

Are Changes in Financial Strain Associated With Changes in Alcohol Use and Smoking Among Older Adults?*

BENJAMIN A. SHAW, PH.D., M.P.H.,[†] NEDA AGAHI, PH.D., M.SC.,[†] AND NEAL KRAUSE, PH.D.[†]

Department of Health Policy, Management, and Behavior, School of Public Health, State University of New York at Albany, One University Place, Rensselaer, New York 12144-3456

ABSTRACT. Objective: This study aimed to assess whether changes in levels of financial strain are associated with changes in alcohol use and smoking among older adults. **Method:** Multilevel analyses were conducted using longitudinal data from a randomly selected national sample of older adults ($N = 2,352$; 60% female). The data were collected in six waves during the period of 1992–2006. We estimated associations between within-person changes in levels of financial strain and the odds of engaging in heavy drinking and smoking, while also testing for the moderating effects of gender, education, and age. **Results:** A direct association was observed between changes in levels of financial strain

and the odds of heavy drinking, particularly among elderly men (odds ratio [OR] = 1.31) and those with low levels of education (OR = 1.27). A direct association between changes in levels of financial strain and the odds of smoking was also evident, particularly among the young-old (i.e., age 65 at baseline; OR = 1.44). **Conclusions:** Exposure to financial strain places some groups of older adults at increased risk for unhealthy drinking and smoking. If the current global financial crisis leads to increases in experiences of financial strain among older adults, alcohol and smoking problems can also be expected to increase in this population. (*J. Stud. Alcohol Drugs*, 72, 917–925, 2011)

AS A RESULT OF THE CURRENT global financial crisis, more people are living below the poverty line in the United States than ever before, and the current poverty rate is at a 15-year high (DeNavas-Walt et al., 2010). Although the list of specific public health problems that could be affected by a global financial crisis is long, problems related to substance use and misuse, in particular alcohol use and smoking behavior, are arguably among the most likely to occur (Stuckler et al., 2010). Still, little is currently known about associations between individual-level financial problems and individual drinking and smoking behavior.

The predominant theoretical rationale underlying expected associations between experiences of financial strain and alcohol or tobacco use is commonly referred to as the tension-reduction hypothesis (Abbey et al., 1993; Greeley and Oei, 1999). According to this hypothesis, also referred to as the affect regulation model, people are inclined to increase use of substances, such as alcohol or tobacco, following experiences of stress because these substances are used as a means of relieving the negative emotions resulting from stress exposure. From this vantage point, some argue that the use of alcohol or tobacco as coping devices may be particularly likely in association with exposure to financially

related stress, a form of chronic stress that for many is likely to be profoundly anxiety provoking given the strong connection between financial well-being and life chances in modern society (Peirce et al., 1994, 1996).

Empirical support for the tension-reduction hypothesis with respect to financial strain, alcohol use, and smoking, however, has been mixed (Kendzor et al., 2010; Perreira and Sloan, 2001; Veenstra et al., 2006). For example, in a review of the literature regarding the relationship between life events in general and alcohol use, Veenstra et al. (2006) identified several studies showing a positive association between exposure to life events and increasing alcohol use, as well as several other studies that failed to find this association. Likewise, when looking specifically at the effects of financial strain, some have found evidence in support of the tension-reduction hypothesis (e.g., Peirce et al., 1994), whereas others have found the inverse: financial problems associated with reduced alcohol use (e.g., Brennan et al., 1999). These latter findings highlight the idea that financial strain is not only a distress-invoking experience, but it is also a marker of reduced discretionary income that may serve to inhibit increases in substance use.

Compared with the literature on financial strain and alcohol use, research on the effects of financial strain on cigarette smoking is relatively scant (Siahpush and Carlin, 2006). However, most of the available studies appear to support the general tenets of the tension-reduction hypothesis. For example, Kendzor et al. (2010) report that smokers experiencing financial strain are the least likely to quit over time. Similarly, Siahpush et al. (2009) have shown that among smokers, those experiencing financial strain are the most likely to want to quit but the least likely to be successful.

Received: February 11, 2011. Revision: May 24, 2011.

*This research was supported by National Institutes of Health, National Institute on Aging Grant R01 AG031109, "Health Behaviors and Lifestyles in Old Age in the United States and Japan."

[†]Correspondence may be sent to Benjamin A. Shaw at the above address or via email at: bashaw@albany.edu. Neda Agahi is with the Aging Research Center, Karolinska Institutet/Stockholm University, Stockholm, Sweden. Neal Krause is with the Department of Health Behavior and Health Education, School of Public Health, University of Michigan, Ann Arbor, MI.

The purpose of the current study is to contribute to the literature on the tension-reduction hypothesis in two potentially important ways. First, rather than estimating associations between financial strain and alcohol or tobacco use on the basis of co-variations in these factors that exist between individuals, we use longitudinal data and multilevel analyses to estimate associations between within-person changes in financial strain and within-person changes in drinking and smoking (Raudenbush and Bryk, 2002). That is, we are primarily interested in examining how changes in levels of financial strain are associated with alcohol use and smoking, regardless of one's average level of financial strain. This approach provides a particularly rigorous test of the effects of financial strain on these behaviors in that each respondent acts as his or her own control, thus reducing the potential impact of confounding that exists when differences between multiple comparison groups are not fully accounted for in more conventional between-persons analyses (Li and Conwell, 2009). Although previous research has used a similar approach to assess the association between the incidence of general types of life events and alcohol use (Glass et al., 1995; Perreira and Sloan, 2001; Veenstra et al., 2007), we are unaware of any other study that has used this approach to study financial strain, specifically, within a national sample of older adults.

Second, we focus on associations with financial strain in the elderly population (age 65 and older) while also testing the moderating effects of gender, education, and age. Because much of the current research linking experiences of stress to substance misuse comes from younger populations (for exceptions, see Glass et al., 1995; Perreira and Sloan, 2001; Veenstra et al., 2007), relatively little is known about how older adults respond to experiences of financial strain. Older adults may be particularly vulnerable to the effects of financial strain (Krause, 2005; Romelsjö et al., 1991) because experiences of financial difficulty are appraised by some as particularly stressful when they occur during late life, when individuals may feel they have little time or opportunity to recover. Vulnerability may also vary across core dimensions of social structure to the extent that important psychosocial coping resources (e.g., social networks and self-efficacy) have been depleted over time among certain subgroups of older adults (Shaw and Krause, 2001; Shaw et al., 2007), leaving them with fewer viable options for confronting the economic problems they have encountered.

Method

Sample

Data for this study came from six waves of a nationwide longitudinal survey of adults, ages 65 years and older at baseline (Krause, 1994). The baseline survey was conducted in 1992–1993, at which time the study population was de-

finied as all household residents (at least age 65) who were not institutionalized, were English-speaking, and were retired (i.e., not working for pay). The sampling frame consisted of all eligible persons contained in the Health Care Financing Administration Medicare Beneficiary Eligibility List (the Health Care Financing Administration is now called the Centers for Medicare and Medicaid Services). Residents of Alaska and Hawaii were excluded, as were elderly people who did not have a Social Security number and those who were 100 years of age and older at baseline. A total of 1,103 interviews were conducted at baseline (69.1% response rate). Additional waves of data were collected from 605 original study participants in 1996–1997 and from 530 participants in 1998–1999.

During the fourth wave of this study, in 2002–2003, 269 of the original respondents were interviewed, as were an additional 1,246 new respondents who were selected after resampling the study population. This supplemental sample was selected so that when it was combined with those who had participated previously in the study, there would be an approximately equal number of people in each of the following age groups: 65–74 ($n = 491$), 75–84 ($n = 515$), and 85 and older ($n = 509$). Altogether, the Wave 4 sample consisted of 1,515 older people (54% response rate). The overall response rate in this wave is somewhat lower than what is found in the typical survey of older people because a large amount of nonresponse was encountered among people ages 85 and older (see Rodgers and Herzog, 1992, for a discussion of this issue). Additional waves of data were collected from 1,277 of these study participants in 2004 and 1,011 participants in 2006.

These sampling procedures resulted in 2,352 unique respondents observed on 6,039 occasions (an average of 2.57 observations per respondent). Because of missing data on key study variables, the final analytic sample for the analyses focusing on alcohol use consists of 2,302 respondents observed on 5,839 occasions (2.54 observations per respondent), and the sample for the analyses focusing on smoking consists of 2,315 respondents observed on 5,967 occasions (2.58 observations per respondent).

Measures

Financial strain. Responses to four survey items were used to measure financial strain at each wave. In particular, respondents were asked to self-rate how much difficulty they had in paying monthly bills, and how often their financial situation resulted in them not having enough food, enough medical care, or enough clothing to meet their family's needs. Response options for each of these items ranged from none/never (1) to a great deal (4). A composite measure of financial strain was created for each individual at each wave by computing a mean across each individual's responses to the four items. At baseline, the mean financial strain score

was 1.35 ($SD = 0.66$), and approximately 35.4% of the sample reported at least some financial strain. The internal consistency reliability for this composite, measured with Cronbach's α at each wave, ranged from .804 (at Wave 5) to .842 (at Wave 3).

Alcohol use and smoking. Two time-varying dichotomous outcome variables were used in this study. An indicator of heavy drinking was used as our measure of alcohol misuse. A designation of heavy drinking was made after first computing the quantity of alcoholic drinks consumed per month for each respondent at each wave. This quantity 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 asked, "During last month, on how many days did you drink (beer, wine, or liquor)?" Last, 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. Because the average baseline age of our sample is 76.52 years ($SD = 8.20$), we defined heavy drinking in accordance with the National Institute of Alcohol Abuse and Alcoholism's recommendation that older adults should drink no more than one drink per day (National Institute on Alcohol Abuse and Alcoholism, 2007). Adapting these guidelines to our measure of drinks per month, our threshold for heavy drinking was set at more than 30 drinks per month. Following this scheme, respondents who were heavy drinkers at a given wave were assigned a code of 1, whereas those who drank less or not at all were assigned a code of 0. At baseline, 7.8% of the sample qualified as heavy drinkers.

Smoking was measured with responses to a single question asking about one's current smoking status. Respondents who reported being current smokers at a given wave were assigned a code of 1, whereas nonsmokers at a given wave were assigned a code of 0. At baseline, 9.4% of the sample were smokers.

Time-constant predictors. Baseline age was measured continuously in years. For the original study respondents, this variable represents one's age during Wave 1, in 1992. For study respondents who entered in 2002, this variable represents age during Wave 4, in 2002. In addition, our analyses include measures of gender (1 = male, 0 = female) and education level, measured as a continuous variable representing the total number of years of completed schooling at baseline.

Data analysis

The analyses for this study used multilevel models, with occasions of measurement nested within individuals (Hox, 2002), to take advantage of the multiple observa-

tions of each individual respondent. Because the dependent variables were dichotomous measures, these analyses were carried out with multilevel logistic regression, using hierarchical linear modeling software (Raudenbush and Bryk, 2002). Each of our models included a time-fixed measure of financial strain, operationalized as an individual's average score across all measurement occasions, as well as a time-varying measure of financial strain, operationalized as the individual's wave-to-wave deviation from this average. Both variables were included because financial strain varies both between and within persons. Without controlling for individual differences in financial strain, the estimated effects of time-varying financial strain could only be interpreted under the assumption that the between-persons and within-persons effects of financial strain on smoking or drinking are equal (Hedeker and Gibbons, 2006). Our focus was on the effects of changes in levels of strain, regardless of the average levels; thus, our analytic approach allowed us to focus on the effects of within-person variations in financial strain (deviations from their mean) while controlling for individual differences in average levels of financial strain (Li and Conwell, 2009). In other words, this approach allowed us to estimate the changes in the log-odds of heavy drinking or smoking that are associated with increases or decreases in financial strain that occur within individuals over time.

After estimating basic models testing the associations between within-person variation in financial strain and drinking and smoking, we tested for gender, education, and age differences in these associations by including in the models a series of interaction terms between time-varying financial strain and each of the time-constant predictors. In addition, we tested for Age \times Gender, Age \times Education, and Gender \times Education effects on the associations between financial strain and drinking and smoking by including a series of three-way interactions in the models.

All of the multilevel models controlled for time of measurement, time of entry into the study, age, gender, and education level at baseline, and attrition, which was accounted for with two dummy variables: one identifying respondents who died during the follow-up period and the other identifying respondents who dropped out of the study for other reasons, either temporarily or permanently. Addressing the problem of attrition was necessary because preliminary analyses indicated that respondents who died or dropped out of the study before its completion were more likely to be smokers than nonsmokers (but were not more likely to be heavy drinkers). Also, these preliminary analyses indicated that respondents who died had significantly higher levels of financial strain than those who survived, but no differences in financial strain were evident between those who dropped out of the study and those who completed it. We controlled for attrition rather than including only those respondents who had completed the study because the latter approach would

TABLE 1. Baseline sample characteristics by heavy drinking and smoking status

Variable	Total (<i>N</i> = 2,352)	Heavy drinker		<i>p</i>	Smoker		<i>p</i>
		Yes (<i>n</i> = 180)	No (<i>n</i> = 2,135)		Yes (<i>n</i> = 221)	No (<i>n</i> = 2,131)	
Age, <i>M</i> (<i>SD</i>)	76.5 (8.2)	74.0 (7.3)	76.7 (8.2)	***	71.7 (5.5)	77.0 (8.3)	***
Gender, % male	39.7	70.6	37.1	***	43.9	39.4	
Education, <i>M</i> (<i>SD</i>)	12.2 (3.6)	13.7 (3.5)	12.1 (3.6)	***	11.6 (3.4)	12.3 (3.6)	**
Financial strain, <i>M</i> (<i>SD</i>)	1.4 (0.7)	1.3 (0.6)	1.4 (0.7)	*	1.5 (0.8)	1.3 (0.6)	***

Note: Significance levels based on independent samples *T* tests (for means) and Pearson chi-square tests (for %'s).

p* < .05; *p* < .01; ****p* < .001.

have severely limited the size and representativeness of the sample.

Results

Before estimating our multilevel models, we first assessed how our key predictors at baseline varied by heavy drinking and smoking status (Table 1) and assessed the prevalence of within-person changes in each of our time-varying measures over the course of the study period (Table 2). Table 1 shows that at baseline, heavy drinkers were relatively young ($M = 74.0$, $SD = 7.3$, vs. $M = 76.7$, $SD = 8.2$, $p < .001$), more likely to be male (70.6 vs. 37.1, $p < .001$), and more highly educated ($M = 13.7$, $SD = 3.5$, vs. $M = 12.1$, $SD = 3.6$, $p < .001$) than nonheavy drinkers (which includes abstainers). Smokers were younger than nonsmokers ($M = 71.7$, $SD = 5.5$, vs. $M = 77.0$, $SD = 8.3$, $p < .001$) and were less highly educated ($M = 11.6$, $SD = 3.4$, vs. $M = 12.3$, $SD = 3.6$, $p < .01$). With respect to financial strain, heavy drinkers reported less strain than nonheavy drinkers/abstainers ($M = 1.3$, $SD = 0.6$, vs. $M = 1.4$, $SD = 0.7$, $p < .05$), whereas smokers reported more financial strain than nonsmokers ($M = 1.5$, $SD = 0.8$, vs. $M = 1.3$, $SD = 0.6$, $p < .001$).

Table 2 presents data on the number of increasing, decreasing, and stable transitions that occurred within respondents from wave to wave throughout the study period. This presentation of the data shows that for each time-varying measure, stability between waves was the norm. With regard to financial strain, just over 64% of the between-wave transitions occurring in this study were accompanied by no changes in levels of financial strain. Close to 20% of these transitions resulted in declines in financial strain, whereas close to 16% resulted in increases. Rates of stability were higher with respect to heavy drinking (93.7%) and smoking (97.4%). This, however, is not unexpected given that our dichotomous measures of these variables are not capable of registering all small increases or declines in drinking and smoking that may have occurred. The remaining cells in this table show that decreases in heavy drinking and smoking were more prevalent than increases in our data (3.5% vs. 2.8% for heavy drinking; 1.7% vs. 0.9% for smoking).

The results from our multilevel models assessing associations between financial strain and heavy drinking and smok-

ing are presented in Tables 3 and 4, respectively. Model 1 of each table shows the main effects of within-person changes in financial strain on the odds of heavy drinking or smoking. In Table 3, this effect is not significant ($b = 0.013$, $p = .834$; odds ratio = 1.013), suggesting that when considering the population as a whole, within-person changes in financial strain are not systematically associated with changes in the odds of heavy drinking. The control variables in this model (not shown in the table) indicate that, at the intercept, the odds of heavy drinking were higher among men and those with higher levels of education and were lower among older adults and those with higher average levels of financial strain. Furthermore, the odds of heavy drinking were not associated with attrition and decreased over time.

The estimates from Model 2 of Table 3 indicate that the association between changes in levels of financial strain and heavy drinking is not the same for all members of the population. Indeed, the interaction effects in this model suggest that the effects of financial strain on the odds of heavy drinking vary by gender ($b = 0.243$, $p < .001$) and education ($b = -0.226$, $p = .010$). The specific nature of both the gender and education variations is presented graphically in Figure 1. This figure was constructed using the estimates from Model 2 to compute odds ratios for the association between financial strain and drinking, for men and women, and specific levels of education (any level of education could be used, but we chose 8 years to represent "low education" and 16 years to represent "high education"). These computed odds ratios were then used to calculate the predicted probabilities of heavy drinking at specific levels of financial strain (we chose "none" to represent a small decrease from the overall average level of financial strain and "a little" to represent an increase from this average).

As the top panel of this figure shows, financial strain is directly associated with the probability of heavy drinking

TABLE 2. Within-person changes in financial strain, heavy drinking, and smoking

Variable	Instances of increase, <i>n</i> (%)	Instances of decrease, <i>n</i> (%)	Instances of stability, <i>n</i> (%)
Financial strain	534 (15.7)	675 (19.9)	2,191 (64.4)
Heavy drinking	91 (2.8)	114 (3.5)	3,054 (93.7)
Smoking	31 (0.9)	59 (1.7)	3,312 (97.4)

TABLE 3. Multilevel models estimating time-varying financial strain as a predictor of heavy drinking

Variable	Heavy drinking					
	Model 1		Model 2		Model 3	
	Coeff. (OR)	<i>p</i>	Coeff. (OR)	<i>p</i>	Coeff. (OR)	<i>p</i>
Financial strain, time varying	0.013 (1.013)	.834	-0.028 (0.972)	.641	-0.110 (0.896)	.054
Financial Strain × Gender			0.243 (1.275)	.000	0.303 (1.354)	.000
Financial Strain × Education			-0.226 (0.798)	.010	-0.015 (0.985)	.812
Financial Strain × Age			0.101 (1.106)	.175	0.018 (1.018)	.782
Financial Strain × Gender × Age					0.143 (1.154)	.055
Financial Strain × Education × Age					0.269 (1.309)	.001
Financial Strain × Gender × Education					-0.083 (0.921)	.236

Notes: All models control for gender, education, and age at baseline, average financial strain across all observations, time, and attrition. Coeff. = coefficient; OR = odds ratio.

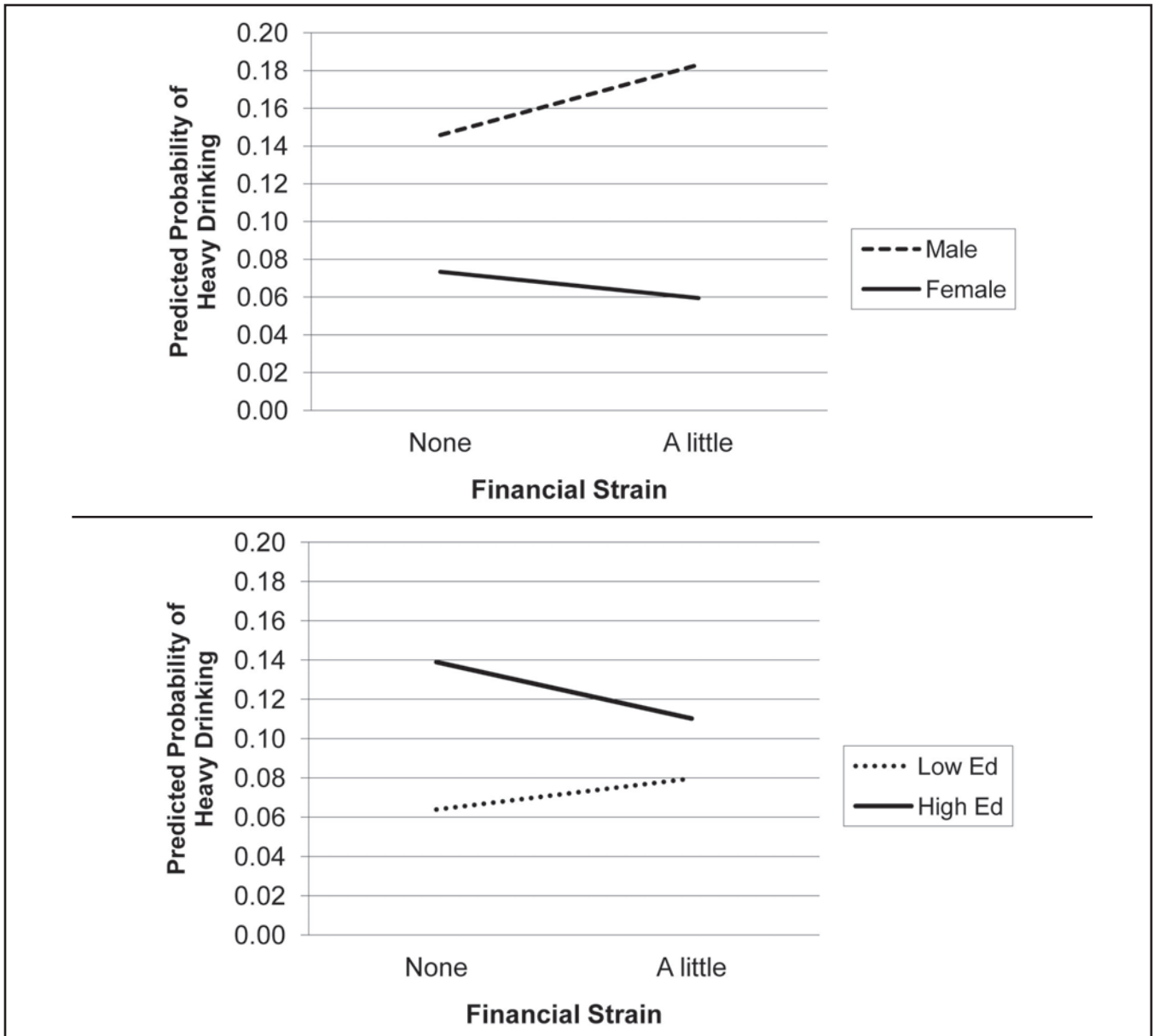


FIGURE 1. Interaction effects of time-varying financial strain and gender (top panel) and education (bottom panel) on the likelihood of heavy drinking. These plots represent the association between financial strain and heavy drinking for persons with average levels of financial strain (1.3 on a scale from 1 to 4). On the x-axes, “none” refers to 0.3 points below the average (1 on a scale from 1 to 4) and “a little” refers to 0.7 points above the average (2 on a scale from 1 to 4). Low Ed = 8 years of education; High Ed = 16 years of education.

TABLE 4. Multilevel models estimating time-varying financial strain as a predictor of smoking

Variable	Smoking					
	Model 1		Model 2		Model 3	
	Coeff. (OR)	<i>p</i>	Coeff. (OR)	<i>p</i>	Coeff. (OR)	<i>p</i>
Financial strain	0.113 (1.120)	.002	0.066 (1.069)	.022	0.038 (1.038)	.147
Financial Strain × Gender			0.056 (1.058)	.179	-0.003 (0.997)	.886
Financial Strain × Education			-0.058 (0.944)	.121	-0.116 (0.891)	.000
Financial Strain × Age			-0.059 (0.942)	.168	-0.106 (0.899)	.015
Financial Strain × Gender × Age					-0.106 (0.900)	.039
Financial Strain × Education × Age					-0.087 (0.916)	.002
Financial Strain × Gender × Education					0.011 (1.011)	.778

Notes: All models control for gender, education, and age at baseline, average financial strain across all observations, time, and attrition. Coeff. = coefficient; OR = odds ratio.

among men but inversely associated with the probability of drinking among women. The computed odds ratio representing the association between financial strain and the odds of heavy drinking for men is 1.31, suggesting that for men, a one-point increase in financial strain (e.g., a change from “none” to “a little”) is associated with a greater than 30% increase in the odds of heavy drinking. The computed odds ratio for women is 0.80, or a 20% reduction in the likelihood of heavy drinking when financial strain increases.

With respect to education, the bottom panel of the figure shows that for highly educated older adults, financial strain is inversely associated with the probability of heavy drinking, whereas for older adults with low levels of education, financial strain is directly associated with the probability of heavy drinking. The computed odds ratio for those with low levels of education is 1.27, and for those with high levels of education this odds ratio is 0.77.

To assess how gender, education, and age may interact with one another to influence the association between financial strain and heavy drinking, three-way interactions were estimated in Model 3. The interaction between financial strain, gender, and age is marginally significant ($b = 0.143$, $p = .055$), suggesting that the gender differences appearing in Figure 1 tend to become more pronounced at older ages. The interaction between financial strain, education, and age is also statistically significant ($b = 0.269$, $p = .001$), suggesting that the education differences in Figure 1 are most apparent among the young-old (e.g., approximately age 65 at baseline).

With regard to smoking, the estimate for financial strain from Model 1 of Table 4 suggests a direct association between financial strain and the odds of smoking ($b = 0.113$, $p = .002$; odds ratio = 1.120). The odds ratio associated with this estimate indicates that a one-point increase in financial strain is associated with a 12% increase in the likelihood of smoking. The control variables in this model (not shown in the table) indicate that, at the intercept, those with high levels of education and older adults had relatively low odds of smoking, those with high average levels of financial strain and respondents who dropped out of the study or died before

its completion had relatively high odds of smoking, and that the odds of smoking declined over time.

Model 2 from this table suggests that this association between financial strain and smoking does not vary systematically across gender, education, or age. However, Model 3 from this table does indicate the presence of higher order interactions. In particular, this model suggests that the association between financial strain and smoking is stronger at younger ages ($b = -0.106$, $p = .015$) and among the less-well-educated elderly ($b = -0.116$, $p < .001$). Furthermore, the Financial Strain × Gender × Age interaction ($b = -0.106$, $p = .039$) suggests that the direct association between financial strain and smoking is particularly strong among younger men in the population. The computed odds ratio representing the association between financial strain and the odds of smoking for young-old men is 1.44, representing a 44% increase in the odds of smoking when financial strain increases by one point. The Financial Strain × Education × Age interaction ($b = -0.087$, $p = .002$) suggests that education differences in the effects of financial strain on smoking are particularly apparent among the oldest-old (e.g., approximately age 85 at baseline).

Discussion

The findings from this study provide support for the idea that for at least some older adults, changes in levels of financial strain are directly associated with the odds of heavy alcohol consumption and smoking. This means that older adults are likely to increase their alcohol and tobacco use during times of financial stress and decrease use in the absence of such stress. These findings are consistent with previous work showing a positive association between nonhealth-related stressors and alcohol consumption during later life (Perreira and Sloan, 2001). At the same time, however, this is one of the first studies based on longitudinal data from a national sample of adults age 65 and older to show findings consistent with the tension-reduction hypothesis as it pertains to financial stress, in particular (Greeley and Oei, 1999).

These findings suggest that even late in life, when certain behavioral patterns are thought to be inflexible, many individuals do change their drinking and smoking behavior in association with changes in their perceived financial circumstances. Although decreases in financial strain, alcohol use, and smoking were more common than increases during this study period, these findings suggest that when financial pressures increase, the risks of heavy drinking and smoking are also likely to increase. Given the negative health and quality of life consequences associated with excessive use of alcohol (Rigler, 2000) and smoking (Maxwell and Hirdes, 1993) in the elderly, these results would seem to call for investment in substance misuse prevention programs targeting older adults who are facing financial pressures. With the lingering global financial crisis and an aging population, the number of older adults who are facing financial strain is only likely to grow in future years and decades.

An important caveat with respect to these findings, however, is that increases in alcohol use and smoking in conjunction with financial strain are not projected for all older adults. In particular, our findings show evidence of direct associations between financial strain and the odds of heavy drinking only among elderly men and those with relatively low levels of education. We believe that the emergence of these groups as those who are most likely to alter their drinking behavior in a manner consistent with the tension-reduction hypothesis could be informative. For instance, we contend that these findings are likely an indication that alcohol is used to relieve the distress brought about by financial problems primarily among those with the least access to resources (e.g., social support) that could be used for more adaptive coping (Krause and Borawski-Clark, 1995; Turner and Marino, 1994). In addition, the gender differences we found—which are consistent with some research (Glass et al., 1995) and inconsistent with other research (Veenstra et al., 2007)—may reflect men's tendency to show externalizing responses to stress (Lemke et al., 2008) and the fact that within current cohorts of older adults, alcohol use and, perhaps, smoking are typically viewed as more masculine responses to stress and less appropriate for women (Reimann and Backes, 2006).

Beyond this, the three-way interactions in our models provide another layer of depth to our understanding of which older adults are most likely to change their drinking behavior in association with financial strain. For example, our findings suggest that gender differences in the effects of financial strain on alcohol use are especially evident at higher ages. This may be an indication of an expansion of gender differences in at least some adaptive social coping resources (e.g., support seeking) with increasing age (Field and Minkler, 1988). As such, older men may be increasingly bereft of a means for effectively regulating the negative emotions associated with financial strain without the use of alcohol. Evidence in support of a growing gender

gap in social coping resources, however, is mixed (Shaw et al., 2007).

The three-way interaction involving financial strain, education, and age is somewhat harder to interpret. Here, the tendency for older adults with low levels of education to increase alcohol use during times of financial strain fades with advancing age. Thus, it appears that in the case of alcohol use in response to financial strain, although gender differences expand with advancing age, education differences dissipate. This dissipation of education differences may be the result of less-educated people experiencing more health problems as they move through late life, which works to offset their earlier tendency to drink more in response to strain. The notion of advancing age acting to level socioeconomic disparities in health-related factors is a prominent theoretical perspective in the aging literature (House et al., 1994), but more work is necessary to determine its applicability to the case of education differences in alcohol use in response to financial strain.

With respect to smoking, our findings suggest that increases in association with financial strain are more common among the young-old compared with the oldest-old. Our failure to find evidence of an association between smoking and financial strain among the oldest-old is most likely an indication of a selection effect. That is, adults who survive into the final years of the life span are likely to be those who are least inclined to take up smoking under any circumstances. Furthermore, our findings suggest that the one group most likely to increase smoking in association with financial strain is young-old men. Again, this propensity for men to respond to financial strain by increasing health risk behaviors (e.g., smoking) may be a reflection of coping resource deficiencies among men compared with women, or it may reflect gender differences in social norms concerning appropriate ways of responding to stress. This trend may also be an indication that within this cohort, the emotional distress caused by financial strain is greater for men than women because they may feel more responsibility for household finances as a result of the traditional socialization of men into the "breadwinner" role.

These findings are especially noteworthy in light of the methodological strengths of this study. In particular, this is the first study, to our knowledge, that has tested the association between within-person changes in financial strain and alcohol use and smoking in a national sample of older adults. The fact that, for many people, between-wave changes in financial strain coincided with between-wave changes in alcohol use and smoking patterns should not be considered substantiation that changes in financial strain cause changes in these behaviors; however, because our design allowed each respondent to act as his or her own control, thereby reducing the potential confounding that comes with comparing differences between individuals (Li and Conwell, 2009), the current findings should add con-

siderably to the body of evidence in favor of such a causal relationship.

Still, more could be done in future research to extend our understanding of this association. First, perhaps most problematic in the current study is the temporal ambiguity with respect to the association between changes in financial strain and changes in alcohol use and smoking behavior. These constructs were measured contemporaneously with one another, and thus it is not certain whether the associations we found indicate that changes in financial strain lead to changes in behavior, or whether changes in behavior precede changes in financial strain. Because some have found evidence of reciprocal relationships between stressors and both drinking and smoking behavior (Brennan et al., 1999; Siahpush et al., 2003), further testing of associations between these variables is necessary, using within-person analysis and methods that resolve the temporal ambiguity of the associations. For this purpose, the use of so-called lag variables as predictors is recommended (Li and Conwell, 2009), but our data did not include enough observations per respondent to allow for such an approach. Tracking individuals over a longer period and allowing for more observations per respondent would also be likely to increase the intra-individual variation in the time-varying measures used in this study, thus improving the statistical power of the analyses.

Second, although coping responses were evoked to justify and explain gender, education, and age differences in the associations between financial strain and substance misuse, specific coping responses were not evaluated in this study. Although a focus on the moderating effects of sociodemographic markers is appropriate given the current state of the literature, moving beyond demographic markers to the coping resources they influence should be a high priority in future studies (Veenstra et al., 2007).

Third, in this study we were not able to examine the associations between financial strain and heavy episodic drinking or heavy smoking. Studying these outcomes could reveal patterns of alcohol use and smoking that are distinct from those that are revealed when focusing only on average monthly alcohol consumption or whether a respondent engages in any level of smoking.

Further, because data on alcohol use and smoking before baseline were not available in this study, a proper examination of whether one's life history of alcohol use and smoking moderate the effects of financial strain on current drinking and smoking behavior was not possible. We suspect that lifelong alcohol abstainers are less likely than others to increase their consumption in response to stress (Glass et al., 1995) and that the uptake of smoking in association with financial strain is bound to be more likely among previous smokers than lifelong nonsmokers. Although we were not able to test these hypotheses formally, we did run some supplemental analyses with alcohol abstinence, rather than heavy drinking, as the outcome. According to the results of these analyses

(not shown here), time-varying financial strain was not associated with the odds of abstaining from alcohol. This suggests that within-persons variations in levels of financial strain are associated with movement into and out of heavy drinking but not with movement into and out of abstinence. Nevertheless, a more formal test of interactions between alcohol use (and smoking) histories and current financial strain is necessary to gain a more complete picture of the impact of one's life history.

These limitations notwithstanding, the current findings do presage a potentially growing problem in our aging population. Although within-person changes in financial strain do not appear to be the norm within the elderly population, they are fairly common, with our data showing that more than 35% of all individual transitions between waves resulted in a change in financial strain. Furthermore, as the baby-boom generation enters old age in the wake of a global financial recession, the number of older adults facing financial difficulties is likely to increase considerably (Soto, 2008). If exposure to such difficulties places at least some individuals at increased risk for unhealthy drinking or smoking, as seems to be the case for elderly men and those with low levels of education, then the number of older adults engaged in such behaviors can also be expected to rise in the coming years. In anticipation of such a trend, a proper public health response would incorporate efforts to identify those who are most likely to increase their risk behaviors, and interventions to strengthen their resources for effectively coping with experiences of financial difficulty without having to rely on the unhealthy use of alcohol and tobacco.

References

- Abbey, A., Smith, M. J., & Scott, R. O. (1993). The relationship between reasons for drinking alcohol and alcohol consumption: An interactional approach. *Addictive Behaviors, 18*, 659–670.
- Brennan, P. L., Schutte, K. K., & Moos, R. H. (1999). Reciprocal relations between stressors and drinking behavior: A three-wave panel study of late middle-aged and older women and men. *Addiction, 94*, 737–749.
- DeNavas-Walt, C., Proctor, B. D., & Smith, J. C. (2010). U.S. Census Bureau, Current Population Reports, P60-238. *Income, Poverty, and Health Insurance Coverage in the United States: 2009*. Washington, DC: U.S. Government Printing Office. Retrieved from <http://www.census.gov/prod/2010pubs/p60-238.pdf>
- Field, D., & Minkler, M. (1988). Continuity and change in social support between young-old and old-old or very-old age. *Journal of Gerontology, 43*, P100–P106.
- Glass, T. A., Prigerson, H., Kasl, S. V., & de Leon, C. F. M. (1995). The effects of negative life events on alcohol consumption among older men and women. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 50B*, S205–S216.
- Greeley, J., & Oei, T. (1999). Alcohol and tension reduction. In K. E. Leonard & H. T. Blane (Eds.), *Psychological theories of drinking and alcoholism* (pp. 14–53). New York, NY: Guilford Press.
- Hedeker, D., & Gibbons, R. D. (2006). *Longitudinal data analysis*. Hoboken, NJ: John Wiley & Sons, Inc.
- House, J. S., Lepkowski, J. M., Kinney, A. M., Mero, R. P., Kessler, R. C.,

- & Herzog, A. R. (1994). The social stratification of aging and health. *Journal of Health and Social Behavior, 35*, 213–234.
- Hox, J. (2002). *Multilevel analysis: Techniques and applications*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Kendzor, D. E., Businelle, M. S., Costello, T. J., Castro, Y., Reitzel, L. R., Cofta-Woerpel, L. M., . . . Wetter, D. W. (2010). Financial strain and smoking cessation among racially/ethnically diverse smokers. *American Journal of Public Health, 100*, 702–706.
- Krause, N. (1994). Stressors in salient social roles and well-being in later life. *Journal of Gerontology, 49*, P137–P148.
- Krause, N. (2005). Exploring age differences in the stress-buffering function of social support. *Psychology and Aging, 20*, 714–717.
- Krause, N., & Borawski-Clark, E. (1995). Social class differences in social support among older adults. *Gerontologist, 35*, 498–508.
- Lemke, S., Schutte, K. K., Brennan, P. L., & Moos, R. H. (2008). Gender differences in social influences and stressors linked to increased drinking. *Journal of Studies on Alcohol and Drugs, 69*, 695–702.
- Li, L. W., & Conwell, Y. (2009). Effects of changes in depressive symptoms and cognitive functioning on physical disability in home care elders. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences, 64A*, 230–236.
- Maxwell, C. J., & Hirdes, J. P. (1993). The prevalence of smoking and implications for quality of life among the community-based elderly. *American Journal of Preventive Medicine, 9*, 338–345.
- National Institute on Alcohol Abuse and Alcoholism. (2007). FAQs for the general public. Retrieved from: http://www.niaaa.nih.gov/FAQs/General-English/Pages/default.aspx#safe_level
- Peirce, R. S., Frone, M. R., Russell, M., & Cooper, M. L. (1994). Relationship of financial strain and psychosocial resources to alcohol use and abuse: The mediating role of negative affect and drinking motives. *Journal of Health and Social Behavior, 35*, 291–308.
- Peirce, R. S., Frone, M. R., Russell, M., & Cooper, M. L. (1996). Financial stress, social support, and alcohol involvement: A longitudinal test of the buffering hypothesis in a general population survey. *Health Psychology, 15*, 38–47.
- Perreira, K. M., & Sloan, F. A. (2001). Life events and alcohol consumption among mature adults: A longitudinal analysis. *Journal of Studies on Alcohol, 62*, 501–508.
- Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models*. Thousand Oaks, CA: Sage.
- Reimann, K., & Backes, G. M. (2006). Men in later life: Perspectives on gender, health, and embodiment. In G. M. Backes, V. Lasch, & K. Reimann (Eds.), *Gender, health and ageing: European perspectives on life course, health issues and social challenges* (pp. 57–70). Wiesbaden, Germany: VS Verlag für Sozialwissenschaften.
- Rigler, S. K. (2000). Alcoholism in the elderly. *American Family Physician, 61*, 1710–1716.
- Rodgers, W. L., & Herzog, A. R. (1992). Collecting data about the oldest old: Problems and procedures. In R. M. Suzman, D. P. Willis, & K. G. Manton (Eds.), *The oldest old*. New York, NY: Oxford University Press.
- Romelsjö, A., Lazarus, N. B., Kaplan, G. A., & Cohen, R. D. (1991). The relationship between stressful life situations and changes in alcohol consumption in a general population sample. *British Journal of Addiction, 86*, 157–169.
- Shaw, B. A., & Krause, N. (2001). Exploring race variations in aging and personal control. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 56*, S119–S124.
- Shaw, B. A., Krause, N., Liang, J., & Bennett, J. (2007). Tracking changes in social relations throughout late life. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 62*, S90–S99.
- Siahpush, M., Borland, R., & Scollo, M. (2003). Smoking and financial stress. *Tobacco Control, 12*, 60–66.
- Siahpush, M., & Carlin, J. B. (2006). Financial stress, smoking cessation and relapse: Results from a prospective study of an Australian national sample. *Addiction, 101*, 121–127.
- Siahpush, M., Yong, H.-H., Borland, R., Reid, J. L., & Hammond, D. (2009). Smokers with financial stress are more likely to want to quit but less likely to try or succeed: Findings from the International Tobacco Control (ITC) Four Country Survey. *Addiction, 104*, 1382–1390.
- Soto, M. (2008). *How is the financial crisis affecting retirement savings? December 10, 2008, Update*. Washington, DC: The Urban Institute. Available at <http://www.urban.org/url.cfm?ID=901206>
- Stuckler, D., Basu, S., & McKee, M. (2010). Budget crises, health, and social welfare programmes. *BMJ, 340*, c3311. Available at <http://www.bmj.com/content/340/bmj.c3311>
- Turner, R. J., & Marino, F. (1994). Social support and social structure: A descriptive epidemiology. *Journal of Health and Social Behavior, 35*, 193–212.
- Veenstra, M. Y., Lemmens, P. H., Friesema, I. H., Garretsen, H. F., Knottnerus, J. A., & Zwietering, P. J. (2006). A literature overview of the relationship between life-events and alcohol use in the general population. *Alcohol and Alcoholism, 41*, 455–463.
- Veenstra, M. Y., Lemmens, P. H., Friesema, I. H., Tan, F. E. S., Garretsen, H. F. L., Knottnerus, J. A., & Zwietering, P. J. (2007). Coping style mediates impact of stress on alcohol use: A prospective population-based study. *Addiction, 102*, 1890–1898.