

Social Influences on Smoking in Middle-Aged and Older Women

Charles J. Holahan, Rebecca J. North, and
Carole K. Holahan
University of Texas at Austin

Rashelle B. Hayes
University of Massachusetts Medical School

Daniel A. Powers
University of Texas at Austin

Judith K. Ockene
University of Massachusetts Medical School

The purpose of this study was to examine the role of 2 types of social influence—general social support and living with a smoker—on smoking behavior among middle-aged and older women in the Women’s Health Initiative (WHI) Observational Study. Participants were postmenopausal women who reported smoking at some time in their lives ($N = 37,027$), who were an average age of 63.3 years at baseline. Analyses used multiple logistic regression and controlled for age, educational level, and ethnicity. In cross-sectional analyses, social support was associated with a lower likelihood and living with a smoker was associated with a higher likelihood of being a current smoker and, among smokers, of being a heavier smoker. Moreover, in prospective analyses among baseline smokers, social support predicted a higher likelihood and living with a smoker predicted a lower likelihood of smoking cessation 1-year later. Further, in prospective analyses among former smokers who were not smoking at baseline, social support predicted a lower likelihood and living with a smoker predicted a higher likelihood of smoking relapse 1-year later. Overall, the present results indicate that social influences are important correlates of smoking status, smoking level, smoking cessation, and smoking relapse among middle-aged and older women.

Keywords: smoking, social support, living with smoker, aging, women’s health

The U.S. Surgeon General has emphasized the importance of longitudinal research on smoking among women across adulthood (U.S. Department of Health and Human Services, 2001). Especially needed is an understanding of determinants of smoking in older women (Donze, Ruffieux, & Cornuz, 2007). A growing body of evidence indicates that social relationships shape health behav-

ior throughout adulthood (Umberson, Crosnoe, & Reczek, 2010); however, research on social influences in smoking has focused primarily on adolescence. The purpose of this study was to examine the role of two types of social influence—social support and living with a smoker—in smoking among middle-aged and older women in the Women’s Health Initiative (WHI) Observational Study.

Women and Smoking

Cigarette smoking is an important causal factor in morbidity and mortality among women in adulthood (Husten et al., 1997; LaCroix et al., 1991; Healthy People, 2010 (U.S. Department of Health and Human Services, 2000)). From 2000 to 2004, almost 174,000 annual deaths among women were attributed to smoking-related causes, principally from cancer, cardiovascular diseases, and respiratory diseases (Centers for Disease Control and Prevention, 2008). Lung cancer now causes greater cancer-related mortality among women than breast cancer (U.S. Department of Health and Human Services, 2001). Cigarette smoking also contributes to many other cancers, as well as lower bone density and increased risk of hip fractures in postmenopausal women (U.S. Department of Health and Human Services, 2004).

Middle-aged and older women can reap substantial health benefits from smoking cessation (Burns, 2000; Hermanson, Omenn, Kronmal, & Gersh, 1988; Ockene, 1993; U.S. Department of Health and Human Services, 1990, 2001, 2004). Smoking cessation in middle-aged and older individuals is associated with improvement in immediate and longer-term health (Hermanson et al.,

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Charles J. Holahan and Rebecca J. North, Department of Psychology, University of Texas at Austin; Carole K. Holahan, Department of Kinesiology and Health Education, University of Texas at Austin; Rashelle B. Hayes and Judith K. Ockene, Division of Preventive and Behavioral Medicine, University of Massachusetts Medical School; Daniel A. Powers, Department of Sociology and Population Research Center, University of Texas at Austin.

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Correspondence concerning this article should be addressed to Charles J. Holahan, Department of Psychology (A8000), University of Texas at Austin, Austin, TX 78712. E-mail: holahan@psy.utexas.edu

1988; Taylor, Hasselblad, Henley, Thun, & Sloan, 2002; U.S. Department of Health and Human Services, 1990). In addition, although fewer older adults attempt to quit smoking as compared with younger persons (U.S. Department of Health and Human Services, 2000), they are just as likely or more likely to be successful in their attempts to quit smoking (Burns, 2000; Sorlie & Kannel, 1990; Whitson, Heflin, & Burchett, 2006).

Social Support and Smoking

Social support has been a central focus in research on social ties and health behavior (Taylor & Repetti, 1997; Umberson et al., 2010). For example, the transtheoretical model of change lists helping relationships as a key process in changing health behaviors (Prochaska, Johnson, & Lee, 2009). However, although research evidence generally suggests a relationship between social support and smoking, effects of social support on smoking cessation have not been consistently significant (Lichtenstein, Glasgow, & Abrams, 1986). Further, while research has tended to focus on smoking-specific social support, general social support from family and friends may play an important role in smoking behavior (Wagner, Burg, & Sirois, 2004). Moreover, few studies have investigated social support and smoking in large samples of women (Väänänen, Kouvonen, Kivimäki, Pentti, & Vahtera, 2008), and fewer have investigated this relationship among middle-aged and older women.

Some cross-sectional evidence from community surveys documents an inverse association between social support and smoking status. Among over 20,000 mixed-aged female employees in Finland, low social support was positively associated with being a current smoker and heavier smoker and with a lower likelihood of reporting having quit smoking (Väänänen et al., 2008). Similarly, among almost 2,000 Lebanese women, those who experienced less trust and felt more isolated were more likely to smoke. However, these effects were observed only among younger women (Affi, Nakkash, & Khawaja, 2010).

Additional prospective evidence documents a positive association between social support and smoking cessation in the context of smoking cessation interventions. For example, early research with community adults in a university-based smoking cessation program indicated that both perceived partner support and perceived general support predicted quitting smoking (Mermelstein, Cohen, Lichtenstein, Baer, & Kamarck, 1986). Further, a social support group intervention among employees from diverse worksites in the Chicago area predicted increased smoking cessation two years later (McMahon & Jason, 2000). Similarly, a social support addition to a behavioral smoking cessation intervention among residents of Calgary, Canada, improved cessation at three months among both women and men. However, at six months, cessation was maintained only among men (Carlson, Goodey, Bennett, Taenzer, & Koopmans 2002). Moreover, among lower-educated women in a community-based smoking cessation program, high social support weakened the negative relationship between history of depression and smoking cessation (Turner, Mermelstein, Hitsman, & Warnecke, 2008).

Effects of Living With a Smoker

Although research on social ties and health behavior generally has assumed that social ties play a salutary role, in fact ties to others can also encourage health risk behaviors (Umberson, Crosnoe, & Reczek, 2010). In fact, for both adolescents and adults, negative health behaviors, such as smoking, often are learned and reinforced in group contexts (Taylor & Repetti, 1997; Väänänen et al., 2008). For example, after following over 9,000 middle-aged couples for up to eight years, Falba and Sindelar (2008) found that partners shape one another's health habits for good and for bad. Effects were especially strong for tobacco where a partner's behavior may operate as a smoking cue. Correspondingly, household smoking bans promote attempts to quit smoking and more successful cessation outcomes among community adults (Farkas, Gilpin, Distefan, & Pierce, 1999; Gilpin, White, Farkas, & Pierce, 1999). However, because most research in this area has focused on younger or mixed-age samples, little is known about the effect of living with a smoker among older women smokers.

Large-sample community surveys have shown consistent adverse effects for living with a smoker on smoking level and smoking cessation among younger Danish women (Mueller, Munk, Thomsen, Frederiksen, & Kjaer, 2007), recently married New York couples (Dollar, Homish, Kozlowski, & Leonard, 2009), and mixed-age British householders (Chandola, Head, & Bartley, 2004). Similarly, in the context of smoking cessation interventions, consistent adverse effects for living with a smoker on cessation have been observed in large samples of mixed-aged adults in Britain (Ferguson, Bauld, Chesterman, & Judge, 2005), Australia (Gourlay et al., 1994), and Italy (Senore et al., 1998). Moreover, there is some evidence from smoking cessation interventions with large mixed-aged samples of adults in the U.S. (Bjornson et al., 1995) and Australia (Moshammer & Neuberger, 2006) that women's smoking may be more adversely influenced than men's by living with a smoker.

In addition to its adverse direct effect on smoking, it is also plausible that living with a smoker may diminish the salutary effect of general social support on smoking outcomes. This question may be especially relevant to women, who are more likely to report inconsistency between perceived norms to quit smoking and the smoking behavior of a partner (Dohnke, Weiss-Gerlach, & Spies, 2011). Very little research has examined this question. Pollak and Mullen (1997) studied a small sample of pregnant women who had spontaneously quit smoking. General social support from a partner was positively associated with continued abstinence six weeks postpartum, but only for women whose partners did not smoke. Reflecting on this pattern of findings, the authors concluded that: "partners evidently cannot override their smoking with general social support" (p. 186). In a similar vein, alliance with a buddy to provide social support enhanced quitting in a self-help smoking cessation program in the Chicago area, but only when the buddy was not a continuing smoker (Kviz, Crittenden, Madura, & Warnecke, 1994).

The Present Study

The present study examined the relation of two types of social influence—general social support in the emotional, informational, leisure, and tangible domains and living with a smoker—on smok-

ing in 37,027 middle-aged and older women using data from the WHI Observational Study. The WHI Observational Study was framed to examine the role of lifestyle factors in the prevention of heart disease, some cancers, and osteoporosis in women who were postmenopausal (Hays et al., 2003). Participants were recruited from urban, suburban, and rural areas surrounding clinical centers in the United States. The WHI Observational Study presents a unique opportunity to examine the separate and interactive effects of social support and living with a smoker on a range of smoking outcomes in a large sample of middle-aged and older women. Smoking outcomes include point-prevalence measures of smoking status and smoking level at baseline and smoking cessation and smoking relapse assessed at a 1-year follow-up.

Two hypotheses were advanced. (a) Extending previous research on the role of social support in smoking in mixed-aged samples (McMahon & Jason, 2000; Väänänen et al., 2008), we hypothesized that social support would be negatively associated with smoking status, heavier smoking, and smoking relapse and positively associated with smoking cessation. (b) Extending previous research on the role of living with a smoker in smoking in mixed-aged samples (Chandola et al., 2004; Falba & Sindelar, 2008), we hypothesized that living with a smoker would be positively associated with smoking status, heavier smoking, and smoking relapse and negatively associated with smoking cessation. In addition, we examined one exploratory question. Extending previous research on the interactive roles of social support and living with a smoker on smoking among young women (Pollak & Mullen, 1997), we examined whether living with a smoker would weaken the hypothesized associations between social support and smoking outcomes.

Methods

Sample Selection and Characteristics

The WHI Observational Study included women between the ages of 50 and 79 who were postmenopausal at enrollment between 1993 and 1998 (Hays et al., 2003). The original purpose of the WHI Observational Study was to explore the predictors and natural history of important causes of morbidity and mortality in postmenopausal women related to heart disease, cancers, and osteoporosis. Postmenopausal was defined as not having a menstrual period for at least 6 months if age was 55 years or older, and more conservatively as having no menstrual period for at least 12 months for younger women aged 50–54.

Inclusion criteria included the ability and willingness to provide written informed consent and plans to stay in the same area for at least 3 years. Potential participants were excluded if they had medical conditions that predicted survival of less than 3 years, or if they had conditions such as alcohol or drug dependency, mental illness, including severe depression or dementia, which might affect retention. The WHI sample was healthier and reported a lower prevalence of smoking than the general population of women in their cohort (Langer et al., 2003). The inclusion of participants from racial/minority groups proportionate to their age-group representation in the U.S. population was a priority (Hays et al., 2003). Details of the WHI design have been published previously (Hays et al., 2003; Langer et al., 2003; Women's Health Initiative Study Group, 1998). Of participants who completed the

WHI screening form and who were not assigned to a clinical trial, 93,676 (30.9%) were successfully enrolled in the WHI Observational Study (Hays et al., 2003).

Because smoking initiation is unlikely in middle to later adulthood (Moon-Howard, 2003), the present analyses were restricted to participants who reported smoking at some time in their lives. Specifically, the present sample includes the 37,027 (40%) of baseline participants in the WHI Observational Study who reported that they “smoked at least 100 cigarettes” during their entire life and who also provided complete data on the measures used here. At baseline, the participants in the present sample were an average age of 63.3 ($SD = 7.19$) years. The majority of participants (59%) were married. The sample was predominantly White (86.6%), with the remainder of the sample American Indian/Alaskan Native (0.4%), Asian/Pacific Islander (1.5%), Black (8.0%), Hispanic (2.5%), and Unknown (1.0%). Both White and Black ethnicity categories specified not-of-Hispanic origin. In terms of education, 4.7% of participants had less than a high school education, 15.5% had a high school (or vocational school) education, 39.2% had some education beyond high school but had not completed college, and 40.5% had completed college.

Measures

Sociodemographic factors, social support, and living with a smoker were assessed at baseline and smoking outcomes were assessed at baseline and at a 1-year follow-up by self-report with standardized questionnaires.

Sociodemographic factors. Sociodemographic factors used as control variables included age (in years), educational level, and ethnicity. Educational level was operationalized as less than a high school (or vocational school) education, high school (or vocational school) education, some education beyond high school (or vocational school) but not having completed college, and completed college.

Social support. Social support was measured with 9 items from the Medical Outcomes Study Social Support Survey (Sherbourne & Stewart, 1991). The items tapped emotional, informational, leisure, and tangible dimensions of general support. Items were preceded by a prompt: “How often is each of the following kinds of support available to you if you need it?” A sample item is “Someone you can count to listen to you when you need to talk.” Responses ranged from 1, *none of the time*, to 5, *all of the time*. Total scores (range = 9–45) are the sum of scores for the nine items. In the present sample, Cronbach's alpha = .93.

Living with a smoker. Living with a smoker in one's home was indexed by a single item: “Does anyone living with you now smoke cigarettes inside your home?” (no = 0, yes = 1). Among participants living with a smoker, most (57.4%) household smokers were partners. Among participants living with a smoker who was not a partner, most household smokers (62.1%) were a daughter or son versus some “other person.”

Smoking outcomes. Four smoking outcomes were assessed. At baseline, we assessed *smoking status* and, among current smokers, *smoking level*. In addition, at a 1-year follow-up, we assessed *smoking cessation* among baseline smokers and *smoking relapse* among former smokers who were not smoking at baseline.

Smoking status at baseline was indexed based on responses to an item that asked “Do you smoke cigarettes now” (no = 0, yes =

1). Level of smoking among smokers was indexed based on responses to a question that asked, "On the average, how many cigarettes do you usually smoke each day?" Response choices were: Less than 1, 1–4, 5–14, 15–24, 25–34, 35–44, and 45 or more. Following Hatsukami et al. (2006) and Holahan et al. (in press), we operationalized light smoking as less than 15 cigarettes per day (score = 0) and heavier smoking as 15 or more cigarettes per day (score = 1). Among baseline *smokers*, smoking cessation at 1 year was operationalized as reporting no smoking (score = 1) versus smoking (score = 0) at the 1-year follow-up. Among former smokers who were *nonsmokers* at baseline, smoking relapse at 1 year was operationalized as reporting smoking (score = 1) versus no smoking (score = 0) at the 1-year follow-up.

Data Analysis Strategy

Multiple logistic regression analyses were used to analyze the relation of social influences to smoking outcomes. First, separate cross-sectional analyses examined smoking status and, among current smokers, smoking level at baseline. Next, separate prospective analyses examined smoking cessation among baseline smokers and smoking relapse among baseline nonsmokers at a 1-year follow-up. In each analysis, we began with a model that included social support and living with a smoker as predictors. Next, we examined a model that included the interaction between social support and living with a smoker. If the interaction was significant, it was retained in the model; if it was not significant, it was not retained in the model. All analyses controlled for age (in years), educational level (less than a high school education was the reference group), and ethnicity (White was the reference group).

Results

Descriptive Statistics

At baseline, mean social support was 35.7 ($SD = 7.9$), and 4,012 participants (10.8%) lived with a smoker. Current smoking was reported by 4,834 participants (13.1%) at baseline. Baseline smokers began smoking at a median age of 15–19 years and had been regular smokers for a median of 30–39 years. Most baseline smokers (51.7%) were light smokers.¹ Among baseline smokers, smoking cessation was reported by 706 of 4,407 participants (16.0%) who provided data at the 1-year follow-up. Among baseline nonsmokers, smoking relapse was reported by 349 of 30,516 participants (1.1%) who provided data at the 1-year follow-up.

Analyses of Missing Data and Attrition

Missing data. Overall, there were relatively little missing data, except for living with a smoker for which 15.4% of participants had missing data. Among the full sample of 45,304 baseline participants who reported smoking at some time in their lives, we compared participants who provided sufficient data to be included in the present analyses ($N = 37,027$) with those who did not provide sufficient data ($n = 8,277$, 18.3%). The only noteworthy difference involved ethnicity, $\chi^2(5, N = 45,185) = 119.67, p > .01$, with missing data most likely among Hispanics (27.5%) and least likely among Whites (17.4%).

1-year attrition. In addition, among the 37,027 participants included in the present analyses, we compared surviving participants ($n = 34,923$) with those who did not participate at the 1-year follow-up ($n = 2,104$, 5.7%). The only noteworthy differences involved educational level and ethnicity. For educational level, $\chi^2(3, N = 37,027) = 283.03, p > .01$, missing data were more likely among participants with less than a high school education (13.8%) compared with other educational groups (average of 5.3%). For ethnicity, $\chi^2(5, N = 37,027) = 820.11, p > .01$, missing data were most likely among American Indian/Alaskan Natives (14.6%), Blacks (15.7%), and Hispanics (14.5%), and least likely Whites (4.4%).

Baseline Smoking

Smoking status. We began by examining the cross-sectional association between social influences and current smoking status at baseline in a multiple logistic regression analysis ($N = 37,027$). Controlling for age, educational level, and ethnicity, both social support (standardized) and living with a smoker were significantly and uniquely associated with current smoking status at baseline. Specifically, a 1 standard deviation increase in social support was linked to a 17% decrease in the odds of being a current smoker. Compared with not living with a smoker, living with a smoker was associated with a more than sixfold increase in the odds of being a current smoker.

Next, we investigated the possible interactive effect of social support and living with a smoker. The interaction was significantly positively related to current smoking status at baseline and was retained in the model. Specifically, living with a smoker attenuated the association between social support and smoking status. Results for the final model are presented in Table 1.

To illustrate the interactive effect of social support and living with a smoker, we examined the association between social support and smoking status under contrasting levels of living with a smoker. Among individuals who did not live with a smoker, each 1 standard deviation increase in social support was linked to a 20% decrease in the odds of being a current smoker. In contrast, among individuals who lived with a smoker, each 1 standard deviation increase in social support was linked to an 8% decrease in the odds of being a current smoker.

Smoking level. In addition, we examined the cross-sectional association between social influences and current smoking level among current smokers at baseline in a multiple logistic regression analysis ($n = 4,834$). Controlling for age, educational level, and ethnicity, both social support (standardized) and living with a smoker were significantly and uniquely associated with current smoking level at baseline. Specifically, a 1 standard deviation increase in social support was linked to a 12% decrease in the odds of being a heavy smoker. Compared with not living with a smoker, living with a smoker was associated with a 34% increase in the odds of being a heavy smoker.

Next, we investigated the possible interactive effect of social support and living with a smoker. The interaction was significantly positively related to smoking level at baseline and was retained in the model. Specifically, living with a smoker attenuated the asso-

¹ The WHI did not assess nondaily, intermittent smoking.

Table 1

Results of Multiple Logistic Regression Analyses Predicting Current Smoking Status Among Participants Who Smoked at Some Time in Their Lives and, Among Current Smokers, Level of Smoking at Baseline

Predictors	Smoking status (N = 37,027)		Smoking level (n = 4,834)	
	OR	95% CI	OR	95% CI
Social support ^a (SS)	.80**	.77, .83	.83**	.77, .90
Living with (LWS)	7.64**	7.09, 8.24	1.33**	1.18, 1.51
SS*LWS	1.15**	1.07, 1.23	1.17*	1.03, 1.32
Age (in years)	0.97**	0.97, 0.98	0.99**	0.98, 0.99
High school ^b	0.87	0.75, 1.01	0.88	0.68, 1.13
Some school after high school ^b	0.81**	0.71, 0.93	0.84	0.67, 1.06
College degree ^b	0.60**	0.52, 0.69	0.64**	0.50, 0.81
American Indian/Alaskan Native ^c	1.10	.72, 1.69	.93	0.46, 1.89
Asian/Pacific Islander ^c	1.04	0.80, 1.36	0.39**	0.24, 0.65
Black ^c	1.40**	1.26, 1.55	0.34**	0.28, .41
Hispanic ^c	1.11	.92, 1.33	0.19**	0.13, 0.27
Unknown ^c	.73	0.51, 1.02	0.51*	0.28, .94

Note. CI = confidence interval; OR = odds ratio.

^a Standardized scale. ^b Less than a high school education was the reference category. ^c White was the reference category.

* p < .05. ** p < .01.

ciation between social support and smoking level among current smokers. Results for the final model are presented in Table 1.

To illustrate the interactive effect of social support and living with a smoker, we examined the association between social support and smoking level under contrasting levels of living with a smoker. Among individuals who did not live with a smoker, each 1 standard deviation increase in social support was linked to a 16% decrease in the odds of being a heavy smoker. In contrast, among individuals who lived with a smoker, each 1 standard deviation increase in social support was linked to a 4% decrease in the odds of being a heavy smoker.

Prospective Analyses

Smoking cessation. Next, we examined the prospective association between social influences and smoking cessation among

baseline smokers in a multiple logistic regression analysis (n = 4,407). Controlling for age, educational level, and ethnicity, both social support (standardized) and living with a smoker were significantly and uniquely associated with smoking cessation among baseline smokers. Next, we investigated the possible interactive effect of social support and living with a smoker. The interaction was not significantly related to smoking cessation and was not retained in the model. Results are presented in Table 2. Each 1 standard deviation increase in social support was linked to a 20% increase in the odds of quitting smoking. Compared with not living with a smoker, living with a smoker was linked to a 26% decrease in the odds of quitting smoking.

Smoking relapse. We also examined the prospective association between social influences and smoking relapse among former smokers who were not smoking at baseline in a multiple

Table 2

Results of Prospective Multiple Logistic Regression Analyses Predicting Smoking Cessation Among Baseline Smokers and Smoking Relapse Among Baseline Nonsmokers at 1-Year Follow-Up

Predictors	Smoking cessation (n = 4,407)		Smoking relapse (n = 30,516)	
	OR	95% CI	OR	95% CI
Social support ^a	1.20**	1.10, 1.31	.80**	.72, .88
Living with smoker	.74**	.62, .88	2.28**	1.70, 3.07
Age (in years)	1.00	0.99, 1.01	0.95**	0.93, 0.96
High school ^b	.72	0.50, 1.02	0.93	0.55, 1.57
Some school after high school ^b	0.83	0.61, 1.15	0.83	0.51, 1.36
College degree ^b	0.82	0.59, 1.14	0.59*	0.36, 0.98
American Indian/Alaskan Native ^c	1.35	.54, 3.37	2.56	0.92, 7.11
Asian/Pacific Islander ^c	0.16*	0.04, .64	0.83	0.31, 2.25
Black ^c	.95	.73, 1.22	1.42*	1.01, 2.01
Hispanic ^c	1.24	.80, 1.93	1.18	0.65, 2.14
Unknown ^c	1.24	0.54, 2.83	0.27	0.04, 1.92

Note. CI = confidence interval; OR = odds ratio.

^a Standardized scale. ^b Less than a high school education was the reference category. ^c White was the reference category.

* p < .05. ** p < .01.

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logistic regression analysis ($n = 30,516$). Controlling for age, educational level, and ethnicity, both social support (standardized) and living with a smoker were significantly and uniquely associated with smoking relapse among former smokers who were not smoking at baseline. Next, we investigated the possible interactive effect of social support and living with a smoker. The interaction was not significantly related to smoking relapse and was not retained in the model. Results are presented in Table 2. Each 1 standard deviation increase in social support was linked to a 20% decrease in the odds of relapsing into smoking. Compared with not living with a smoker, living with a smoker was associated with a 128% increase in the odds of relapsing into smoking.

Discussion

The present findings demonstrate a consistent link between social influences and negative smoking-related behaviors among middle-aged and older women in the WHI Observational Study who smoked at some point in their lives. Extending previous research on the role of social support in smoking in mixed-aged samples (McMahon & Jason, 2000; Väänänen et al., 2008), we found that social support was consistently inversely associated with all of the smoking outcomes we investigated. Further, extending previous research on the role of living with a smoker in smoking in mixed-aged samples (Chandola et al., 2004; Falba & Sindelar, 2008), we found that living with a smoker was consistently positively associated with all of the smoking outcomes we investigated. The strength of these findings may be due in part to the nature of the sample. Current smokers in the sample were more likely to be light smokers, and light compared with heavier smoking is more likely to be influenced by environmental factors (Shiffman, 2009).

Specifically, general social support was associated with a lower likelihood of living with a smoker was associated with a higher likelihood of being a current smoker and, among smokers, of being a heavier smoker. Moreover, among baseline smokers, social support predicted a higher likelihood and living with a smoker predicted a lower likelihood of smoking cessation 1-year later. Further, among former smokers who were not smoking at baseline, social support predicted a lower likelihood and living with a smoker predicted a higher likelihood of smoking relapse 1-year later. All of these effects were unique contributions for both social support and living with a smoker controlling for one another as well as for age, educational level, and ethnicity.

General social support from family and friends may reduce smoking in several ways. A perception of positive regard from significant others may motivate self-care behaviors (Wagner et al., 2004). In addition, family and friends may explicitly endorse behaviors that enhance the health of loved ones (Väänänen et al., 2008). Further, social support may reduce stress and depressed mood (Umberson et al., 2010; Väänänen et al., 2008). Further, supportive others may further perceptions of self-efficacy toward desired health behaviors (Umberson et al., 2010).

On the other hand, living with a smoker may increase smoking in several ways. At a psychological level, for individuals attempting to quit smoking, abstinence from smoking on the part of partners or housemates may be perceived as a form of social support (Pollak & Mullen, 1997). Partners or housemates who smoke may also foster a household norm that legitimizes smoking

behavior and signals a lack of communal commitment to reducing negative health behaviors more generally (Umberson, Crosnoe, & Reczek, 2010). In addition, at a behavioral level, smoking by others in the household provides smoking cues (Falba & Sindelar, 2008). More practically, living with a smoker also results in an easy availability of cigarettes (Chandola, Head, & Bartley, 2004).

Extending previous research on the interactive roles of social support and living with a smoker on smoking among young women (Kviz, Crittenden, Madura, & Warnecke, 1994; Pollak & Mullen, 1997), we found that living with a smoker weakened the cross-sectional inverse association of social support with both smoking status and smoking level. In contrast, the prospective association of social support with both smoking cessation and smoking relapse was independent of living with a smoker.

Social support may have been less reactive to living with a smoker in the context of change in health behavior where social support is especially likely to be sought and valued for promoting change (see Prochaska et al., 2009). Alternatively, social support may have been more stable than housemates' smoking behavior across the 1-year follow-up period. Whereas self-reports of available social support are highly stable across time (Sarason, Sarason, & Shearin, 1986), partners' health behaviors often change in unison (Falba & Sindelar, 2008) and household smokers may themselves have quit smoking at follow-up.

Some limitations should be kept in mind in interpreting these results. The WHI Observational Study measure of smoking relied on self-report. However, several comparisons of self-report with biochemical or cross-informant measures of smoking have found that self-report measures are accurate in most situations, particularly, as in the WHI, in studies of adults who are not in smoking intervention studies (Caraballo, Giovino, Pechacek, & Mowery, 2001; Rebagliato, 2002). Nevertheless, future research would be strengthened by including objective or collateral measures of smoking. Moreover, because participants in the WHI Observational Study were healthier and reported a lower prevalence of smoking than the general population of women in their cohort (Langer et al., 2003), the results may not generalize to all middle-aged and older women. Further, missing data on the variables examined here resulted in an underrepresentation of Hispanics in our baseline analyses and 1-year attrition resulted in an underrepresentation of several ethnic minority groups (Indian/Alaskan Natives, Blacks, and Hispanics), as well as participants with less than a high school education, in our follow-up analyses.

The present study has several strengths. A central contribution is the analysis of social influences and smoking in middle-aged and older women, a population that has been neglected in smoking research. Additional strengths are the large sample, the longitudinal design, and the availability of well-validated measures of social influences. Overall, the present results indicate that social influences are important correlates of smoking status, smoking level, smoking cessation, and smoking relapse among middle-aged and older women. Moreover, our findings demonstrate that the effects of social ties are complex. Whereas, positive social support discourages smoking, living with a smoker maintains it. In fact, as Umberson et al. (2010) have noted, the counter effects of positive and negative influences have likely resulted in an underappreciation of the role of social ties in health behavior.

Our results suggest that addressing social influences can contribute to the effectiveness of smoking intervention programs with

middle-aged and older women. Our findings reinforce U.S. Public Health Service clinical practice guidelines for treating tobacco use (Fiore et al., 2000) that encourage incorporating social support both within and outside of treatment. At the same time, our findings underscore the need for a more textured appreciation of the adverse, as well as the salutary, effects of social ties. For example, training in cognitive-behavioral skills for relapse prevention might be tailored to include coping with the adverse effects of living with a smoker. Further, when partners or housemates smoke, group interventions, including household smoking bans, may be especially effective.

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