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Authors

Gruenewald, Tara L.
Karlamanla, Arun S.
Greendale, Gail A.
et al.

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Tara L. Gruenewald
Arun S. Karlamangla
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Feelings of Usefulness to Others, Disability, and Mortality in Older Adults: The MacArthur Study of Successful Aging

Tara L. Gruenewald,¹ Arun S. Karlamangla,¹ Gail A. Greendale,¹
Burton H. Singer,² and Teresa E. Seeman¹

¹Department of Medicine/Geriatrics, University of California, Los Angeles.

²Office of Population Research, Princeton University, New Jersey.

We examined feelings of usefulness to others as a predictor of disability and mortality risk in a sample of older adults (aged 70–79 years) from the MacArthur Study of Successful Aging. We examined participants' perceptions of their usefulness to friends and family, measured at a baseline interview, as a predictor of subsequent increases in self-reported mobility disability, the onset of difficulty in performing activities of daily living, or mortality occurrence over a 7-year follow-up period. Compared with older adults who frequently felt useful to others, those who never or rarely felt useful were more likely to experience an increase in disability or to die over the 7-year period, even when we accounted for a number of demographic, health status, behavioral, and psychosocial factors. This suggests that feelings of usefulness may shape health trajectories in older adults.

THE period of life after a person reaches the age of 65 has often been referred to as the “third age,” a time largely characterized by disengagement from paid, productive roles (e.g., retirement from work); the lack of significant caretaking demands for younger generations; and the lack of other positive roles in productive or social domains (Cornman, 1997). In general, engagement in social and productive activities, especially in the domains of paid work and child care, declines with increasing age (Herzog & House, 1991; Herzog, Kahn, Morgan, Jackson, & Antonucci, 1989; Rossi, 2004). However, there is substantial heterogeneity in the rate of participation in other domains of activity, including volunteer and unpaid work and informal social support, in those of older ages (Glass, Seeman, Herzog, Kahn, & Berkman, 1995; Herzog et al.).

An overall decrease in social and productive activities may, on the one hand, lead to enhanced well-being in older adults as they experience a decrease in the demands associated with such roles and an increase in leisure time. On the other hand, the increasing lack of roles for individuals in the third age may also contribute to dissatisfaction and worse mental and physical health as older adults lose sources of social and physical activity, as well as feelings of accomplishment, of being productive members of society, and of being useful to and valued by others around them. Consistent with this notion, older as compared with younger and middle-aged adults have been found to have lower scores on measures of a sense of purpose in life and personal growth (Ryff & Singer, 2002), as well as generativity (Rossi, 2004), which assesses perceptions of making important contributions to others.

Although older adults may experience a decrease in the availability of socially valued and meaningful roles, they do not appear to experience a reduction in the desire to be valued and useful members of society and of their social networks. The need to feel useful to others, the need to be productive, and the need to “give back” to others have been cited as motivating

factors for volunteerism among older adults (Fried et al., 2004; Glass et al., 2004; Hainsworth & Barlow, 2001; Okun, 1994). Older adults have also indicated that an important component of “successful aging” is contributing to and helping others (Fischer, 1995). There has been surprisingly little research on the role of feelings of value and usefulness to others within more proximal social networks (e.g., family and friends) in older adults. However, the opportunity to provide social support to others is thought to enhance mental well-being in older adults (e.g., Krause, Herzog, & Baker, 1992; Krause & Shaw, 2000), suggesting that being of use to others is important in these networks.

If the desire to feel useful to and valued by others is an important component of older adults' activities and life goals, then these feelings may play an important role in the mental and physical well-being of older adults. To date, there is a paucity of research on links between feeling useful to others and health, but available data do indicate an association between feelings of usefulness and functioning and mortality outcomes. A study of older Japanese adults (aged 65 years or older) found that, compared with participants who felt quite useful to others and society, those who felt only a little or not at all useful were twice as likely to die over a 6-year follow-up period in analyses adjusting for sociodemographic factors, comorbidity, depression, self-perceived health, and social network characteristics (Okamoto & Tanaka, 2004). Similar links were found in the Helsinki Aging Study. In that study, older adults (aged 75 years or older) who indicated that they felt needed (vs those who did not) were less likely to die over a 10-year follow-up period and were less likely to enter into institutionalized care over a 5-year follow-up period in models controlling for sociodemographic and health status factors (Pitkala, Laakkonen, Strandberg, & Tilvis, 2004). Feeling useless also predicted an increase in disability (difficulty in performing activities of daily living and mobility) over a 4-year period in a sample of older French

adults (aged 60 years or older; see Grand, Grosclaude, Bocquet, Pous, & Albarede, 1988). Positive perceptions of aging, including the belief that individuals remain useful as they age, have also been found to predict the lower likelihood of an increase in disability (Levy, Slade, & Kasl, 2002) and are associated with greater longevity (Levy, Slade, Kunkel, & Kasl, 2002). Taken together, these findings indicate that feeling useful to or needed by others may impact trajectories of functioning (as indicated by the need for institutional care and increases in disability) and mortality outcomes in older adults.

In the present investigation, we examine the construct of feeling useful to others as a predictor of future disability and mortality risk in a sample of high-functioning older adults who were part of the MacArthur Study of Successful Aging (MSSA). In light of previous research, we hypothesized that greater feelings of usefulness would be associated with a lower likelihood of increases in disability and mortality over a 7-year follow-up period in MSSA participants. Our objective was to determine if such links, observed previously in European and Japanese elders, would also be present in older Americans. We also sought to examine whether feelings of usefulness were associated with a range of psychosocial and behavioral factors known to be related to disability and mortality outcomes in older adults, and whether such factors might underlie hypothesized associations between perceived usefulness and health outcomes.

We examined social integration and social activity, given the large body of research that demonstrates ties between these factors and disability, morbidity, and mortality outcomes (see, e.g., Berkman et al., 1993; Glass, de Leon, Marottoli, & Berkman, 1999; Mendes de Leon et al., 1999; Mendes de Leon, Glass, & Berkman, 2003; Menec, 2003; Musick, Herzog, & House, 1999; T. E. Seeman & Crimmins, 2001; Stuck et al., 1999, for reviews). Social relations and activity may be important sources of feelings of usefulness, and these feelings may also have a positive impact on individuals' desires to form or maintain social connections and engage in social activity.

We also examined other psychological states known to affect functioning and health outcomes in older adults, including perceptions of self-efficacy (e.g., Kaplan, Ries, Prewitt, & Eakin, 1994; Mendes de Leon, Seeman, Baker, Richardson, & Tinetti, 1996), personal mastery (e.g., M. Seeman & Lewis, 1995; Surtees, Wainwright, Luben, Khaw, & Day, 2006), and depressed mood (e.g., Hemingway & Marmot, 1999; Stuck et al., 1999), as feelings of usefulness may affect, or be affected by, these beliefs and moods. Self-efficacy and mastery beliefs, including perceptions of abilities to deal with others and with instrumental activities of daily living (e.g., transportation), as well as perceptions of control over outcomes in one's life, may alter individuals' perceptions of their usefulness to others, and greater perceived usefulness may also have a positive impact on individuals' appraisals of their capacity to deal with social and instrumental activities and control events.

Depressed mood may alter individuals' perceptions of serving a useful role to others, whereas low feelings of usefulness may in turn lead to depression. Low feelings of self-worth are a hallmark of depression (Beck, 1967; Strauman, 1996), and it has been suggested that low feelings of social worth may also be an important component of depressive

symptomatology (Sloman, Gilbert, & Hasey, 2003). To date, however, there has been little empirical examination of associations between feelings of usefulness to others and depressed mood. Feelings of usefulness may also affect engagement in health-promoting behaviors (e.g., physical activity, smoking abstinence). It is plausible that older adults who feel more useful to others may be motivated to take better care of themselves in order to ensure that they can perform needed and vital roles and activities.

Thus, our main objectives were to determine whether feelings of usefulness were associated with disability and mortality outcomes; whether such feelings were associated with a range of other psychosocial and behavioral factors known to affect health outcomes; and whether there was any evidence that feelings of usefulness might work through these other factors to affect disability and mortality outcomes. If feelings of usefulness are associated with health outcomes in elder Americans, then these perceptions may also be important targets of health-promotion interventions and activities in older adults.

METHODS

Participants

Participants were from the MSSA, a prospective investigation of older adults (aged 70–79 years) who were recruited on the basis of age and cognitive and physical functioning levels from three community-based cohorts (Durham, NC; East Boston, MA; and New Haven, CT) of the Established Populations for the Epidemiologic Studies of the Elderly (EPESE; see Berkman et al., 1993; Comoni-Huntley et al., 1993). Physical functioning selection criteria for the MSSA included the following: (a) no reported disability on the seven-item Activities of Daily Living Scale (Katz, Downs, Cash, & Grotz, 1970; Katz, Ford, Moskowitz, Jackson, & Jaffe, 1963); (b) no more than one reported functional limitation on eight items assessing gross mobility and range of motion (Nagi, 1976; Rosow & Breslau, 1966); (c) ability to hold a semitandem balance for at least 10 seconds; and (d) ability to stand from a seated position at least five times within 20 seconds. Cognitive functioning selection criteria included the following: (a) scoring six or more correct on the nine-item Short Portable Mental Status Questionnaire and (b) remembering three or more of six elements on a delayed recall of a short story (Pfeiffer, 1975). The aims in using the physical and cognitive functioning selection criteria were to screen out individuals with manifest functional disability and to obtain a cohort of older adults who represented approximately the top third of their age group in terms of functional ability at baseline enrollment into the study.

Of 4,030 age-eligible men and women who were screened, a cohort of 1,313 met all screening criteria, and 1,189 (90.6%) agreed to participate and provided informed consent. The sample was predominantly White (80.7% White, 18.8% African-American, and 0.5% other) and had slightly higher numbers of women (women 55.4%, men 44.6%). Study investigators collected baseline data from the 1988–1989 period; the data included a 90-minute, in-home interview assessing physical and cognitive performance; health status; and sociodemographic, psychosocial, and lifestyle or behavioral

characteristics. Study investigators reevaluated the cohort by means of in-home and phone interviews that took place approximately 3 years (in 1991–1992; $n = 1,103$) and 7 years (in 1995–1996; $n = 853$) after the baseline exam. In the present examination, we utilized information obtained from participants at the baseline and 7-year follow-up exams for our analyses.

Measures

Feelings of usefulness.—Participants' feelings of usefulness to others were assessed at the baseline exam by asking participants to rate (using a 4-point scale: 1 = never, 2 = rarely, 3 = sometimes, and 4 = frequently), how often they felt useful to family and friends. Because a small number of participants selected the first (never) and second (rarely) response options, we combined these two response groups and used a three-category variable in our analyses (never or rarely, sometimes, and frequently).

Disability.—We examined two common measures of disability assessed at the baseline and 7-year follow-up examinations in our analyses. The first was derived from the Katz Index of Independence in Activities of Daily Living (Katz et al., 1970). It assessed a person's ability to independently perform (yes or no) seven basic, physical activities of daily living (ADLs): bathing, grooming, dressing, toileting, eating, transferring (moving from bed to chair), and walking across a small room. We computed an ADL disability score as the sum of the number of items that participants indicated they needed assistance in performing (possible range = 0–7).

The second measure assessed limitations in mobility and strength and was based on the work of Rosow and Breslau (1966). We computed a mobility disability score as the sum of the number of three activities (walk half a mile, walk up and down stairs, and perform heavy housework) that participants reported being unable to do (possible range = 0–3).

Change in disability.—Because ADL disability was an exclusion criterion for the MSSA, all participants had an ADL disability score of 0 at baseline. We considered participants to have exhibited the onset of new ADL disability if they indicated they were unable to perform one or more ADLs at the 7-year follow-up exam. Screened participants were allowed to participate in the MSSA if they indicated they were unable to perform none or one of the Rosow–Breslau mobility disability items. Thus, we considered participants to exhibit an increase in mobility disability if they reported an increase in the number of items they were unable to perform at the 7-year follow-up exam, as compared with the baseline exam measurement.

Mortality.—We identified deaths through contact with next of kin at the follow-up exams, the ongoing local monitoring of obituary notices, and National Death Index searches. As of the 7-year follow-up exam, a total of 273 participants had died.

Covariates.—We examined a number of variables (assessed at the baseline exam) that might be associated with feelings of usefulness to others and that may influence disability and mortality outcomes as covariates in analyses of associations

between feelings of usefulness and disability or mortality outcomes. We examined sociodemographic variables (e.g., age, gender) for inclusion in our analyses as potential confounders, as these variables may influence usefulness perceptions and health outcomes but are unlikely to be altered by such factors. We also examined baseline health conditions. In addition, we examined psychosocial and behavioral variables for inclusion in our analyses as potential mediators of associations between feelings of usefulness and disability or mortality outcomes. Although the concurrent measurement of these factors with feelings of usefulness rendered it impossible for us to establish the exact temporal nature of relationships between perceived usefulness and these variables, a reduction in the hypothesized association between perceived usefulness and the disability or mortality outcomes when we included these factors in analytic models would point to their potential mediational role.

Sociodemographic measures included gender, age (measured in years as of baseline interview), ethnicity (coded as White or African American), and educational attainment (years of completed education). We used past history, or current experience of, six health conditions as diagnosed by a physician (myocardial infarction, stroke, diabetes, hypertension, cancer, and broken hip), based on self-reports from previous annual EPESE exams (study participants were sampled from three community-based EPESE cohorts), and at the subsequent MacArthur baseline exam, to construct a summary measure of chronic health conditions (coded as the presence of none, one, or two or more self-reported chronic conditions). We also examined the presence or absence of a mobility limitation at the baseline exam for inclusion as a covariate in our analyses to control for possible influences on a subsequent increase in mobility disability, the onset of ADL disability, or mortality occurrence.

We assessed physical activity with questions adapted from the Yale Physical Activity Survey (Dipietro, Caspersen, Ostfeld, & Nadel, 1993) assessing frequency of engagement in leisure- and work-related activities. We computed summary indices by multiplying the frequency of activity (five categories, ranging from never to 3 or more times per week) by intensity codes (kilocalories per minute; adapted from Paffenbarger, Wing, & Hyde, 1978, and Taylor et al., 1978) and summing over all activities within a given category of intensity. The physical activity variable used in our current analyses assessed engagement in four categories of activity: inactive, engagement in moderate activities only, engagement in strenuous activities only, and engagement in both moderate and strenuous activities. We also examined waist-to-hip ratio, smoking behavior (coded as nonsmoker, exsmoker, or current smoker as of the baseline interview), and alcohol use (coded as nondrinker; light drinker, i.e., drank within the past year but less than 1 oz (~30 ml) in the past month, $M = 0.25$ oz, $SD = 0.32$; or moderate drinker, i.e., drank greater than 1 oz within the past month, $M = 11.62$ oz, $SD = 12.02$), as of the baseline interview, as potential covariates for use in our analyses.

We assessed social integration with a summary index of the self-reported number of children, close friends, and close relatives. We also assessed current marital status (married or not married). We assessed engagement in social activity with four dummy variables representing attendance at social club

meetings (never attend vs attend sometimes or often), attendance at religious services (never attend or attend less than monthly vs attend monthly to weekly), attendance at other social activities or meetings with a religious group (never attend vs attend sometimes or often), and engagement in volunteer activities (no volunteer work in the past year vs volunteer work in the past year). We assessed depressed mood with the Depression subscale of the Hopkins Symptom Checklist (Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974). Respondents indicated how distressed they were (1 = not at all to 4 = extremely) by 11 symptoms of depression (e.g., feeling blue, or feeling hopeless; possible scale score range = 11–44; internal reliability as assessed by Cronbach's alpha, $\alpha = 0.93$). We measured self-efficacy beliefs with a scale developed and validated by Rodin and McAvay (1992), assessing self-efficacy perceptions in managing interpersonal relationships and instrumental ADLs (e.g., arranging transportation). We computed a summary score of agreement ratings (1 = strongly disagree to 4 = strongly agree) for nine items measuring feelings of efficacy (possible scale score range = 9–36, $\alpha = 0.50$). We measured personal mastery beliefs with a seven-item scale developed by Pearlin and Schooler (1978). Respondents were asked to indicate their degree of agreement (1 = strongly disagree to 4 = strongly agree) with each item; from this, we computed a summary score (possible scale score range = 7–28, $\alpha = 0.63$).

Analyses

Participants selected for analyses of disability or mortality through the 7-year follow-up exam included 1,030 participants for whom complete information on feelings of usefulness, sociodemographic, health status, psychosocial and behavioral covariates, and disability or mortality information were available. Of the 159 participants not examined in analyses, 125 were missing information on one or more study variables and 34 refused participation in the 7-year follow-up exam.

We first examined the rates of occurrence of four categories of disability or mortality outcomes over the 7-year follow-up period: (a) no change in mobility disability or ADL disability onset, or slight improvement (1-point decrease) on the mobility disability measure; (b) an increase in mobility disability but no onset of ADL disability; (c) onset of ADL disability (the majority of participants who exhibited an increase on the ADL disability measure also showed increases on the mobility disability measure); or (d) death. We then examined the risk of each outcome by the three levels of feelings of usefulness to others: never or rarely felt useful, sometimes felt useful, and frequently felt useful to others.

Next, we examined the association between feelings of usefulness and our sociodemographic, health status, health behavior, and psychosocial covariates. For continuous measures, we examined linear trends for mean scores across the different levels of feelings of usefulness, and we used chi-square analyses to assess associations between group representation in categorical covariates and the feelings of usefulness categories. We then identified which of the covariates were significant predictors of one or more of our disability or mortality outcomes over the 7-year follow-up period by using multinomial logistic regression (comparing the likelihood of mobility disability increase, ADL disability onset, or mortality

occurrence with the likelihood of no change or slight improvement in physical ability). We then retained those covariates that were significant predictors ($p \leq .10$) of one or more of the outcomes, and that showed a significant association with feelings of usefulness, as covariates in subsequent analyses examining the feelings of usefulness variables as predictors of disability or mortality outcomes.

We then used multinomial logistic regression analyses to examine the likelihood of the disability and mortality outcomes as a function of level of feelings of usefulness to others when potential confounders and mediators of such associations were included in the model. A baseline model examined unadjusted odds ratios (ORs). A second model examined the OR estimates produced when potential sociodemographic and health status confounders were included in the model, and a third model added potential psychosocial and behavioral mediators. As we already described, we retained only those variables shown in previous analyses to be associated both with feelings of usefulness and the disability or mortality outcomes as potential confounders or mediators in the final set of models. We estimated the percentage of the primary effect of feelings of usefulness on disability and mortality outcomes explained by the set of potential behavioral and psychosocial mediators by calculating the percentage reduction in model regression coefficients between the second model, which did not contain the potential mediators, and the third model, which did include potential behavioral and psychosocial mediators [$(b_{\text{Model 2}} - b_{\text{Model 3}})/b_{\text{Model 2}}$].

RESULTS

Over the 7-year follow-up period, approximately one third of the individuals in the sample demonstrated increases in mobility disability ($n = 201$, or 19.5%) or exhibited the onset of one or more ADL disabilities ($n = 137$, or 13.3%; 123 of the 137 participants also showed increases in mobility disability), and almost one fourth of the persons in the sample died ($n = 252$, or 24.5%). However, a little over two fifths ($n = 440$, or 42.7%) of the individuals in the sample showed no change or slight improvement on measures of physical ability over the 7-year follow-up (15 of the 440 participants showed a 1-point decline in mobility disability).

At the baseline examination, the majority of participants indicated that they frequently felt useful to others, with smaller subsets of participants indicating that they only sometimes or never or rarely felt useful (see top of Table 1). As we can see in Figure 1, the proportion of participants within each category of the feelings of usefulness predictor who experienced increases in disability and mortality was greatest for those who indicated that they never or rarely felt useful to others at the baseline exam, next greatest for those who indicated that they only sometimes felt useful to others, and lowest for those who indicated that they frequently felt useful to others. In contrast, the proportion of the respondents who exhibited no change or a slight improvement in physical ability was largest among those indicating that they frequently felt useful to others, next largest among those who only sometimes felt useful, and smallest among those who never or rarely felt useful.

Mean scores on, or the percentage of participants in various categories of, each sociodemographic, psychosocial, behavioral,

Table 1. Sociodemographic, Psychosocial, Behavioral, and Health Status Variables by Feelings of Usefulness to Others Category

	Feelings of Usefulness to Others Category			<i>p</i> (Linear Trend)
	Never/Rarely (<i>n</i> = 60)	Sometimes (<i>n</i> = 349)	Frequently (<i>n</i> = 621)	
	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	
Age	75.0 (2.7)	74.3 (2.9)	74.1 (2.7)	.01
Education (years)	9.3 (3.4)	10.9 (3.1)	10.7 (3.4)	.00
Waist-hip ratio	.89 (.06)	.89 (.08)	.88 (.08)	.47
Depressed mood	15.0 (3.2)	14.7 (3.4)	13.8 (2.9)	.00
Self-efficacy beliefs	25.8 (2.3)	26.0 (2.4)	26.5 (2.4)	.01
Mastery beliefs	18.4 (2.2)	18.7 (2.4)	19.2 (2.2)	.01
No. of social ties	7.6 (4.7)	9.2 (4.6)	10.9 (5.4)	.00
	%	%	%	<i>p</i> (χ^2)
% Female	55.0	54.2	55.2	.95
% Caucasian	76.7	86.5	79.5	.02
% Married	38.3	49.3	48.8	.28
% With 1 mobility limitation at baseline	13.3	11.2	8.9	.34
Chronic conditions				
None	30.0	34.4	36.6	.33
One	36.7	39.8	41.2	
Two or more	33.3	25.8	22.2	
Physical activity				
None	28.3	19.2	21.7	.00
Moderate only	36.7	36.7	28.0	
Strenuous only	32.1	32.1	31.1	
Moderate + strenuous	18.3	12.0	19.2	
Alcohol use				
Non-drinker	51.7	42.4	49.8	.03
Light drinker	20.0	25.8	17.6	
Moderate drinker	28.3	31.8	32.7	
Smoking status				
Current smoker	25.0	16.3	14.7	.09
Ex-smoker	28.3	40.4	35.9	
Never smoked	46.7	43.3	49.4	
Attend clubs	41.7	45.6	53.0	.04
Attend other meetings	25.0	36.4	49.9	.00
Attend religious services	65.0	69.1	77.9	.00
Volunteer	11.7	22.6	32.9	.00

Notes: Possible range of scores for depressed mood is 11–44, for self-efficacy is 9–36, and for mastery is 7–28. Chronic conditions assessed with a summary measure of six prevalent chronic conditions (hypertension, diabetes, myocardial infarction, stroke, cancer, broken hip). Alcohol use classifications based on amount of alcohol consumed in last month/year at baseline interview (non-drinker = none, light drinker = drank within last year, but less than 1 oz. in last month (*M* = .25 oz, standard deviation [*SD*] = .32), moderate drinker = drank greater than 1 oz. within last month (*M* = 11.63 oz, *SD* = 12.01)).

and health status covariate are displayed in Table 1, by each category of the feelings of usefulness variable. In general, those with lower feelings of usefulness to others exhibited a poorer profile in terms of psychological well-being (e.g., higher levels of depressed mood and lower scores on self-efficacy and mastery beliefs), social integration and social activity (e.g., lower number of social ties, lower rates of engagement in social activities), and health behaviors (e.g., higher rates of current smoking, lower rates of physical activity). Those with lower

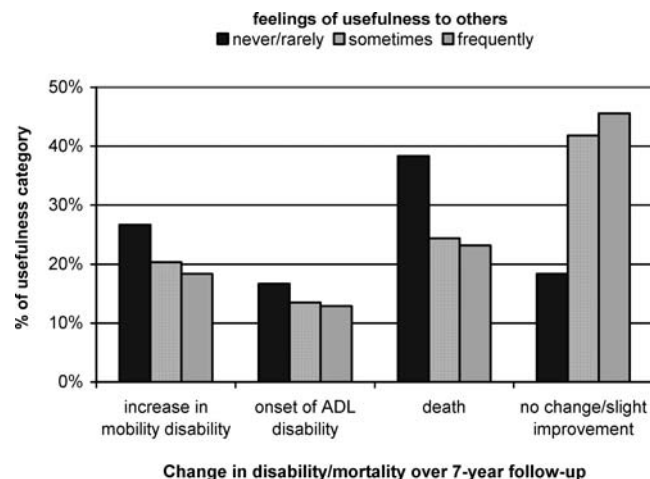


Figure 1. Proportion of participants in each category of the feelings of usefulness to others measure at the baseline exam that experienced each disability or mortality outcome event over the 7-year follow-up period. The proportions within each category add up to 100% across all four events (i.e., each participant within a category experienced one of the outcome events over each follow-up period).

feelings of usefulness were of slightly older age. The gender distribution of those in each category of the feelings of usefulness variable was relatively equivalent, however, as was the mean waist-to-hip ratio of participants.

Results from a multinomial logistic regression analysis examining all of the sociodemographic, health status, health behavior, and psychosocial covariates as predictors of the disability and mortality outcomes are displayed in Table 2. As age, years of education completed, physical activity level, alcohol use, smoking behavior, volunteer activity, levels of social integration, depressed mood, and self-efficacy beliefs predicted the likelihood of disability or mortality outcomes and were associated with levels of feelings of usefulness to others ($p \leq .10$), we retained these variables in subsequent multinomial logistic regression analyses examining feelings of usefulness as predictors of change in disability and mortality.

Results from the final set of multinomial logistic regression analyses are displayed in Table 3. Compared with individuals who frequently felt useful to others, individuals who never or rarely felt useful were at three times the odds of experiencing an increase in disability and over four times the odds of dying over the 7-year follow-up period (see unadjusted results in Model 1). These associations were reduced, but remained significant, when we adjusted for age and educational attainment (see Model 2). Further adjustment for behavioral and psychosocial factors led to only a further slight reduction in the OR estimates for mobility disability increase and mortality (percentage reduction in regression estimates, *bs*, from Models 2 to 3 was 2.6% for mobility disability increase and 5.8% for mortality), and a slight increase in the estimate for ADL disability onset.¹ The odds of disability increase or mortality for those individuals who sometimes felt useful to others showed a pattern of slightly higher likelihood of these outcomes in comparison with those who frequently felt useful to others, but these estimates were not statistically significant.

Table 2. Odds Ratios for Sociodemographic, Health Status, Health Behavior, and Psychosocial Variables as Predictors of Disability/Mortality Outcomes

	Disability/Mortality Outcome Over 7-Year Follow-Up					
	Increase in Mobility Disability ^a		Onset of ADL Disability ^a		Death ^a	
	OR	95% CI	OR	95% CI	OR	95% CI
Age	1.10**	1.03, 1.17	1.18***	1.09, 1.27	1.18***	1.11, 1.26
Gender (female)	1.16	0.70, 1.91	1.32	0.75, 2.34	0.35***	0.22, 0.57
Race (African American)	0.91	0.55, 1.51	1.17	0.68, 2.03	1.10	0.67, 1.80
Married (yes)	0.92	0.62, 1.36	0.79	0.50, 1.24	0.84	0.57, 1.22
Education (years)	1.00	0.94, 1.06	0.95	0.89, 1.02	0.95†	0.89, 1.00
1 Chronic health condition	1.01	0.68, 1.50	1.16	0.73, 1.84	0.86	0.58, 1.27
2+ Chronic health conditions	1.23	0.76, 1.99	1.36	0.78, 2.34	2.21***	1.43, 3.43
Moderate physical activity only	1.12	0.69, 1.81	1.05	0.60, 1.85	0.93	0.58, 1.49
Strenuous physical activity only	0.69	0.42, 1.14	0.72	0.40, 1.28	0.72	0.44, 1.17
Moderate + strenuous physical activity	0.43**	0.23, 0.81	0.67	0.34, 1.32	0.46**	0.26, 0.82
Light alcohol use	0.93	0.59, 1.47	1.03	0.60, 1.77	1.36	0.87, 2.13
Moderate alcohol use	0.68†	0.44, 1.06	1.11	0.67, 1.82	0.99	0.66, 1.50
Current smoker	1.78*	1.06, 2.97	0.99	0.51, 1.93	2.91***	1.77, 4.79
Ex-smoker	1.12	0.75, 1.67	1.12	0.72, 1.76	1.35	0.92, 1.98
Waist-hip ratio	2.00	0.14, 28.94	9.92	0.45, 216.6	0.49	0.03, 7.00
No. of social ties	1.04*	1.00, 1.07	1.04†	1.00, 1.08	1.00	0.97, 1.03
Attend club meetings	1.23	0.82, 1.84	1.20	0.76, 1.90	0.92	0.63, 1.37
Attend other meetings/activities	0.86	0.57, 1.32	1.15	0.71, 1.86	1.20	0.79, 1.82
Attend religious services	1.10	0.70, 1.72	0.93	0.55, 1.56	0.73	0.48, 1.09
Volunteer (yes)	0.65†	0.42, 1.01	0.80	0.49, 1.31	0.69†	0.44, 1.06
Depressed mood	0.99	0.94, 1.05	1.06†	0.99, 1.12	0.96	0.91, 1.02
Self-efficacy	0.96	0.89, 1.04	1.02	0.94, 1.12	0.90**	0.83, 0.97
Mastery	0.95	0.87, 1.04	0.93	0.84, 1.03	1.03	0.94, 1.12

Notes: Bolding indicates that variable is a significant predictor of disability or mortality outcome. ADL = activities of daily living; OR = odds ratio; CI = confidence interval.

^aNo change in Rosow-Breslau mobility disability and Katz ADL measure of disability/slight improvement in Rosow-Breslau mobility disability used as reference group in analyses.

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$; † $p \leq .10$.

We also computed unadjusted relative risk (RR) estimates for feelings of usefulness variables as predictors of disability and mortality outcomes.² Although the pattern of RR estimates (see End Note 1 for estimates) was similar to that of the OR estimates, with greater RR of each outcome's occurring in those individuals who never or rarely felt useful as compared with those who frequently did, the magnitude of the OR estimates was considerably greater than that of the RR estimates, as is frequently the case when the rates of outcomes are not rare (i.e., >10%; see Davies, Crombie, & Tavakoli, 1998).

DISCUSSION

In this relatively high-functioning sample of older adults, those participants who indicated that they never or rarely felt useful to others were more likely to experience increases in mobility disability, the onset of ADL disability, or mortality over a 7-year follow-up period compared with those who frequently felt useful. This association was reduced somewhat but remained significant when we accounted for sociodemographic covariates, and it was only further slightly reduced when we included potential psychosocial and behavioral mediators in our analyses. Although those persons who only sometimes felt useful to others also showed a pattern of greater odds of an increase in disability or mortality, these associations were weaker and not statistically significant.

Our findings also indicate that those individuals with low feelings of usefulness had less favorable scores on measures of psychological and social well-being, including lower levels of self-efficacy and mastery, higher levels of depressed mood, and lower levels of social integration and social activity, and were more likely to report poor health behaviors, such as low rates of physical activity and higher rates of smoking. Many of these factors were also associated with the likelihood of disability and mortality outcomes examined in this study. Of those that were associated with both feelings of usefulness and one or more of the disability or mortality outcomes, only lack of engagement in physical and volunteer activity, smoking, and lower feelings of self-efficacy emerged as independent predictors of disability and mortality outcomes in multivariate analyses, and these potential mediators accounted for only a small portion of the primary association between feelings of usefulness and these outcomes. Given the contemporaneous measurement of these variables with the assessment of feelings of usefulness, we were unable to establish the temporal nature of association among these variables; thus, these factors may be as likely to influence perceptions of usefulness as to be influenced by such feelings. Future research examining relationships between feelings of usefulness and these behavioral and psychosocial factors as they unfold over time is needed for us to understand the associations among these variables and their subsequent impact on health outcomes in older adults.

Table 3. Odds Ratios for Feelings of Usefulness to Others Variables as Predictors of Disability/Mortality Outcomes in Unadjusted Models and Covariate-Adjusted Models

	Disability/Mortality Outcome Over 7-Year Follow-Up					
	Increase in Mobility Disability ^a		Onset of ADL Disability ^a		Death ^a	
	OR	95% CI	OR	95% CI	OR	95% CI
Model 1: Unadjusted						
Never/rarely feel useful ^b	3.61**	1.63, 8.02	3.22**	1.32, 7.84	4.11**	1.95, 8.66
Sometimes feel useful ^b	1.21	0.84, 1.73	1.14	0.75, 1.72	1.14	0.82, 1.60
Model 2: +Sociodemographic covariates ^c						
Never/rarely feel useful ^b	3.18**	1.43, 7.11	2.60*	1.06, 6.41	3.35**	1.57, 7.13
Sometimes feel useful ^b	1.20	0.84, 1.71	1.11	0.73, 1.69	1.13	0.081, 1.59
Model 3: +Behavioral & psychosocial covariates ^d						
Never/rarely feel useful ^b	3.08**	1.35, 7.07	2.65*	1.05, 6.68	3.13**	1.43, 6.84
Sometimes feel useful ^b	1.07	0.74, 1.57	1.05	0.68, 1.62	0.99	0.69, 1.41
Covariates for Models 2 and 3:						
Age	1.09**	1.02, 1.17	1.18***	1.09, 1.27	1.17***	1.10, 1.24
Education (years)	1.01	0.95, 1.07	0.95‡	0.89, 1.01	0.94*	0.89, 1.00
Moderate physical activity only	1.16	0.72, 1.86	1.02	0.58, 1.77	0.91	0.57, 1.43
Strenuous physical activity only	0.70	0.43, 1.15	0.67	0.38, 1.19	0.74	0.46, 1.18
Moderate + strenuous physical activity	0.42**	0.23, 0.78	0.59	0.31, 1.15	0.51*	0.29, 0.88
Light alcohol use	0.98	0.62, 1.54	1.06	0.62, 1.80	1.45‡	0.95, 2.24
Moderate alcohol use	0.67‡	0.44, 1.02	1.02	0.64, 1.64	1.25	0.84, 1.84
Current smoker	1.67*	1.01, 2.78	0.90	0.47, 1.73	2.85***	1.77, 4.59
Ex-smoker	1.06	0.72, 1.56	1.01	0.66, 1.56	1.77***	1.23, 2.54
Volunteer (yes)	0.68‡	0.45, 1.03	0.91	0.58, 1.42	0.71‡	0.48, 1.05
No. of social ties	1.04*	1.01, 1.08	1.04*	1.00, 1.08	1.02	0.99, 1.06
Depressed mood	1.00	0.95, 1.06	1.07*	1.00, 1.13	0.97	0.92, 1.02
Self-efficacy	0.95	0.88, 1.02	1.00	0.92, 1.09	0.92*	0.86, 0.99

Notes: Bolding indicates that variable is a significant predictor of disability or mortality outcome. ADL = activities of daily living; OR = odds ratio; CI = confidence interval.

^aNo change in Rosow-Breslau mobility disability and Katz ADL measure of disability/slight improvement in Rosow-Breslau mobility disability used as reference group in analyses.

^bParticipants reporting that they frequently felt useful to others used as reference group in analyses.

^cModel 2 adds age and years of education as model covariates.

^dModel 3 adds physical activity, alcohol use, smoking status, volunteer activity, number of social ties, depressed mood and self-efficacy as model covariates.

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$; ‡ $p \leq .10$.

One strength of the current set of analyses is that participants were free of major disability at the baseline exam, which is when feelings of usefulness were measured, thereby minimizing the likelihood that low feelings of usefulness at baseline were the result of disablement. Nonetheless, it will be important for researchers to evaluate the possible bidirectionality of links between feeling useful and disability status and their associations over time. It is plausible that these two variables can operate in a synergistic fashion, with increasing levels of one variable leading to an increase in the other and continuing increases in both variables leading to even poorer states of health.

Little is known about the stability of perceptions of social usefulness over time in older adults. Although we did not examine change in feelings of usefulness in the present analyses, we have observed that usefulness perceptions remain stable over a 3-year period for the majority, that is, over 60%, of older adults in this sample (unpublished data). However, the remaining 40% of surviving older adults show change in their usefulness perceptions, with approximately half showing an increase in perceived social usefulness and approximately half showing a decrease. This observation suggests that not only

will it be important to understand the correlates and potential health impacts of change or stability in perceived usefulness over time, but it might also be fruitful to explore interventions aimed at maintaining or enhancing perceptions of social usefulness in older adults, especially if future research indicates that stable positive perceptions of usefulness or improvements in perceived usefulness are related to more favorable health outcomes in older adults.

It is important to note that low feelings of usefulness were observed in only a small number of older adults (~6%) in this sample, and that only this minority of older adults exhibited an increased likelihood of increases in disability and mortality compared with older adults with high feelings of usefulness. Those individuals with more moderate feelings of usefulness did not show a statistically significant increased risk of disability increase or mortality. The relatively small number of older adults indicating low feelings of usefulness may be the result of study selection criteria that selected for relatively high-functioning older adults, thus limiting the number of older adults who did not feel useful at baseline. Other studies, which have not specifically recruited high-functioning older adults (e.g., Okamoto & Tanaka, 2004), have shown larger

percentages of older adults reporting low or moderate levels of perceived usefulness to others, and they have shown evidence of graded associations with health outcomes across levels of usefulness. Thus, the poorer health states that occur with lower perceptions of usefulness may not be limited to only a small minority of older adults, as was observed in the present study.

One limitation of the present investigation was the measure of feelings of usefulness to others. Although the single-item measure was high in face validity, one might achieve better construct validity by examining these feelings with a more comprehensive set of questions. Nevertheless, other investigators (e.g., Okamoto & Tanaka, 2004; Pitkala et al., 2004) employing similar limited measures of feelings of usefulness have also found that these feelings predict health status and mortality outcomes, and that answers on a single-item measure show high agreement with scores derived from a multi-item usefulness measure (Okamoto & Tanaka). Still, it should be acknowledged that although these simple measures may be effective in capturing older adults' general sense of usefulness to others, such measures do not provide any detailed information on the social targets or criteria upon which individuals judge their levels of usefulness, which may limit our understanding of links between perceptions of usefulness and health outcomes. The measure used in this investigation only queried the perceived usefulness to friends and family, so our findings may not generalize to usefulness perceptions in regard to other social targets (e.g., one's neighborhood, community).

A second limitation was the observational nature of the present study; feelings of usefulness, changes in disability, and mortality occurrence were simply measured over time without active intervention. It will be important to discern whether active interventions can modify feelings of usefulness and whether changes in such feelings will have an impact on disability, morbidity, and mortality. A third limitation concerns our examination of disability and mortality outcomes over a single 7-year follow-up period. Although we have documented that low feelings of usefulness are associated with a similar pattern of increased likelihood of disability increase and mortality over a shorter 3-year follow-up period (data not shown), the time frame of assessments within the MacArthur Study are less likely to capture shorter term fluctuations in disability that may occur in older adults and that may be associated with feelings of usefulness. Recent research by Gill and colleagues (2006) in which disability status was assessed monthly over multiple years indicates significant rates of transitions from states of physical disability to independence and vice versa. Similar fluctuations may have occurred in MacArthur participants and may be associated with feelings of usefulness, but we may have been unable to capture such transitions with single assessments that were spaced years apart. However, we should note that the rate of transitions from disability to a less severe state of disability or no disability over the time period from the 3- to 7-year follow-up assessments in the MacArthur cohort was very low. Although this does not rule out the possibility that important transitions occurred in shorter intervening time periods, we do not appear to have missed significant reductions in disability level over the 7-year follow-up period by omitting information from the 3-year assessment.

Another potential limitation concerns the generalizability of our findings to other populations of older adults. MSSA

participants were selected for high levels of cognitive and physical functioning in comparison with their peers, which may mean that observed associations may not generalize to older adults with lower levels of functional status. Although it is likely that the small number of participants reporting low levels of usefulness and the high functioning level of the sample may have made it more difficult to observe links between low feelings of usefulness and increased disability and mortality risk, providing greater support for observed findings, it may also be that the strength of these associations is affected by the functional status of the respondents at the time of the perceived usefulness assessment.

Perhaps the most significant contribution of the present findings is that they highlight feelings of usefulness to others as a potentially important predictor of an older adult's functioning and health status. Such feelings have been largely ignored in previous investigations of the effects of social relations on functioning, morbidity, and mortality. The current results suggest that older individuals who never or rarely feel useful to others may be a vulnerable group that should be targeted for psychosocial and medical attention and intervention. These preliminary findings also suggest that greater attention should be paid to the factors that might promote feelings of usefulness in older adults. For example, participation in social activity interventions, such as engagement in meaningful volunteer activities that serve to help others, may help to increase feelings of usefulness in older adults and may be particularly helpful for older adults who suffer from feelings of low usefulness or lack social inputs for such feelings. If future research continues to support a link between health and feeling useful, it will be important for us to understand how we can enhance and maintain these feelings in elder adults. Such efforts will help to ensure that those individuals in the third age live not only longer but also healthier and more productive lives.

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Address correspondence to Tara L. Gruenewald, Department of Medicine/Geriatrics, UCLA Geffen School of Medicine, 10945 Le Conte Avenue, Suite 2339, Los Angeles, CA 90095-1687. E-mail: tgruenewald@mednet.ucla.edu.

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END NOTES

¹Analyses using an alternative propensity-score covariate adjustment technique, which adjusted for all sociodemographic, health status, health behavior, and psychosocial covariates with the use of two propensity scores (which reflect the likelihood of being in the never or rarely and sometimes useful predictor categories), yielded similar findings to those reported here with the use of individual covariates in analyses.

²For relatively common outcomes (i.e., events that occur in greater than 10% of the population), such as the outcomes examined in

the present analyses, OR estimates will be of considerably larger magnitude than RR estimates. Although RR estimates are intuitively easier to comprehend, the use of OR estimates (derived from logistic regression analyses) is preferred when it is desirable to adjust for a large number of covariates, as was the case in the present study. For interested readers, we calculated the following RR values from OR estimates in models presented in Table 3: increase in mobility disability, RRs for never or rarely useful predictor = 1.45 (Model 1), 1.28 (Model 2), and 1.24 (Model 3); RRs for sometimes useful predictor = 1.11 (Model 1), 1.10 (Model 2), and 0.98 (Model 3); onset of ADL disability, RRs for never or rarely useful predictor = 1.30 (Model 1), 1.05 (Model 2), and 1.07 (Model 3); RRs for sometimes useful predictor = 1.05 (Model 1), 1.02 (Model 2), and 0.96 (Model 3); death, RRs for never or rarely useful predictor = 1.65 (Model 1), 1.35 (Model 2), and 1.26 (Model 3); RRs for sometimes useful predictor = 1.05 (Model 1), 1.04 (Model 2), and 0.91 (Model 3). These RR values should be interpreted with caution, as there is some concern regarding the conversion of OR to RR values in models with a substantial number of covariates.

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Program Chair for 2006:

Jennifer Mendez, PhD
Wayne State University
Institute of Gerontology
87 East Ferry, #239
Detroit, MI 48202
j.mendez@wayne.edu



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