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The Effects of Volunteering on the Physical and Mental Health of Older People

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The purpose of this study is to build on the growing body of literature examining the correlations between volunteering and health among older persons. Longitudinal data from the 1993 and 2000 panels of the Asset and Health Dynamics Among the Oldest Old Study (AHEAD) were used to measure health and mental health outcomes of people over age 70 who volunteered at least 100 hours in 1993. The findings provide empirical support to earlier claims that volunteering slows the decline in self-reported health and functioning levels, slows the increase in depression levels, and improves mortality rates for those who volunteer. However, volunteering had no effect on the number of physician-diagnosed health conditions or nursing home residence rates. The findings provide support for the concept of role enhancement.

Keywords: *older volunteers; health; mental health; medical conditions; physical functioning*

Volunteering by older people is often seen as a cornerstone to productive aging, as volunteering helps provide a service that has an economic and/or social value. Many public and private initiatives encourage older people to remain involved in productive activities such as volunteering. There are frequent claims by these initiatives, as well as by the popular press, that formal volunteering not only provides a valuable service to the community but also actually improves mental and physical health, and perhaps even affects longevity (Chambre 1993; Kovacs and Black 1999). Social scientists have often explained the relationship between volunteering and health using the concept of role enhancement, which is contained within the broader framework of role theory. Role enhancement suggests that by involving oneself in

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a productive role, such as volunteering, an older person will have more resources, a larger social network, more power, and more prestige (Moen, Dempster-McClain, and Williams 1992), and this in turn leads to better physical and mental health.

The volume of literature on the association between volunteering and health has increased rapidly in the last decade. Earlier studies, typically using cross-sectional designs and/or nonrepresentative data, showed positive correlations between volunteering and physical and mental health (Ager 1986; Morrow-Howell, Kinnevy, and Mann 1999; Wheeler, Gorey, and Breenblatt 1998). However, these studies were not able to establish the direction of the relationship between volunteering and physical and mental health and may not be generalizable to the entire population. More recently, there have been a number of longitudinal studies of this relationship, which have helped to determine the direction of this relationship (Luoh and Herzog 2002; Moen et al. 1992; Morrow-Howell et al. 2003; Musick, Herzog, and House 1999; Musick and Wilson 2003; Thoits and Hewitt 2001; Van Willigen 2000). These studies are more advanced, yet they have been limited by the data set used and their reliance primarily on perceived health measures.

Using seven-year longitudinal data between 1993 and 2000 from the Asset and Health Dynamics Among the Oldest Old Study (AHEAD), this study examines the relationship between formal volunteering by older people and their subsequent physical and mental health over time. This study looks at the relationship between volunteering by those over age 70 and their self-reported health, depression levels, functioning levels, mortality rate, nursing home residence rate, and the number of physician-diagnosed medical conditions. Compared with the existing longitudinal studies, this study uses a much larger national representative sample of older people that also has a much lower attrition rate and also includes more objective health measures.

Background

Research on volunteerism among older persons has focused primarily on general trends of volunteerism, demographics of older volunteers, and motivations of older people to volunteer (Kuehne and

Sears 1993; O'Reilly and Caro 1994; Putnam 2000; Rouse and Clawson 1992). This interest in volunteering coincides with a general increase of volunteerism among older people, with increasing percentages of older people volunteering during the past 30 years (Chambre 1993). U.S. Census Bureau (2002) statistics show that 41.4% of people aged 65 to 74 and 39.0% of people age 75 and older volunteered in the 12 months before the survey. Demographic studies have found that although volunteering increases with age through middle adulthood (Janoski and Wilson 1995), the rate of volunteering peaks when individuals reach their late 60s and then begins to taper off (Kim and Hong 1998). There is some evidence that this is a generational phenomenon, and we may see different volunteerism rates among future generations (Putnam 2000). Volunteers are more likely to have higher education levels (Chambre 1993), to be native-born Americans (Chambre 1993), and to have higher incomes (Wilson and Musick 1997).

The assumption underlying much of the research on volunteering is that volunteering is beneficial to older people. Indeed, there has been a great deal of research on the correlation between volunteering and physical and mental health among older people, and most of this research provides evidence that volunteering and health are correlated (Dye et al. 1973; Hunter and Linn 1980; Krause, Herzog, and Baker 1992; Luoh and Herzog 2002; Moen et al. 1992; Morrow-Howell et al. 2003; Musick et al. 1999; Thoits and Hewitt 2001; Van Willigen 2000).

The framework for understanding the connections between volunteerism and health often rests on the idea that it is the embodiment of the role of a volunteer that is key for explaining the health benefits. Role theory suggests that engagement in a productive role, such as being a volunteer, results in role enhancement. Older people who volunteer enhance their roles, which then amplifies their opportunities to increase social networks, power, prestige, resources, and emotional gratification, which can have a positive effect on their health (Moen et al. 1992). However, for those who volunteer too many hours, role theory suggests they may experience role strain and thus will have limited or no physical and mental health benefits of volunteering (Moen et al. 1992; Morrow-Howell et al. 2003; Musick et al. 1999; Van Willigen 2000). The concept of role context suggests that having a volunteer role may have dissimilar health impacts on people, based

on their initial levels of social supports and resources (Morrow-Howell et al. 2003; Musick et al. 1999).

A number of recent longitudinal studies examine the effects of volunteering on the physical and mental health of older people, using various aspects of role theory as their explanatory framework. Moen et al. (1992) studied the effects of volunteering in a sample of 300 women over a 30-year period. They found that volunteering at an earlier time related to increased functional ability later in life. Glass, Seeman, Herzog, Kahn, and Berkman (1995) studied the relationship between productivity and health among those age 70 to 79 years, with volunteering included as one measure of productivity, along with other aspects such as housekeeping and shopping. Using longitudinal data from the MacArthur Research Network on Successful Aging Community Study, Glass et al. (1995) found that engagement in productive activities, including volunteering, reduced the risk of disability and mortality. However, they also found that the level of disability also affects the degree that an older adult is involved in productive activities. Therefore, these findings still make it difficult to determine selection effects from causation effects, as it is not clear if productive activities make people healthier or healthy people are more likely to be engaged in productive activities.

Most of the longitudinal studies of the relationship between volunteering and health have used data from the American's Changing Lives (ACL) survey. Van Willigen (2000), using data from the 1986 and 1989 waves of the ACL, found that volunteering increased life satisfaction and self-reported health among older adults. Similarly, Thoits and Hewitt (2001), also using data from the 1986 and 1989 waves of the ACL, found that volunteering increased life satisfaction, happiness, self-esteem, self-reported physical health, and reduced depression among people age 60 or older. Thoits and Hewitt also used their longitudinal data to distinguish between selection and causation effects and did find that volunteers had better self-reported past health that nonvolunteers.

Several more recent studies by Morrow-Howell et al. (2003) and Musick and Wilson (2003) used three waves of ACL data (between 1986 and 1994) to reexamine the relationship between volunteering and health and mental health of older people. Morrow-Howell et al. included self-reported health, levels of depression, and functional dependency as dependent variables. By including the functional

dependency measure, they attempted to move beyond relying only on subjective health measures. They found that both self-reported health and functional dependency are positively affected by formal volunteering. They also examined the effects of role accumulation—acquiring multiple roles in multiple locations—on self-reported health, depression levels, and functioning levels. However, they found that neither the type of organization at which a person volunteered, the number of organizations for which an older adult volunteered, nor the perceived social benefit of the volunteering affected the levels of self-reported health, depression levels, or functioning levels.

Musick and Wilson (2003), using the same three waves of the ACL data as Morrow-Howell et al. (2003), measured the impact of volunteering on depression. They found that volunteering does lower depression levels for people over age 65 but not for people younger than age 65. In their study, Musick and Wilson looked into the mechanisms of role context variables on depression levels by studying the mediating effects of individuals' initial level of psychological resources and level of social integration on the relationship between volunteering and depression. They found that there are some small mediating effects of the level of social integration, but no mediating effects of psychological resources.

Luoh and Herzog (2002) used AHEAD data to investigate the impacts of volunteering and paid work on health among the oldest old. They found that performing more than 100 annual hours of volunteer work has independent and significant protective effects against poor health. They also found that the quantity of volunteering beyond 100 annual hours is not related to health outcomes.

A number of researchers (Morrow-Howell et al. 2003; Musick et al. 1999; Musick and Wilson 2003; Van Willigen 2000) have found that even a very small amount of volunteering—as little as an average of 3 hours per month—is related to better health outcomes among older people. This suggests that simply having the role of volunteer may be enough to have positive effect on self-reported health and functioning levels. Furthermore, several studies have found a nonlinear relationship between volunteering and health, with volunteering more than 100 hours per year resulting in decreased positive self-reported health and depression levels (Morrow-Howell et al. 2003; Van Willigen 2000), and volunteering more than 40 hours per year resulting in decreased mortality (Musick et al. 1999). Volunteering too many

hours may lead to role strain, which limits the positive self-reported health effects of volunteering.

Several longitudinal studies have explicitly examined the impact of volunteering on mortality rates. In a longitudinal study of older volunteers in Marin County, California, Oman, Thoresen, and McMahon (1999) found that older volunteers had a 44% lower rate of mortality over a five-year period than did nonvolunteers. Musick et al. (1999), using data from the ACL study, found a curvilinear relationship between volunteering and mortality, with older volunteers who volunteered 40 annual hours (or about five days per year) as having the greatest benefit from volunteering. Luoh and Herzog (2002), using AHEAD data, found that having spent 100 annual hours in volunteer work significantly lowered the odds of dying compared to reporting good health. Although the impact of volunteering on mortality rates indeed gives us a crude indication that volunteering affects actual health, it does not give us much insight into how volunteering affects the health of those still living.

Research so far has supported this notion that volunteering does help older people maintain their self-reported physical and mental health. The theoretical framework of role theory appears to be a useful construct for explaining the relationship between volunteering and physical and mental health. However, most of the studies using ACL data have measured health based solely on individual's perceptions. Although self-reported health has been determined to be reliable indicator of actual health (Idler and Benyamini 1997), and perceptions themselves are important, as they often relate an individual's adaptations to a medical condition, it is important to attempt to augment these measures of perceptions of health with more objective measures of health and functioning, such as physician-diagnosed medical conditions, difficulties in activities of daily living (ADLs) and instrumental activities of daily living (IADLs), nursing home residence, and mortality. Changes in self-reported health may not tell us if volunteering actually decreases the onset of medical conditions or slows the decline in functioning; or simply changes their perceptions regarding their health.

The present study builds on these previous studies, although instead of using data from the ACL, it uses data from the AHEAD survey. The AHEAD survey has a much larger initial sample size of 7,443 respondents who were 70 years of age or older in 1993, compared with the

ACL's initial sample size of 1,669 respondents over age 65. The AHEAD survey has a much lower attrition rate (8.3% between the 1993 and 2000 interviews) than the ACL. It also includes more detailed measures of health. One drawback of using the AHEAD data compared with the ACL data is that the AHEAD survey uses 100 hours a year as a threshold for measuring volunteering, whereas the ACL measures any amount of volunteering. Although 100 hours per year, or about 8 hours per month, seems to be an acceptable threshold for volunteering, we do lose the opportunity to test the curvilinear relationship between volunteering and self-reported health found in the ACL studies and are unable to determine if there is an optimal amount of volunteering under 100 hours per year.

The general purpose of this study is similar to previous studies: to measure the effects of formal volunteering on the physical and mental health of older people, and like previous studies, we use role theory as a general framework for examining this relationship. A possible explanation is that by volunteering, an older adult can increase his or her social networks, increase power and prestige, and have access to greater resources through role enhancement, which in turn slow his or her decline in health, mental health, and functioning.

The specific hypotheses addressed in the study are the following. Older people who volunteered at least 100 hours in 1993:

> *Hypothesis 1:* Are less likely to be living in a nursing home in 2000 than those who do not.
> *Hypothesis 2:* Are less likely to die before 2000 than those who do not.
> *Hypothesis 3:* Have better self-reported health in 2000 than those who do not.
> *Hypothesis 4:* Have better functioning levels (ADLs and IADLs) in 2000 than those who do not.
> *Hypothesis 5:* Have fewer physician-diagnosed medical conditions in 2000 than those who do not.
> *Hypothesis 6:* Have lower depression levels in 2000 than those who do not.

The final hypothesis is as follows:

> *Hypothesis 7:* The amount of hours a person volunteered in 1993, more than 100 hours per year, would have a curvilinear relationship with the health, depression, and functioning variables.

Data and Sample

Data for this study came from the 1993 and 2000 panels of the AHEAD survey. Funded by the National Institute on Aging, AHEAD is a large-scale collaborative effort between the federal government and academia. Its purpose is to examine the effects and interrelationships of transitions experienced by older people in health, disability, work, financial, and family relationship domains. Detailed information about the AHEAD survey and the quality of the data has been reported in a special issue of the *Journals of Gerontology, Series B: Psychological and Social Sciences* (vol. 52B) in May 1997 and in the study's Web site (http://hrsonline.isr.umich.edu/). The study sample included all AHEAD respondents who were age 70 or older in 1993. We excluded 105 respondents who reported "other" race (other than White, Black, and Hispanic) from the study sample as their number was as too small for data analysis and 20 respondents who had missing data in the major independent variable—1993 volunteering status. Furthermore, two respondents were excluded because their data in subsequent follow-up interviews were missing. The final sample of this study contained 7,322 respondents who were age 70 or older in 1993.

Measurements

This study focused on the association between formal volunteering and health. Although informal volunteering, such as providing care to family members or neighbors, can also be hypothesized to have similar benefits, we are focusing solely on formal volunteering because the AHEAD study only collected data on formal volunteering. Formal volunteering, as discussed by Janoski and Wilson (1995) and Wilson and Musick (1997), consists of assistance provided through organizations, either mutual-benefit associations in which the beneficiary is the membership (e.g., professional and union groups) or community-oriented service organizations that benefit clients or others outside the organization (e.g., church-related or fraternal organizations). Providing assistance goes beyond simple membership in an organization or attendance at organizational events but rather must include actual assistance that benefits others. Formal volunteering is focused on con-

tributions to the collective good (Wilson and Musick 1997), whereas informal volunteering tends to focus on helping friends, neighbors, or relatives.

The 1993 AHEAD survey asked each respondent, "In the past 12 months, have you done volunteer work totaling 100 hours or more for religious or other charitable organizations?" It defined religious or charitable organizations as groups such as "the United Way, the Heart Association, educational institutions, religious organizations, or other such groups." We created a dichotomous variable for volunteering using the respondents' answer to this question. The survey also collected the actual hours of volunteering in the 12-month period before the interview from those who answered "yes" to the volunteering question. The answer to this question was used to create the hours-of-volunteering variable.

Respondents' health and functional status were captured by self-reported health, number of physician-diagnosed health problems, depression level, functional level, mortality rate, and rate of residing in a nursing home. The AHEAD survey asked each respondent, "Would you say your health is excellent, very good, good, fair, or poor?" Although this question asked for a subjective judgment rather than an objective fact, others have found responses to be predictive of objective health status, health behaviors, and even mortality (for a review, see Idler and Benyamini 1997). Using the answers to this question, we created an ordinal self-reported health variable with five possible outcomes (poor, fair, good, very good, and excellent). Functional status was measured by both ADLs and IADLs. ADLs are basic self-care activities, such as bathing, dressing, eating, getting in and out of bed, and using the toilet that need to be completed on a daily basis. In the AHEAD survey, respondents were asked whether they had any difficulty with each of these activities. We created an ordinal variable for number of ADL difficulties using their responses to these questions. The possible ADL score ranged between 0 and 5, and a higher ADL score indicated poorer functioning. IADLs are more complex tasks than ADLs and often require a combination of physical and mental abilities. Examples of IADLs include grocery shopping, preparing hot meals, managing money, and managing medication. In the AHEAD survey, respondents were asked whether they had any difficulty with each of these tasks. We created an ordinal variable for number of IADL difficulties using their responses to these questions.

The IADL score ranged between 0 and 5, and a higher IADL score indicated poor functioning. Depression was measured by an eight-item Center for Epidemiologic Studies–Depression Scale (CES-D) (Radloff 1977; Steffick 2000). The CES-D is a valid and reliable instrument to measure levels of depression in a population study. A higher CES-D score signifies a higher level of depression.

The number of physician-diagnosed health conditions variable was created from a list of the following eight medical conditions: (1) high blood pressure; (2) diabetes or high blood sugar; (3) cancer or a malignant tumor of any kind, except skin cancer; (4) chronic lung disease, except asthma; (5) heart attack or other heart problems; (6) stroke; (7) emotional, nervous, or psychiatric problems; and (8) arthritis or rheumatism. The AHEAD survey asked whether or not a physician had ever told the respondent that he or she had these conditions. Although we do not have data on the onset of medical conditions for this study, we measured the changes in the total number of physician-diagnosed medical conditions between 1993 and 2000. There are several major medical conditions that are not asked about by the AHEAD survey, such as neurological conditions, liver disease, and kidney disease.

Finally, mortality or nursing home residence was measured by a categorical variable with three possible outcomes: deceased before the 2000 interview, living in a nursing home during the 2000 interview, and living in the community during the 2000 interview.

Control variables used in this study were age, gender, race and ethnicity, marital status, and socioeconomic status, measured by educational level and annual household income. All variables used in the analysis are described in Table 1, along with the weight-adjusted univariate description of the sample.

Data Analysis

We used weighted data for our data analyses to adjust for over-samples and biases due to nonresponse. To investigate our first two hypotheses, that volunteers were less likely to die or be living in a nursing home, we used multinomial logit regression, as the dependent variable was nominal (Long and Freese 2001). To study the effects of volunteering on self-reported health, ADLs, IADLs, number of physician-diagnosed health conditions, and depression (Hypotheses 3

TABLE 1

Definitions of Variables and the Weighted Characteristics of the Sample ($N = 7,322$)

Variable	Mean	Definitions
Demographic characteristics		
Age	77	Age at interview in years
White (%)	88	1 = non-Hispanic White, 0 = otherwise
Black (%)	8	1 = non-Hispanic Black, 0 = otherwise
Hispanic (%)	4	1 = Hispanic, 0 =otherwise
Female (%)	60	1 = female, 0 = male
Marital status (%)		
Married	52	1 = married, 0 = otherwise
Separated/divorced	5	1 = separated/divorced, 0 = otherwise
Widowed	40	1 = widowed, 0 = otherwise
Never	3	1 = Never married, 0 = otherwise
Education (%)		
< high school diploma	42	1 = no high school diploma, 0 = otherwise
High school diploma	31	1 = have high school diploma, 0 = otherwise
Some college	15	1 = some college education, 0 = otherwise
College degree	13	1 = have college degree, 0 = otherwise
Household income 1993	$25,879	Annual household income in dollars
Volunteer 1993 (%)	13	Formal volunteering for 100 hours or more during the past 12 months
Volunteer hours 1993 (hours)	305	Actual hours of volunteering in the 12-month period before the interview from those who volunteered at least 100 hours
Health and functioning		
Self-reported health score 1993	3.0	Respondent's self-reported health in 1993, 1 (*poor*) to 5 (*excellent*)
Depression score 1993	1.5	Score of eight items of CES-D in 1993, 0 to 8
Medical conditions score 1993	1.5	Number of physician-diagnosed health problems in 1993, 0 to 8

(continued)

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TABLE 1 (continued)

Variable	Mean	Definitions
ADL score 1993	0.4	Number of difficulties with activities of daily living in 1993, 0 to 5
IADL score 1993	0.4	Number of difficulties with instrumental activities of daily living in 1993, 0 to 5
Self-reported health score 2000	2.8	Respondent's self-reported health in 2000, 1 (*poor*) to 5 (*excellent*)
Depression score 2000	1.8	Eight-item CES-D score in 2000, 0 to 8
Medical conditions score 2000	2.5	Number of physician-diagnosed health problems in 2000, 0 to 8
ADL score 2000	0.8	Number of difficulties with activities of daily living in 2000, 0 to 5
IADL score 2000	0.8	Number of difficulties with instrumental activities of daily living in 2000, 0 to 5
Death (%)	35	1 = respondent died before 2000 survey, 0 = otherwise
Institutionalization (%)	8	1 = respondent was a nursing home resident during 2000 survey, 0 = otherwise

NOTE: CES-D = Center for Epidemiologic Studies–Depression Scale; ADL = activity of daily living; IADL = instrumental activity of daily living.

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to 6), we used ordered logit regression as the dependent variables were ordinal (Long and Freese 2001). We tested each of these ordered logit models for the proportional odds assumption. If the assumption was violated, we repeated the regression analyses by using a less restrictive generalized ordered logit regression, executed by the –gologit-comment of the STATA 7.0 program (Fu 1998). The results of both the ordered logit regression and the generalized ordered logit regression were reported. Finally, to investigate the effects of the number of hours volunteered on these outcomes (Hypothesis 7), we repeated the above regression analyses with a subsample of volunteers and used hours of volunteering as the independent variable.

Because the AHEAD data were collected using a complex multistage sampling design, the variance estimates of these regression analyses would be underestimated if we did not adjust for the effects of multistage sampling in our analyses (Brogan 1998; Carlson 1998; Lepkowski and Bowles 1996; StataCorp 2001). We used the survey regression functions of the STATA 7.0 program to produce the correct variance estimates (StataCorp 2001). The STATA 7.0 uses a Taylor series linearization approach to make necessary adjustment to the variances. The linearization approach rewrites the population estimates in the form of a Taylor's series expansion with the assumption that all higher-order terms are negligible. The standard errors are obtained by applying a standard formula for the mean-square error to the first-order portion of the expanded estimates (Brogan 1998; Carlson 1998).

Findings

Table 1 shows the weight-adjusted characteristics of the sample. The average age of respondents was 77 years. Whites made up 88% of the respondents in the study, African Americans consisted of 8%, and Hispanic consisted of 4%. Women made up 60% of respondents. Fifty-two percent were married, 5% were separated or divorced, and 40% were widowed. Thirteen percent had a college degree, 15% had some college education, 31% had a high school diploma, and 42% did not have a high school diploma. In 1993, the average self-reported health was 3.0 (good), the average number of physician-diagnosed medical problems was 1.5, the average ADL and IADL scores were

both 0.4, the average depression (CES-D) score was 1.5, and the average household annual income was $25,879. Thirteen percent of the respondents volunteered for at least 100 hours in the 12 months before the interview. They volunteered, on average, 305 hours during the 12 months before the interview, with a median of approximately 200 hours. In 2000, the average numbers of difficulties in ADLs and IADLs were both 0.8, and the average depression (CES-D) score was 1.8. All these health indicators pointed to deteriorating health and functioning as the respondents aged. Thirty-five percent of the respondents died between 1993 and 2000, and another 8% were living in a nursing home during the 2000 interview.

Table 2 shows the results of the survey multinomial logit regression on mortality and on nursing home residence compared to living in the community. After controlling for demographics, marital status, socioeconomic status, and baseline health and functioning, volunteers were 28% less likely to die before the 2000 interview than nonvolunteers. However there was no difference in the odds of living in a nursing home between the two groups.

Table 3 shows the results of the survey-ordered logit regressions. To make sure that each response category had at least 5% of respondents in regression analyses, we had to recode some of the dependent variables into fewer response categories. For example, the CES-D scores were originally scored from 0 to 8, with a higher score indicating a greater degree of depression. For regression analysis, we recoded the CES-D score into five scores: 0, 1, 2, 3, and "4 or higher." Similarly, we recoded IADLs from scores of 0 to 5 to scores of 0, 1, 2, or "3 or more IADLs" and recoded the number of physician-diagnosed medical conditions variable from 0 to 8 medical conditions to 0, 1, 2, 3, or "4 or more medical conditions."

The regression models we used are similar to the conditional change model as we controlled the effect of the baseline health or functional status (Finkel 1995; Plewis 1985). In other words, the coefficients of the volunteering variable can be interpreted as the effect of volunteering on the change in health and functioning between 1993 and 2000. After controlling for demographics, marital status, socioeconomic status, and baseline health and functioning, volunteering had led to a smaller decline in self-reported health as the respondents aged. Volunteering also led to a smaller increase in the number of difficulties in both ADLs and IADLs, and a smaller increase in levels of

TABLE 2
Result of Multinomial Logit Regression on Mortality
and Nursing Home Residence ($N = 7,323$)

	Death		Nursing Home	
	RRR	SE	RRR	SE
Demographic characteristics				
Age	1.14***	.01	1.15***	.01
Female	0.50***	.04	1.53**	.25
Black	0.89	.09	0.88	.15
Hispanic	0.52***	.08	0.53*	.15
Marital status				
Separated/divorced	1.25	.17	1.19	.34
Widowed	1.34***	.10	1.42*	.22
Never married	1.78***	.29	2.06*	.61
Education				
High school diploma	1.09	.08	0.99	.15
Some college	1.12	.11	1.12	.20
College degree or above	1.02	.11	1.12	.23
1993 health status				
Self-reported health	0.67***	.02	0.83**	.05
ADLs	1.06	.05	1.01	.07
IADLs	1.67***	.06	1.27***	.08
Economic variables				
1993 income (log)	0.95	.03	0.90*	.04
Volunteered >100 hours	0.72**	.07	0.95	.19
$F(30, 7241)$			43.45***	

NOTE: RRR = relative risk ratio; ADL = activity of daily living; IADL = instrumental activity of daily living.
*$p < .05$. **$p < .01$. ***$p < .001$.

depression (CES-D) among elderly people. In other words, everything being equal, volunteers had better self-reported health, fewer ADL and IADL difficulties, and lower depression levels in 2000 than those who did not volunteer at least 100 hours per year. However, volunteering had no effect on the number of physician-diagnosed medical conditions.

We tested all these ordered logit models for the proportional odds assumption and found that three of them, self-reported health, the number of IADLs, and number of physician-diagnosed medical conditions, violated this assumption. Therefore, we used the generalized logit model to repeat the multivariate analyses of these three variables (Fu 1998). Table 4 shows the odds ratios from the generalized logit

TABLE 3
Results of Survey Ordered Logit Regressions on Depression and Functional Outcomes

	Health		CES-D		ADL		IADL		Medical Condition	
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient	SE
Demographic characteristics										
Age	−.02*	.01	.03***	.01	.10***	.01	.11***	.01	.00	.01
Hispanic	.02	.07	.07	.17	.01	.16	−.12	.17	−.52***	.14
Black	−.20*	.10	.39***	.10	.37***	.11	.33**	.11	−.15	.10
Female	−.18	.12	.27***	.08	.29***	.09	.40***	.09	.00	.07
Marital status										
Separated/divorced	.04	.14	−.18	.13	−.11	.17	−.05	.17	−.01	.15
Widowed	−.01	.07	−.34***	.08	.00	.09	.04	.09	−.07	.08
Never married	.12	.18	−.33	.19	.40	.21	.37	.20	.19	.21
Education										
High school diploma	.09	.08	−.14	.08	−.21*	.09	−.20*	.10	−.11	.08
Some college	.20*	.10	−.29**	.10	−.26*	.12	−.27*	.12	−.05	.10
College degree	.42***	.11	−.34**	.12	−.16	.12	−.26	.14	−.30**	.11
1993 health										
Self-reported health	0.91***	.04								
ADLs					.80***	.05				
IADLs							.86***	.06		
CES-D 1993			.43***	.02						
Medical condition									1.65***	.04

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Economic resources										
Income (log)	.03	.04	–.02	.04	–.11**	.04	–.12**	.04	–.04	.04
Volunteered	.21*	.08	–.31***	.09	–.46***	.11	–.49***	.12	–.08	.09
n	4,204		3,422		4,199		4,197		4,208	
F value	69.57***		37.88***		47.69***		51.04***		143.32***	

NOTE: CES-D = Center for Epidemiologic Studies–Depression Scale; ADL = activity of daily living; IADL = instrumental activity of daily living.
*$p < .05$. **$p < .01$. ***$p < .001$.

TABLE 4
Odds Ratios From Generalized Ordered Logit Model for
Health, IADL, and Physician-Diagnosed Medical Problem

Variable	Odds Ratios	SE
Self-reported health		
Health = fair	.26	.16
Health = good	.21*	.10
Health = very good	.22*	.10
Health = excellent	.20	.15
(Health = poor)		
IADL		
IADL = 1	−.467***	.110
IADL = 2	−.588***	.139
IADL = 3 or above	−.537**	.162
Number of medical problems		
Number of medical problems = 1	−.12	.18
Number of medical problems = 2	.08	.11
Number of medical problems = 3	−.13	.10
Number of medical problems = 4	−.17	.13

NOTE: IADL = instrumental activity of daily living.
*$p < .05$. **$p < .01$. ***$p < .001$.

models. For the health variables, two out of the four odds ratios were
statistically significant. For the IADL variables, all three odds ratios
were statistically significant. For the number of physician-diagnosed
medical conditions variable, all the odds ratios were not statistically
significant. Although these findings indicate that the odds ratios are
not identical across different response categories of these dependent
variables, they do not significantly change the interpretation of our
findings from the ordered logit regressions in Table 2.

Finally, we repeated the above analyses with only the respondents
who volunteered, using the actual hours of volunteering as the inde-
pendent variable. We included both hours of volunteering and its
square term (i.e., hours of volunteering^2) to model the possible curvi-
linear effect of hours of volunteering on the dependent variables. We
found that the hours of volunteering had a statistically significant
effect only on self-reported health, and this relationship was curvi-
linear. Using the regression coefficients, we calculated that the posi-
tive effect of volunteering peaked at 1,878 hours. However, because
the mean of the actual hours of volunteering was just 305 hours, very

few (about 1%) of the respondents had volunteered that many hours. Table 5 shows the regression coefficients of the effect of volunteer hours on self-reported health. We tested this ordered logit model for the proportional odds assumption and found that it did not violate this assumption.

Discussion

The purpose of this study was to examine the relationship between formal volunteering and the physical and mental health of people over age 70, building on a growing body of evidence that older people who volunteer have better self-reported health and mental health than those who do not. Although recent longitudinal studies examining the relationship between involvement in volunteering and health have been able to disentangle some of the relationships between volunteering, health, functioning, and mortality, this study improves on the previous studies in several ways. First, the AHEAD survey used in this study is about 4.5 times larger that the more commonly used ACL study and has a much lower attrition rate. Furthermore, although most studies of the relationship between volunteering and health rely on either self-reported health and mental health or the more crude "mortality" measure, this study attempted to include more objective measures of health, including physician-diagnosed medical conditions, functioning levels measured by ADLs and IADLs, and nursing home residence. Understanding whether having the volunteer role actually decreases the onset of medical conditions, slows the decline of functioning levels, and lowers nursing home residence and mortality rates, versus simply changing one's perception of health, gives us a greater insight into the operation of the volunteer role on health.

Providing empirical support to earlier studies, our study found that volunteering by older individuals is positively correlated with self-reported health, depression levels, and functioning levels as measured by ADLs and IADLs. These findings essentially replicate the findings linking volunteering with self-reported health by Van Willigen (2000), Morrow-Howell et al. (2003), Thoits and Hewitt (2001), Luoh and Herzog (2002), and Musick and Wilson (2003) but using a much larger data set and focusing on people over age 70 who volunteered a much higher average number of hours.

TABLE 5
Results of Ordered Logit of Volunteer
Hours on Perceived Health ($n = 655$)

Perceived Health	Coefficient	SE
Demographic characteristics		
Age	.0054	.0171
Hispanic	.0972	.2449
Black	.6566	.4860
Female	.0415	.1692
Marital status		
Separated/divorced	−.4284	.3684
Widowed	−.2242	.1788
Never married	−.0176	.4063
Education		
High school diploma	.1088	.2244
Some college	.2172	.2385
College degree	.7761**	.2540
1993 health		
Self-reported health	.9593***	.0851
Economic resources		
Income (log)	.0501	.0989
Volunteer hours	.0013*	.0006
(Volunteer hours)^2	-7.07×10^{-7}***	-3.36×10^{-7}
χ^2	197.09***	
Pseudo R^2	.1012	

Our findings on the more objective measures of health were mixed. Similar to the results of Musick et al. (1999) and Oman et al. (1999), our findings show that older volunteers were less likely to die between 1993 and 2000. However, our findings indicate that those who volunteered at least 100 hours in 1993 were not less likely to be living in a nursing home in 2000. Furthermore, older volunteers did not have fewer physician-diagnosed medical conditions, such as heart conditions, strokes, diabetes, or arthritis in 2000 than those who did not volunteer.

Thus, we find that older people who volunteer at least 100 hours per year have slower declines in self-reported health and physical functioning, slower increases in depression levels, and lower mortality rates than those who do not volunteer 100 hours or more per year. However, volunteering is not correlated with the accumulation of the most common physician-diagnosed medical conditions or the rate of

residing in a nursing home. The findings related to rate of residing in a nursing home are less remarkable than the number of physician-diagnosed medical conditions. Because our measure only included people who were residing in a nursing home during the 2000 interview, we do not have information on people who had resided in a nursing home before or after the interview. There is a possibility that many of those who died between 1993 and 2000 had lived in a nursing home at some period before they passed away. Thus, a measure that included all nursing home admissions between 1993 and 2000 may have shown some correlation.

The lack of a relationship between volunteering and physician-diagnosed medical conditions is more striking. There are several possible reasons for the lack of relationship between these two variables in our study. First, perhaps the measure of physician-diagnosed medical conditions present in the AHEAD survey is not sensitive enough to provide a good estimate of this phenomenon. The AHEAD survey only asks respondents about whether or not they have any physician-diagnosed medical conditions, but nothing about the severity or prognosis of these conditions. Perhaps with more detailed information on the severity, prognosis, and/or duration of a condition, we would find different results.

A second explanation is that although volunteering does not have an effect on the likelihood that one would have a physician-diagnosed medical condition, it does have an impact on how individuals cope with such a condition, which may affect the severity or prognosis of such a condition. The concept of role enhancement asserts that by participating in a volunteer role, older people have an opportunity to increase their social networks and their resources. These larger social networks and greater access to resources may help people deal with the onset of such medical conditions. In fact, there is a considerable amount of research in the field of medicine and public health examining the impacts of social networks and resources on survival rates. Some research has found that people with serious illnesses, such as cancer and heart disease, who have strong social support networks fare better than those who do not (Eng et al. 2002; Kawachi et al. 1996; Lutgendorf et al. 2002; Pennix et al. 1997; Reynolds and Kaplan 1990; Sugisawa, Liang, and Liu 1994). The connection between volunteering and health may have nothing to do with the likelihood that one would obtain a medical condition, but rather that volunteering

may increase an older person's social and psychological resources necessary to cope with the onset of such a medical condition. Earlier studies have found that social support decreases negative health behaviors (Broman 1993; Hanson et al. 1989, 1990; McIntosh, Shifflett, and Picou 1989) and buffers against stress, which in turn would reduce harmful endocrinal system responses (Kamarck, Manuck, and Jennings 1990; Thomas, Goodwin, and Goodwin 1985). The social networks and increased access to resources resulting from volunteering may be the protective factor that results in better self-reported health, lower depression levels, slower declines in functioning, and lower mortality rates over nonvolunteers, despite no difference in the diagnosis of medical conditions.

There are several limitations of this study related to the AHEAD's 100-hour minimum threshold for being designated a volunteer. Compared to the ACL, the individuals in this study were well ensconced in their role as volunteers, as the baseline volunteer participation is 100 hours, or about 2 hours per week, with the mean volunteer hours at 305 hours, or an average of almost 6 hours per week. Thus, we are not able to test whether simply having the role of a volunteer, without putting many hours into the role, affects their self-reported health or mortality as suggested by role enhancement theory and found in earlier studies (Morrow-Howell et al. 2003; Musick et al. 1999; Van Willigen 2000). Furthermore, with the AHEAD survey we were not able to test for any curvilinear relationship between our variables that may have occurred under the threshold of 100 hours per year. Studies using ACL data have shown a curvilinear relationship between volunteering and health benefits, with the maximum positive perceived health gains for volunteers at 100 hours per year (Morrow-Howell et al. 2003; Van Willigen 2000) and the maximum protection against mortality at 40 hours per year (Musick et al. 1999). However, we did find a similar curvilinear relationship well above the threshold of 100 hours per year. For the committed volunteer, the positive health effects began to taper off only after volunteering roughly four days per week.

Despite this limitation of our data, our findings add to the knowledge base regarding the relationship between volunteering and the physical and mental health among older people by including more objective health measures. More research needs to be conducted looking at the precise mechanisms of the relationship between volunteering and health to see if and how volunteering improves self-reported

health, decreases the mortality rate, and slows the declines in functioning levels and mental health among older people, particularly as this relates to the onset of medical conditions. The findings from this study and future research regarding the differences between self-reported health, mental health and functioning, and actual medical conditions are invaluable in designing and promoting activities, such as formal volunteering, whose purpose, at least partially, is to improve the well-being of older people.

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