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Guided by social control theory and an adapted version of Bengtson and Roberts's model of intergenerational solidarity, this study used data from the National Survey of Midlife Development in the United States (MIDUS), with respondents (N = 3,485) ages 25 to 74, to examine the associations between multiple dimensions of family solidarity (affectual, normative, associational, functional, structural) and seven behaviors advocated to promote health. Although some results supported the hypotheses that family ties promote better health behaviors, particularly among men, a number of cases were found to have either no association or a problematic association with positive health behaviors.

Family Solidarity and Health Behaviors

Evidence From the National Survey of Midlife Development in the United States

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Positive health behaviors have a significant influence on physical and mental health (Berkman & Breslow, 1983; Kaplan, Seeman, Cohen, Knudsen, & Guralnik, 1987; Paffenbarger et al., 1994; Pinsky, Leaverton, & Stokes, 1987; Roos & Havens, 1991; Rowe & Kahn, 1987). Some scholars have even suggested that a sizeable portion of the morbidity and mortality typically associated with aging can be avoided through positive health behaviors (Albert, 1995; Rowe & Kahn, 1987). As the United States and the world "ages" (Myers, 1990), maintaining physical and mental functioning throughout the life course has become increasingly salient. Although most people older than age 65 report two or more chronic conditions (Ory & Cox, 1994), it has been projected that prevalence rates for chronic conditions at all ages will decline if primary and secondary

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health promotion programs grow into wider acceptance (Verbrugge, 1990).

Although the family is one of the primary factors in shaping and influencing individuals' health habits, attitudes, beliefs and behaviors (Doherty, 1993; Doherty & Campbell, 1988; Doherty & McCubbin, 1985), the specific ways that family fosters positive health behaviors among individual members is not clearly understood. Theory and empirical evidence suggest that family members may model positive health behaviors (Baranowski, 1997; Baranowski, Nadar, Dunn, & Vanderpool, 1982; Lau, Jacobs Quadrel, & Hartman, 1990; Sallis & Nadar, 1988) or act as sources of support during times of crisis or change, such as avoiding alcohol and caffeine during pregnancy (Aaronson, 1989), quitting smoking (Cohen et al., 1988; Schoenbach et al., 1992), or adoption of an exercise program (Sallis, Hovell, Hofstetter, & Barrington, 1992). Yet, the day-to-day structural, functional, and relational characteristics of families that encourage health behaviors in an ongoing fashion remain largely unexplored.

Social control has been hypothesized as one mechanism through which different aspects of family relationships (e.g., parental status, affectional closeness, obligation) influence participation in health behaviors (Umberson, 1987). Umberson's (1987, 1992) research has indicated that family ties of marriage and parenthood are associated with more positive health behaviors and fewer risk behaviors. Moreover, Umberson has found indirect indicators of family relationship quality (e.g., child living away from home, divorce) to be associated with health behaviors in both cross-sectional and longitudinal analyses. However, a more systematic examination of the association between multiple dimensions of family ties, including more direct assessments of family relationship quality, and health behaviors has not been previously undertaken.

Recognizing the important role of health behaviors in maintaining physical and emotional health throughout the life course and the important place the family holds in shaping individual health behavior, the overarching goal of this study was to use Umberson's social control theory to guide an investigation of the relationship between multiple dimensions of family solidarity (Bengtson & Roberts, 1991) and health behaviors using data from a recent national sample study of American adults. Additionally, because there is substantial evidence that social relations within families are gendered (Rossi & Rossi, 1990), we also examined gender differences in the relationships between family solidarity and health behavior.

BACKGROUND

HEALTH BEHAVIORS AND HEALTH

The lifestyle behaviors typically identified as having salutary effects on physical and mental well-being have been conceptualized as wellness maintenance activities and avoidance of risk behaviors (Vickers, Conway, & Hervig, 1990). The U.S. Public Health Service, in its *Healthy People 2000* initiative (Public Health Service, 1991), encouraged every adult to adopt a set of specific health behaviors to improve the health of the nation, including (a) the avoidance of tobacco use; (b) moderate consumption of alcohol; (c) controlled intake of calories, fat, salt and sugar; (d) participation in regular physical activity; (e) regular medical screening for major disorders such as high blood pressure, diabetes, and cancer; and (f) adherence to speed and seat belt laws.

Most research evidence confirms the importance of positive lifestyle behaviors for good health. Longitudinal data analyses from Alameda County suggested that adopting health behaviors had salutary effects on adults' physical health status (Belloc & Breslow, 1972), disability levels (Breslow & Breslow, 1993), and mortality (Belloc, 1973). Other researchers specifically investigating older adults have found positive effects of health behaviors on functional ability and well being (Kaplan et al., 1987), as well as greater longevity and reduced incidence of functional decline (Paffenbarger et al., 1994; Pinsky et al., 1987). Whereas several studies have demonstrated the salutary effects of health behaviors on a variety of health outcomes, others have found no significant relationships between health behaviors and health outcomes (Branch & Jette, 1984). These inconsistent results may be due to the use of different outcome measures. For example, Branch and Jette (1984) assessed shorter term mortality (i.e., 5-year all cause mortality), whereas other studies (e.g., Belloc, 1973; Belloc & Breslow, 1972; Breslow & Breslow, 1993) assessed mortality and disability after a longer period of time. These inconsistent findings suggest that the benefits of health behaviors may not be realized for several years.

SOCIAL CONTROL AND HEALTH BEHAVIORS

Social control theory suggests that family ties influence health behaviors through indirect and direct control mechanisms (Umberson, 1987). Indirectly, different aspects of family relationships (e.g., affectional closeness, feelings of obligation) are thought to influence the internaliza-

tion of norms for prosocial behavior, which in turn influence participation in various health behaviors (Umberson, 1987). In other words, positive family ties lead to a greater sense of responsibility for self and family; consequently, an individual is motivated to practice better health behaviors, in part, to perpetuate positive family relationships. Consequently, family ties may indirectly influence positive health behaviors by promoting or undermining various aspects of psychological well-being (Duncan & McAuley, 1993; Franks, Campbell, & Shields, 1992; Mechanic & Cleary, 1980).

Family members may also directly regulate another member's health behaviors through physical intervention (e.g., a spouse preparing specific meals; Shattuck, White, & Kristal, 1992), supportive behaviors (e.g., supporting exercise adoption; Sallis et al., 1992), or social sanctions (e.g., threatening to leave a marriage if excessive alcohol consumption persists; Orford, Oppenheimer, Egert, & Hensman, 1977). Indeed, a substantial body of research has demonstrated that the family, as a support network, serves an important role in shaping health behaviors (Aaronson, 1989; Cohen et al, 1988; O'Reilly, & Thomas, 1989; Potts, Hurwicz, Goldstein, & Berkanovic, 1992; Rakowski, Julius, Hickey, & Halter, 1987; Schoenbach et al., 1992; Zimmerman & Connor, 1989).

Strands of evidence suggest that gendered patterns of role socialization for men and women regarding family relationships, as well as gender differences in behavioral expectations for men and women help explain some of the variance in health and health behaviors between men and women (Simon, 1992; Verbrugge, 1990; Waldron, 1976). For example, married men's health behaviors are influenced more by their spouse than married women's health behaviors, whereas married women are more likely than married men to report that their lifestyle behaviors are influenced by parents and their children (Umberson, 1992). Similarly, recent research indicated that the pressure women feel to quit smoking comes primarily from their children, whereas men feel pressure from friends and coworkers to quit smoking (Royce, Corbett, Sorensen, & Ockene, 1997). These results suggest that it is important to consider gender differences in any assessment of how relationships within the family may exert different influences on the health behaviors of men and women.

CONCEPTUALIZING FAMILY RELATIONSHIPS

Like other social networks, families provide an opportunity for social integration by providing formal roles (e.g., spouse, parent), as well as opportunities for exchanging emotional, companionate, instrumental, and

functional assistance (Cohen & Wills, 1985). Unfortunately, most of the research examining the association between the family and an individual's participation in various health behaviors is limited by a narrow conceptualization or operationalization of family relationships. It is typical for much of the research in this area to examine the association between only one aspect of family relationships and health behaviors. For this research project, we adapted Bengtson and Roberts's (1991) model of intergenerational solidarity into a "family solidarity" model as a conceptual framework for operationalizing the multiple dimensions of family relationships. The intergenerational family solidarity model was originally developed to provide a taxonomy of intergenerational cohesion between parents and their children during the adult life course. Bengtson and Roberts's theoretical model posits six independent dimensions.

1. *Associational solidarity* encompasses patterns of interaction among family members, and includes measures of frequency of contact with family members.
2. *Affectual solidarity* captures the degree of positive (and negative) sentiment between family members.
3. *Functional solidarity* addresses the amount of helping and exchanges that occur between family members.
4. *Consensual solidarity* considers the level of agreement on values, attitudes, and beliefs among family members.
5. *Normative solidarity* includes the strength of internalized commitment or obligation to family roles and family members.
6. *Structural solidarity* refers to the structure and availability of family in terms of number of family members, the type of family, and the health of family members.

Bengtson and Roberts (1991) demonstrated that normative, affectual, and associational solidarity are related but independent dimensions of intergenerational relations. Their factor analytic work further suggested that endorsement of familial norms and obligations is associated with a more positive effect within the family ($r = .25$, $p \leq .001$) and more frequent contact among family members ($r = .24$, $p \leq .01$) (Bengtson & Roberts, 1991).

The multidimensional family solidarity model as a conceptual definition for family relationships helps address current limitations in the family and health behavior literature. Although the model is congruent with Cohen and Wills's (1985) well-cited multidimensional typology of social resources (emotional support, informational support, companionship support, and instrumental support), it also concurrently includes structural measures of family relationships (e.g., marital status), which have been

demonstrated to be salient predictors of health behaviors (Umberson, 1987), as well as other dimensions of relationship quality that are largely missing from the literature. Therefore, this differentiated model provides a much more expansive framework than is typically employed for examining which types of support are most salient in influencing an individual's health behaviors.

In summary, social control theory suggests that different aspects of family relationships influence an individual's participation in different health behaviors; unfortunately, most of the family and health behavior research includes limited and incomplete measurement of family relationships. Much of the research in this area is also limited to nonrepresentative samples making generalizations tenuous. Therefore, the primary aims of this study were to (a) extend previous research by systematically examining the associations between multiple dimensions of family relationships and multiple positive health behaviors among a nationally representative sample of adults, and (b) examine gender differences in the influence of family on health behaviors.

HYPOTHESES

The family provides a multidimensional, multilevel opportunity for social integration, which contributes to direct and indirect forms of social control that may influence participation in positive health behaviors. If we assume that individuals involved in positive relationships will internalize norms for prosocial behavior (Umberson, 1987), individuals with a higher level of affectual solidarity (i.e., more emotional support and less strain from family or spouse) should be more likely to participate in positive health behaviors. Similarly, individuals who have high levels of normative solidarity (i.e., perceive strong family obligations and strong commitment to family roles) and whose behavior suggests more associational and functional solidarity (i.e., more frequent contact with family and more giving of emotional, instrumental, and financial assistance) should be more likely to participate in advocated health behaviors. Finally, more structural solidarity evidenced by more formal family roles (e.g., being a spouse, being a parent) should be associated with a greater likelihood of participation in positive health behaviors. Building from Umberson's (1987) gender moderation hypothesis, we further expected that these family relationship factors would beneficially influence men's health behaviors more than women's health behaviors.

METHOD

DATA

The data used for this study came from the National Survey of Midlife Development in the United States (MIDUS) collected in 1995. This survey was conducted by the John D. and Catherine T. MacArthur Foundation Network on Successful Midlife Development. The original purpose of the MIDUS was to examine patterns, predictors, and consequences of midlife development in the areas of physical health, psychological well-being, and social responsibility. MIDUS respondents are a nationally representative general U.S. population sample of noninstitutionalized persons age 25 to 74, who have telephones. The sample was obtained through random digit dialing, with an oversampling of older respondents and men made to guarantee a good distribution on the cross-classification of age and gender (N = 3,032; N = 1,318 for men; N = 1,714 for women). Sampling weights correcting for selection probabilities and nonresponse allow this sample to match the composition of the U.S. population on age, sex, race, and education.

MIDUS respondents first participated in a telephone interview that lasted approximately 40 minutes. The response rate for the telephone questionnaire was 70%. Respondents to the telephone survey were then asked to complete two self-administered mail-back questionnaires. The response rate for the mail-back questionnaire was 86.8%. This yielded an overall response rate of 60.8% (i.e., $.70 \times .868$) for both parts of the survey.

MEASURES

Consistent with various reports from Alameda County's Human Population Laboratory indicating that participation in multiple health behaviors promotes more healthy outcomes, the health behavior literature is replete with research using summed scales of health behaviors. However, considerable research suggests that health behaviors are not second-order unidimensional (Langlie, 1977; Vickers et al., 1990) and that different health behaviors, at best, are only modestly correlated (Blair, Jacobs, & Powell, 1985; Glik, Kronenfeld, & Jackson, 1996; Mechanic & Cleary, 1980; Rakowski et al., 1987; Sallis et al., 1989; Weiss, Larsen, & Baker, 1996). Because health behaviors are related but distinct outcomes, we operationalized health behaviors as distinct outcomes.

Dependent Variables: Health Behaviors

Healthy body mass index (BMI). BMI is a common proxy for assessing an individual's dietary patterns (Kaplan et al., 1987; Paffenbarger et al., 1994). BMI was calculated from respondent self-reports of their height and weight (BMI = [height in inches $\times$ .4536] / [weight in pounds $\times$ .0254]^2). Respondents whose BMI exceeded 26 (the conventional cut-off point for obesity) were coded 0, whereas those whose BMI was less than 26 were coded 1.

Vigorous *exercise* was measured using two questions. Respondents were asked, "During the summer, how often do you engage in vigorous physical activity (e.g., running or lifting heavy objects) long enough to work up a sweat?" Response categories were "several times a week or more," "about once a week," "several times a month," "about once a month," "less than once a month," or "never." The same question was then asked again with reference to winter. Because maintaining physical fitness generally is considered to consist of at least three or more vigorous exercise sessions a week (American College of Sports Medicine, 1990), we coded respondents who reported several times a week to both questions as 1; others were coded 0. See Table 1 for descriptive statistics for all analysis variables.

Moderate *activity* also was assessed with two questions. Respondents were asked, "During the summer, how often do you engage in moderate physical activity (e.g., bowling or using the vacuum cleaner)?" Again, the same question was then asked with reference to winter. Responses and coding were the same as for vigorous exercise.

Checkup was measured with the question, "In the past 12 months, how many times did you visit a doctor, hospital, or clinic for a routine physical checkup or gynecological exam?" A subject's response was coded 1 if the respondent had one or more checkups in the past year, 0 if otherwise.

To measure "appropriate use of medications," respondents were asked five questions pertaining to their use of drugs or medications without a doctor's prescription, in larger amounts than prescribed, or for longer periods than prescribed. The drugs asked about included sedatives, sleeping pills, tranquilizers, amphetamines, analgesics or other prescription pain killers, and Prozac or other antidepressants. Respondents were coded 1 if they responded "no" to all "unadvised" use of drugs or medication, and were coded 0 otherwise.

TABLE 1
Descriptive Statistics for Analysis Variables

	Total			*Women*		*Men*	
	Mean	SD	*Range*	*Mean*	SD	*Mean*	SD
Health behaviors							
Healthy body mass index	0.51	0.50	0-1	0.56	0.50	0.46	0.50
Exercise	0.25	0.43	0-1	0.17	0.38	0.36	0.48
Active	0.48	0.50	0-1	0.46	0.50	0.50	0.50
Checkup	0.70	0.46	0-1	0.79	0.41	0.58	0.49
Appropriate use of medications	0.90	0.30	0-1	0.90	0.30	0.89	0.31
Nonsmoker	0.76	0.43	0-1	0.76	0.42	0.75	0.44
No alcohol problems	0.86	0.35	0-1	0.91	0.29	0.80	0.40
Affectual solidarity							
Family affectual	3.13	0.53	1-4	3.11	0.55	3.15	0.51
Spouse affectual	3.14	0.56	1-4	3.07	0.61	3.22	0.50
Normative solidarity							
Obligation to family	8.16	1.70	0-10	8.41	1.61	7.84	1.75
Associational solidarity							
Contact with family	5.89	1.57	1-8	6.11	1.48	5.60	1.64
Functional solidarity							
Emotional exchange	20.99	27.43	0-202	23.45	30.31	17.77	22.71
Give instrumental assistance	4.69	9.70	0-75.50	5.30	10.55	3.88	8.41
Receive instrumental assistance	2.39	7.24	0-75.50	2.78	8.18	1.87	5.74
Give financial (tens of dollars)	2.09	5.35	0-50.05	1.91	4.86	2.34	5.92
Receive financial (tens of dollars)	0.31	1.31	0-11.70	0.25	1.06	0.39	1.57
Structural solidarity							
First marriage	0.52	0.50	0-1	0.49	0.50	0.56	0.50
Remarried	0.16	0.37	0-1	0.15	0.36	0.18	0.38
Never married	0.12	0.32	0-1	0.11	0.31	0.12	0.33
Formerly married	0.14	0.35	0-1	0.17	0.38	0.10	0.30
Has child(ren)	0.83	0.37	0-1	0.86	0.35	0.80	0.40
Individual characteristics							
Age	45.30	13.48	25-74	45.49	13.69	45.05	13.20
Education	2.58	0.98	1-4	2.52	0.96	2.67	1.01
Gender (female = 1)	0.57	0.50	0-1				
Race/ethnicity (Black = 1)	0.11	0.32	0-1	0.13	0.33	0.10	0.30
Household income	39,254	36,172	0-300,000	35,336	33,739	44,353	38,533
Self-rated health	3.41	1.00	1-5	3.37	1.02	3.46	0.97

SOURCE: National Survey of Midlife Development in the United States 1995 (MIDUS).
NOTE: Descriptives based on weighted data.

Nonsmoker status was determined using responses to a question about the respondent's current smoking status: current nonsmoker was coded 1, current smoker was coded 0.

"No alcohol problems" was assessed with a five-item modified version of the Michigan Alcohol Screening Test (MAST) (Selzer, 1971). Specifically, the questions asked during the past 12 months were (a) "Were you ever, under the effects of alcohol or feeling its after-effects in a situation that increased your chances of getting hurt—such as when driving a car or boat, or using knives or guns or machinery?" (b) "Did you ever have any emotional or psychological problems from using alcohol—such as feeling depressed, being suspicious of people, or having strange ideas?" (c) "Did you ever have such a strong desire or urge to use alcohol that you could not resist it or could not think of anything else?" (d) "Did you have a period of a month or more when you spent a great deal of time using alcohol or getting over its effects?" (e) "Did you ever find that you had to use more alcohol than usual to get the same effect or that the same amount had less effect on you than before?" Respondents answered "yes" (coded 1) or "no" (coded 0) to each of these questions. The responses were summed (Cronbach's alpha = .68) and then dichotomized (no alcohol problems coded 1, otherwise 0).

Independent Variables: Family Solidarity

Family affectual solidarity was constructed by summing responses to the following eight questions: (a) "Not including your spouse or partner, how much do members of your family really care about you?" (b) "How much do they understand the way you feel about things?" (c) "How much can you rely on them for help if you have a serious problem?" (d) "How much can you open up to them if you need to talk about your worries?" (e) "Not including your spouse or partner, how often do members of your family make too many demands on you?" (f) "How often do they criticize you?" (g) "How often do they let you down when you are counting on them?" (h) "How often do they get on your nerves?" Response categories for all items were 1= never or not at all, 2 = a little or rarely, 3 = some or sometimes, and 4 = a lot or often; Items 5 through 8 were reverse coded. Cronbach's alpha for family affectual solidarity was .83.

Spouse affectual solidarity was assessed by summing the responses to the following questions: (a) "How much does your spouse or partner really care about you?" (b) "How much does he or she understand the way you feel about things?" (c) "How much does he or she appreciate you?" (d) "How much can you rely on him or her for help if you have a serious

problem?" (e) "How much can you open up to him or her if you need to talk about your worries?" (f) "How much can you relax and be yourself around him or her?" (g) "How often does your spouse or partner make too many demands on you?" (h) "How often does he or she make you feel tense?" (i) "How often does he or she argue with you?" (j) "How often does he or she criticize you?" (k) "How often does he or she let you down when you are counting on him or her?" (l) "How often does he or she get on your nerves?" Response categories were 1 = not at all, 2 = a little, 3 = some, and 4 = a lot, with Items 7 through 12 reverse coded. Cronbach's alpha was .92.

Normative solidarity was assessed with a strength of obligation to family index, which was constructed by summing respondents' answers (rated on a 10-point scale) to four questions. Specifically, the items asked, "How much obligation would you feel (a) to drop your plans when your children seem very troubled; (b) to call, write, or visit your adult children on a regular basis; (c) to drop your plans when your spouse seems very troubled; and (d) to take your divorced or unemployed adult child back into your home?" Cronbach's alpha for this index was .79.

To assess associational solidarity, respondents answered a single question regarding contact with the family, "How often are you in contact with any members of your family, that is, any of your brothers, sisters, parents or children who do not live with you, including visits, phone calls, letters or electronic-mail messages?" Responses included 8 = several times a day, 7 = about once a day, 6 = several times a week, 5 = about once a week, 4 = two or three times a month, 3 = about once a month, 2 = less than once a month, or 1 = never or hardly ever.

Five scales of functional solidarity were created: exchange emotional support, give instrumental assistance, receive instrumental assistance, give financial assistance, and receive financial assistance. Emotional support given was based on summing respondents' reports to four questions that asked the number of hours of emotional support the respondent gave to each of the following family members: (a) spouse, (b) parents, (c) in-laws, and (d) children or grandchildren. Receipt of emotional support was constructed from four similar questions asking the number of hours of emotional support the respondent received from the same list of family members. The correlation between these two indexes was very high (r = .87); therefore, all eight items were summed to create the "exchange of emotional support" measure. The "give instrumental support" measure was constructed from summing answers to three questions that asked the respondent to report the number of hours per month the respondent gave instrumental assistance to his or her (a) parents, (b) in-laws, and (c) chil-

dren or grandchildren. Receipt of instrumental assistance was constructed from adding up responses to three similar questions regarding the number of hours they received instrumental assistance from their parents, their in-laws, and their children or grandchildren. Finally, the "give financial assistance" and "receive financial assistance" measures were constructed from six questions that asked a respondent to indicate the number of dollars per month he or she gave to and received from (a) parents, (b) in-laws, and (c) children or grandchildren. Answers were coded in tens of dollars.

Several respondents indicated 720 hours per month of support (i.e., the maximum number of hours available per month). To help "rein in" these outliers, hours of emotional assistance and hours of instrumental assistance were truncated at 101 hours per month for each family grouping (i.e., children, in-laws, parents). Outliers in financial assistance were truncated by top-coding financial exchanges with parents and in-laws to $300 a month, financial assistance to children or grandchildren to $1,000 a month, and financial assistance from children or grandchildren to $100 a month.

Our analysis included two measures of structural solidarity. Some scholars suggest that the traditional dichotomous classification of married versus not married is too general (e.g., Tucker, Friedman, Wingard, & Schwartz, 1996) to fully understand marital status contrasts; therefore, we created four marital status categories in which first-marriage respondents were contrasted with, remarried, formerly married (including separated, divorced, and widowed), and never-married respondents. The second measure was parental status (has biological or adoptive child(ren) coded 1, otherwise coded 0).

Individual characteristics. Because health behaviors are known to vary across several demographic characteristics (Berkman & Breslow, 1983; Schoenborn, 1986), all analyses also controlled for potentially confounding associations with age, education (1 = less than high school diploma, 2 = high school or GED, 3 = some college, and 4 = college graduate), gender (female = 1), race/ethnicity (African American coded 1, otherwise coded 0), household income, and perceived health status (1 = excellent, 2 = very good, 3 = good, 4 = fair, and 5 = poor).

MISSING DATA

To retain as many cases as possible in the multivariate analyses, if a respondent answered more than half of the items composing an index (e.g., family affectual solidarity, spouse affectual solidarity, normative solidar-

ity, emotional exchange with family), the mean of the valid responses for the respondent was used for the index value. If the respondent answered less than half of the items for the index, the index value for that respondent was coded as missing. Missing (indicator variables) were then created for independent variables with missing data and included in all analyses.

ANALYTIC SEQUENCE

Multivariate logistic regression models were estimated for all of the outcomes using unweighted data. Initially, both men and women were included in models that examined the effects of gender, the multiple dimensions of family solidarity, Gender × Family Solidarity interactions, and the individual characteristic control variables. Because significant Gender × Family Solidarity interactions were in evidence for each outcome, additional models were estimated, which examined the pattern of effects for men and women separately. For easier substantive interpretation, we report the odds ratio estimates (i.e., exponentiated logit coefficients) for each of the predictor variables.

RESULTS

AFFECTUAL SOLIDARITY AND HEALTH BEHAVIORS

Table 2 reports odds ratio estimates for the effects of gender and family solidarity on each health behavior outcome, adjusting also for age, race, education, household income, and health status. The results reported in the table indicate that affectual solidarity was associated (at least at a trend level) with five of the seven health behaviors explored here. Family affectual solidarity and spouse affectual solidarity were each associated with four health behavior outcomes. For family affectual solidarity, the most robust findings suggest that a higher level of emotional closeness with family members was associated with greater odds of following a physician's recommendations for prescription drug use among women and men. Specifically, for every unit increase in the amount of family affectual solidarity, the odds of following a prescription increased by a factor of 56% among women and by a factor of 77% among men. A higher level of family affectual solidarity was also associated with a greater likelihood of reporting no alcohol-related problems among women. A trend level ($p \leq .10$) significant Gender × Family affectual solidarity interaction in pre-

TABLE 2
Odds Ratio Estimates for the Effects of Family Solidarity on Health Behavior

	Healthy Body Mass Index		*Exercise*		*Activity*	
Predictors	*Women*	*Men*	*Women*	*Men*	*Women*	*Men*
Affectual solidarity						
Family affectual	1.14	1.14	0.87	1.12	0.94 [a]	1.15 [a]
Spouse affectual	1.13	1.04	1.26 [*]	1.06	1.15	1.07
Normative solidarity						
Obligation to family	1.02	0.99	0.93 [*c]	1.07 [**c]	1.04 [a]	1.12 [***a]
Associational solidarity						
Contact with family	1.00	1.00	1.00	1.01 [**]	1.00	1.00
Functional solidarity						
Emotional exchange	0.99 [**]	1.00	1.01*	1.00	1.00	1.00
Give instrumental assistance	1.00	1.00	1.00	1.00	1.00	0.98 [**]
Receive instrumental assistance	1.00	1.02	1.01	1.00	1.00	1.01
Give financial (tens of dollars)	1.00 [a]	0.98 [**a]	0.99 [b]	1.01 [*b]	0.99	1.02 [**]
Receive financial (tens of dollars)	0.93 [*b]	0.98 [b]	1.04 [b]	0.98 [b]	1.06	0.98
Structural solidarity						
First marriage (omitted)	1.00	1.00	1.00	1.00	1.00	1.00
Remarried	1.40 [**b]	0.96 [b]	0.87	0.99	1.11	1.04
Never married	0.76	1.88 [***]	0.85 [*]	0.76 [*]	0.88	0.62 [**]
Formerly married	1.00	1.57 [**]	1.35 [*]	1.42 [*]	0.97	1.10
Has child(ren)	0.88 [a]	1.03 [a]	0.65 [**]	0.83	1.30 [*]	0.75 [*]
Log-likelihood	1,789.43	1,788.67	1,288.10	1,716.43	1,909.62	1,850.48
df	1,393	1,330	1,469	1,380	1,468	1,379

	Checkup		*Appropriate Use of Medication*		*Nonsmoker*	
Predictors	*Women*	*Men*	*Women*	*Men*	*Women*	*Men*
Affectual solidarity						
Family affectual	1.24 [*]	1.16	1.56 [***]	1.77 [****]	0.82 [*a]	1.23
Spouse affectual	1.16	1.09	1.08	1.32 [*]	1.21 [*]	1.25
Normative solidarity						
Obligation to family	1.10 [***]	1.03	1.05	1.06	0.95 [*]	0.91
Associational solidarity						
Contact with family	1.01 [*]	1.01	0.99 [**]	1.01	1.00	1.02
Functional solidarity						
Emotional exchange	1.00 [a]	1.00 [a]	1.00	0.99	0.99 [*]	0.99
Give instrumental assistance	1.00	1.00	1.01	1.03 [*]	1.00	0.99
Receive instrumental assistance	1.00	1.04 [**]	1.00 [a]	1.05 [*a]	1.01 [*]	1.01

TABLE 2 Continued

Predictors	Checkup		Appropriate Use of Medication		Nonsmoker	
	Women	*Men*	*Women*	*Men*	*Women*	*Men*
Give financial (tens of dollars)	0.98 **	1.03 ***	0.98 **	0.98	0.97 **	0.99
Receive financial (tens of dollars)	0.99	1.05	0.87 ***	0.92 **	1.06	0.98
Structural solidarity						
First marriage (omitted)	1.00	1.00	1.00	1.00	1.00	1.00
Remarried	1.19	1.19	0.96	0.80	0.47 ***b	0.73
Never married	0.55 **	0.57 **	2.11	0.79	0.87 b	1.05
Formerly married	0.75 *	0.61 **	1.01 b	0.97 b	1.06 c	0.85
Has child(ren)	0.82 a	0.60 ***a	1.13	1.45 *	0.90 b	0.53
Log-likelihood	1,420.93	1,710.33	850.84	843.20	1,447.76	1,358.36
df	1,444	1,343	1,460	1,376	1,473	1,382

Predictors	No Alcohol Problems	
	Women	*Men*
Affectual solidarity		
Family affectual	1.36 **	1.10
Spouse affectual	1.59 ***	1.54 ***
Normative solidarity		
Obligation to family	1.05	1.06 *
Associational solidarity		
Contact with family	1.00	1.01
Functional solidarity		
Emotional exchange	1.00 b	1.01 **b
Give instrumental assistance	1.00	1.02
Receive instrumental assistance	1.00	0.98
Give financial (tens of dollars)	0.99 b	0.99 b
Receive financial (tens of dollars)	1.00	0.98
Structural solidarity		
First marriage (omitted)	1.00	1.00
Remarried	0.98	0.64 **
Never married	0.80 a	1.30 a
Formerly married	0.85 a	0.85 a
Has child(ren)	1.51 *a	1.70 ***a
Log-likelihood	782.14	1,275.50
df	1,453	1,370

SOURCE: National Survey of Midlife Development in the United States 1995 (MIDUS).
NOTE: Models also controlled for age, race/ethnicity, education, household income, and perceived health status.
a. A trend level ($p \leq .10$) gender interaction effect was revealed in combined gender model.
b. A significant ($p \leq .05$) gender interaction effect was revealed in combined gender model.
c. A significant ($p \leq .01$) gender interaction effect was revealed in combined gender model.
*$p \leq .10$. **$p \leq .05$. ***$p \leq .01$. ****$p \leq .001$. All one-tailed tests.

liminary analysis suggested that the association between family affectual solidarity and nonsmoking status might be different for women in contrast to men. Gender separate analyses indicated that at a trend level, a higher level of family affectual solidarity was associated with lower odds of being a nonsmoker among women but higher odds of nonsmoking among men. Results also suggested that a higher level of family affectual solidarity might be associated with a greater likelihood of reporting a preventive checkup in the past year among women ($p \leq .10$).

Results examining the net effects of spouse affectual solidarity on different health behaviors yielded only one robust association: Among both women and men, the odds of reporting an absence of alcohol-related problems increased by more than 50% for each unit increase in the amount of emotional closeness with a spouse or partner. Trend effects also indicated that spouse affectual solidarity might promote the odds of vigorous exercise and nonsmoking among women and increase the likelihood of appropriate use of medications and nonsmoking among men. Taken together, these results estimating the association between affectual solidarity and health behaviors, net of the effects for other dimensions of family relations, provide partial support for the social control hypothesis, which suggests that stronger family ties promote more positive health behaviors. Only in the case of smoking was there evidence for the gender moderation hypothesis anticipating that family relationships would benefit men's health behaviors more than that of women's.

NORMATIVE SOLIDARITY AND HEALTH BEHAVIORS

Five of our health outcome measures were found to be beneficially influenced by perceived obligation to family (i.e., normative solidarity). Gender interaction effects found in the combined-gender preliminary analysis for both vigorous exercise and moderate activity further suggested that perceptions of family obligation benefit men's physical activity habits more than women's. Gender separate analyses indicated that a higher level of normative solidarity might be associated with decreased odds of engaging in regular vigorous exercise among women ($p \leq .10$); however, for men, a greater sense of family obligation was associated with a greater likelihood of participating in regular exercise. Similarly, a higher level of normative solidarity was found to be associated with a greater likelihood of engaging in moderate intensity activity among men; whereas among women, the association between normative solidarity and moderate activity was not significant. A greater feeling of family obliga-

tion was associated with greater odds of reporting an absence of alcohol-related problems among men (trend level). The most robust finding for women indicated that for every unit increase in the amount of normative solidarity, the odds of participating in annual preventive exam within the past year increased by a factor of 10%. Contrary to hypotheses, however, a higher level of normative solidarity was associated with decreased odds of being a nonsmoker among women ($p \leq .10$) and men ($p \leq .05$).

In sum, results from these analyses estimating the association between normative solidarity and health behaviors provide mixed support for the research hypotheses. Consistent with our hypotheses, the evidence indicates that a higher level of perceived family obligation is associated with a greater likelihood of several health behaviors, particularly among men; yet, contrary to the hypothesis, greater normative solidarity was also found to be associated with a greater likelihood of being a smoker and possibly less vigorous exercise among women.

ASSOCIATIONAL SOLIDARITY AND HEALTH BEHAVIORS

More contact with family members was found to be associated with greater odds of participating in regular vigorous exercise and greater odds of being a nonsmoker among men. Among women, more contact with family was found to be associated with greater odds of reporting a preventive exam within the past year (trend level) but lower odds of following a physician's advice for medications. Therefore, there was only partial support again for the social control hypothesis, anticipating that greater association with family would promote better health behaviors. There was not clear support for the hypothesis of gender differences in the effects of associational solidarity.

FUNCTIONAL SOLIDARITY AND HEALTH BEHAVIORS

Preliminary analysis of models combining both men and women indicated a significant gender interaction effect for the association between emotional exchange with family and absence of alcohol-related problems. Subsequent gender separate analysis reported in Table 2 revealed that for each additional hour of emotional exchange (i.e., getting or receiving), the odds of reporting no alcohol-related problems increased by 1%. Although significant gender interaction effects were not observed in the combined gender model, separate analyses by gender provided evidence suggesting that increased emotional exchange with the family is associated with a less

healthy weight among women. Yet, at the same time, a trend level effect indicated that more emotional exchange was associated with more vigorous exercise among women. Finally, trend level effects suggested that more emotional exchanges with family members might be associated with lower odds of being a nonsmoker among both women and men.

No significant gender differences in the effects of giving instrumental support were found in the preliminary analysis, but the estimates from the gender separate models suggested that for each additional hour giving instrumental assistance to family members, the odds of men participating in moderate activity decreased by a factor of 2%, but the odds of following the physician's recommendations on prescription medications increased by a factor of 3% (trend level effect). These results suggest that the provision of instrumental assistance may infringe on men's free time, thereby undermining their ability to participate in activity; however, their responsibility to others promotes more appropriate use of medications. Our analysis did not yield strong evidence for an association between provision of instrumental assistance and health behavior outcomes for women.

The receipt of instrumental assistance was associated with greater odds of participating in an annual preventive exam and following a physician's advice for medications among men; for women, receipt of instrumental assistance from family was only associated at a trend level with greater odds of nonsmoking.

Both beneficial and negative effects on health behaviors were found to be associated with giving financial assistance to family members. In the combined gender model, we found a significant interaction effect suggesting that gender moderates the association between giving financial assistance and regular vigorous exercise. Gender separate estimates indicated that giving more financial support to family was associated with a greater likelihood of participating in regular vigorous exercise among men; for women, giving financial assistance to family was not a significant predictor of exercise. Other gender separate analyses indicated that men's positive health behaviors are generally associated with giving financial resources. For example, for every additional 10 dollars of financial giving, the odds of engaging in moderate activity and participating in an annual exam increased by a factor of 2% and 3%, respectively. Interestingly, although more financial giving was associated with more physical activity among men, it was also associated with lower odds of reporting a healthy BMI. Among women, giving financial assistance was consistently associated with lower odds of different health behaviors. Specifically, for every additional 10 dollars given to family, the odds of participating in a regular

preventive exam, following a prescription, and being a nonsmoker decreased among women.

In terms of receiving financial assistance from family members, a significant gender difference was found in the preliminary analysis that included both men and women together to examine gender by family solidarity interaction effects. Gender separate analyses indicated that the more financial assistance a woman received from family, the lower the odds of reporting a healthy BMI (trend level); for men, receipt of financial assistance was not associated with this outcome. Receipt of financial assistance from family members was also found to be associated with lower odds of appropriate use of prescription medications among both women and men. For each additional 10 dollars received, the odds of using prescription medications appropriately decreased by a factor of 13% among women, and it decreased by a factor of 8% among men. Taken together, these results estimating the associations between multiple dimensions of functional exchange among family members and health behaviors provide only modest support for the hypothesis, suggesting that family social exchange promotes more participation in health behaviors. In fact, receiving financial assistance appears to be associated with several negative outcomes. However, these results do provide relatively consistent evidence, suggesting that men's health behaviors in particular benefit from functional exchanges in family relationships.

STRUCTURAL SOLIDARITY AND HEALTH BEHAVIORS

Several significant gender interaction effects were revealed in the combined gender model suggesting that gender moderated the relationship between marital status and health behavior. Overall, individuals in their first marriage demonstrated more participation in better health behaviors, in contrast to the nonmarried and remarried participants. Our results indicated that being remarried was associated with lower odds of being a nonsmoker, particularly among women, whereas being remarried was associated with lower odds of reporting an absence of alcohol-related problems among men. Being unmarried was found to be associated with lower odds of participating in a preventive exam in the past year among women and men, whereas being unmarried was also associated with lower odds of being moderately active three or more times each week among men. Interestingly, although several Gender $\times$ Marital Status interactions were in evidence in preliminary analyses, marital status indicators were oftentimes not found to be significantly associated with different health behaviors

among women or men when analyses were done separately for men and women.

In general, although first marriage was found to be the most beneficial marital status for health behaviors, some exceptions were noted. The only result contradicting the gender moderation hypothesis occurred for the healthy body weight outcome. Specifically, gender separate analyses indicated that the odds of having a healthy weight were greater for remarried women than for first-marriage women, whereas among men, there was not a statistical difference in the body mass reports of remarried men in contrast to first-marriage men. Among men, being never married increased the odds of reporting healthy body weight by 88%, and being formerly married increased the odds of reporting healthy body weight by 57%, in contrast to first-marriage men. Similarly, being formerly married was associated with greater odds of regular vigorous exercise among both women and men (trend level). Collectively, these results estimating the association between marital status and health behaviors provide mixed support for the social control hypothesis, suggesting that greater social integration through marital roles promotes better health behaviors.

Interestingly, among women, being a parent was associated with lower odds of being vigorously active three or more times each week, but mothers were more likely to be moderately active (trend level) and report an absence of alcohol-related problems (trend level) in contrast to women without children. Among men, being a father was associated with lower odds of being moderately active (trend level), lower odds of participating in a preventive exam in the past year, and lower odds of being a nonsmoker, in contrast to men without children. However, having children was associated with greater odds of using prescription medications appropriately (trend level) and greater odds of reporting an absence of alcohol-related problems among men. Specifically, fathers were found to be 70% more likely to report an absence of alcohol-related problems in contrast to men without children.

DISCUSSION

The results of this study of the association between several dimensions of family solidarity and health behaviors indicate that this relationship is complex. Some dimensions of family solidarity have positive effects on some health behaviors and negative effects on others. Of the most robust associations (i.e., significant at the $p \leq .05$ level), 20 were consistent with

the social control hypothesis, whereas 13 contradicted the hypothesis that greater family ties would be associated with more positive health behaviors. Moreover, the effects of family solidarity on health behaviors in a number of cases were different for women and men. Consistent with the gender moderation hypothesis, 10 of the 13 most robust gender interactions suggested that men's health behaviors, even more than women's health behaviors, were positively influenced by family solidarity. Additionally, gender separate models in five cases indicated that men's health behaviors were beneficially associated with different aspects of family relationships, in which women's health behaviors were not.

The large number of significant associations that ran counter to our hypothesis, suggesting that different aspects of family solidarity were associated with less participation in different health behaviors among women or men, is one of the most important findings of this analysis. In contrast to what social control theory might predict, greater family solidarity does not always lead to better health behaviors. For example, our analyses indicated that among men, higher levels of perceived obligation to family undermined nonsmoking and provision of financial resources to family members was associated with lower odds of being healthy body weight. Among women, giving financial assistance was associated with more smoking and problematic medication use. Most surprising were the results indicating that for men, having children was associated with decreased odds of being a nonsmoker and having an annual checkup. Although these results are consistent with other work suggesting that social relationships can have costs as well as benefits (Burg & Seeman, 1994; Rook, 1984), they are inconsistent with Umberson's (1987) conclusions that having children (particularly in the home) promote more positive health behaviors.

Interestingly, the counterhypothesis findings have a common thread; most of the associations in this study that ran counter to the social control hypothesis reflected risk behaviors (e.g., inappropriate use of medications, smoking, and unhealthy BMI). These results begin to suggest that apart from the direct and indirect social control mechanisms, family interactions may influence health behaviors in other ways. For example, our findings indicating that giving more instrumental assistance is associated with less moderate activity among men and that high levels of perceived obligation to family is associated with more smoking among women is consistent with other research indicating that caregiving is associated with fewer positive health behaviors and more risk behaviors (Connell, 1994). Consequently, it may be important to consider contextual factors (e.g.,

family members' health status, family members' health behaviors) that may moderate the association between family ties and health behaviors.

These more fine-grained results also highlight the importance of looking at the unique associations between family relationships and different health behaviors. For example, our results examining an alcohol-related outcome were similar to Umberson's (1987) results —that is, having children was associated with more healthy use of alcohol. However, this result cannot be generalized to all other health risk behaviors because our results suggest that having a child is also associated with decreased odds of being a nonsmoker among men. In short, these analyses indicate that each health behavior, regardless of similarities (e.g., vigorous vs. moderate activity), may have unique predictors and correlates.

Another interesting finding from this analysis is the distribution of associations among the various dimensions of family solidarity. Other scholars have already noted the generally salutary effects of marital and parental status on health behaviors (Ross, Mirowsky, & Goldsteen, 1990; Umberson, 1987); therefore, we were not surprised to find structural measures of family solidarity associated with a variety of health behaviors. What is newer to the literature, however, is our finding of several positive associations between perceived obligation toward family members and health behaviors, particularly among men. Perceived family obligation might be conceptualized in terms of burden; however, our results indicate that perceived levels of obligation may actually promote men's moderate activity, vigorous exercise, and appropriate use of alcohol, as well as women's participation in regular preventive exams. As with all analyses of self-reported data, however, these findings may be biased by social desirability; that is, because the respondents answered hypothetical questions, the results may be skewed to conform with social expectations.

Using cross-sectional data, we cannot be sure about the direction of causality in all of the associations discussed here (e.g., does providing instrumental assistance lead to decreased time for moderate activity for men, or does reduced participation in moderate activity lead to more time to provide instrumental assistance?). Does receiving financial assistance from family lead to feelings that provoke the misuse of medications for women, or does the misuse of medications and its sequelae lead to the need to receive financial assistance from family? It will take longitudinal research to more conclusively answer these questions. Finally, another limitation of this study is the possibility that other unmeasured factors may yet account for the associations between family solidarity and health behaviors.

In sum, this analysis suggests that higher levels of family solidarity are associated with a higher likelihood of engaging in positive health behaviors, especially among men. However, because of the mixed results we found, it is important for future research in this area to further evaluate different dimensions of family relationships, consider the potential for different predictors for different health behavior outcomes, and remain attentive to gender differences to most accurately specify and understand the ways family influences health behaviors and health.

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