of 20-year alcohol-consumption trajectories. Both men and women showed decline in drinking problems, especially during the first 10 years of the study, followed by a pattern of leveling-off between 10 and 20 years. Apart from that for initial status, there were no statistically significant gender differences in drinking-problem growth parameters. Thus, although men consistently had higher levels of drinking problems over the course of 20 years, the average shape of their 20-year drinking-problem trajectories did not differ from that of women.

Baseline predictors of late-life alcohol-consumption trajectories

Having fewer health problems, drinking beyond recommended guidelines, using substances to reduce tension, having friends who approved more of drinking, and more drinking-related complaints of family and friends at baseline were all independently associated with higher initial levels of alcohol consumption, but only two of these baseline predictors were independent harbingers of subsequent within-individual linear change in alcohol consumption. Drinking beyond guidelines and negative reactions to drinking by friends and family predicted an overall faster rate of decline in alcohol use. Drinking beyond guidelines at baseline also reduced the likelihood that this decline in alcohol consumption was accelerated downward during the later part of the 20-year follow-up. Overall, baseline use of alcohol itself—specifically, exceeding drinking guidelines, and drinking in ways problematic enough to elicit complaints from significant others—was the single best independent predictor of intraindividual change in older adults' 20-year alcohol consumption.

Further work is needed to specify the predictors of the long-term course of alcohol consumption among older adults. Baseline beyond-guideline drinking may foreshadow more rapid decline in 20-year alcohol use because it is a proxy for specific negative physiological and psychological experiences (e.g., unpleasant physical and emotional effects of alcohol use) that work to suppress heavier, more frequent alcohol consumption by older adults. Also, drinking behavior at late middle age may be a prime predictor of subsequent alcohol consumption because it is preamble to mediating processes that eventuate in less use of alcohol. For example, changes in health or in significant others' tolerance for alcohol misuse may intervene between beyond-guideline alcohol consumption at baseline in midlife and subsequent decline in drinking.

Baseline predictors of late-life drinking-problem trajectories

Several baseline variables (younger age, beyond-guideline drinking, use of substances to reduce tension, more friends' approval of drinking and [among men only] being unmarried) were significantly associated with more initial drinking problems. In addition, having more baseline health problems, drinking beyond guidelines, using substances to reduce tension, and having more friends who approved of drinking were all independently predictive of more linear decline in negative consequences of drinking over the next 20 years. As indicated by their effects on the quadratic growth factors in our model, baseline drinking beyond guidelines appeared to support a later-life leveling off in drinking problems, whereas more baseline reliance on avoidance coping appeared to detract from it. Overall, these findings suggest that individuals who likely needed at late middle age to curtail their problematic or risky drinking subsequently did so. To enhance understanding and prediction of drinking-problem decline in later life, it would be useful to learn more about self-regulatory health processes, as well as changes in family and friends' reactions to drinking, that mediate between problematic or risky drinking at late middle age and subsequent decline in negative consequences of alcohol use.

Limitations and implications

These findings should be interpreted with suitable caution. The drinking trajectories described here have limited generalizability. Our baseline sample was not representative of all older adults with respect to drinking behavior and demographic characteristics, and 20-year mortality removed from the baseline sample more male than female participants as well as participants who had somewhat more drinking problems and fewer social and financial resources. Furthermore, the drinking trajectories described here may be specific to the cohort to which our sample belongs. Further research is needed to determine the generalizability of our findings to more representative samples of older adults and to multiwave assessments of late-life drinking behavior that differ from ours in overall duration and spacing of as-

sessment intervals. In addition, longitudinal assessments of drinking behavior, using research designs that incorporate multiple same-age cohorts, are needed to determine the generalizability of our findings to drinking behavior of other cohorts of adults as they progress from late-middle to later old age.

In addition, recent efforts to classify adults' cross-sectional and longitudinal drinking patterns (Jacob et al., 2009; Sacco et al., 2009) raise the question of whether our sample is homogeneous with regard to 20-year drinking trajectories or might instead comprise multiple classes of individuals who share distinctive 20-year drinking patterns. Future research, using latent growth mixture modeling (Muthén, 2004), should address this question. In this same vein, future research on the longitudinal course and predictors of drinking behaviors that occur with relative infrequency among older adults (e.g., drinking problems, episodic heavy drinking) might profit by application of two-part growth modeling approaches (Brown et al., 2005; Petras et al., 2010), because these potentially can provide unique information about the binary part (whether individuals engage in a drinking behavior) as well as the continuous part (amount of the behavior among those who engage in it) of longitudinal drinking behavior. Future research also should consider time-varying as well as baseline predictors of late-life drinking trajectories in an effort to identify those personal and contextual characteristics most relevant for promoting improved post-midlife drinking behavior and health.

Notwithstanding these concerns, our findings have potential research and clinical implications. Our finding that gender moderates the level and shape of older adults' 20-year alcohol consumption trajectories may help explain earlier, mixed findings about the degree and rate of change in alcohol use in later life. Studies comprised only or mainly of men, those with shorter follow-ups, and investigations spanning only "early" late life may be more likely to show stability or increase in alcohol consumption than are longer longitudinal studies that include older women.

Older men's somewhat delayed reduction in alcohol consumption relative to that of older women highlights the importance of health care providers continuing to monitor men's alcohol consumption even well into old age. It implies that, for men, the period spanning late-middle to early old age may be more challenging than formerly thought for reducing alcohol consumption. Health care providers might consider this and adjust accordingly the methods they use to encourage men in this life stage to cut down on alcohol consumption. More broadly, our findings counter the widespread assumption that alcohol consumption and drinking problems invariably and rapidly decline past late middle age and thus have limited relevance as late-life health issues. For many individuals, use of alcohol remains a consistent and important aspect of health status and social functioning even as they advance into later old age. Further work is needed to determine the course and outcomes of late-life alcohol use patterns and whether we can successfully predict and intervene to change long-term drinking patterns that deviate from healthy use of alcohol in later life.

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