Published in final edited form as:

J Aging Health. 2009 March ; 21(2): 398–425. doi:10.1177/0898264308329023.

Increased Mortality Risk in Older Adults with Persistently Low or Declining Feelings of Usefulness to Others

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Abstract

Objectives—To determine if persistently low or declining feelings of usefulness to others in later life predicts increased mortality hazard in older adults.

Methods—Data on change in perceptions of usefulness, health, behavioral and psychosocial covariate factors, and mortality originate from the MacArthur Study of Successful Aging, a prospective study of 1,189 older adults (age 70–79 years).

Results—Older adults with persistently low feelings of usefulness or who experienced a decline to low feelings of usefulness over the first 3-years of the study experienced a greater hazard of mortality (sociodemographic adjusted HR = 1.75 (95% CI = 1.22 to 2.51)) over a subsequent 9-year follow-up as compared to older adults with persistently high feelings of usefulness.

Discussion—Older adults with persistently low perceived usefulness or feelings of usefulness that decline to a low level may be a vulnerable group with increased risk for poor health outcomes in later life.

Keywords

older adults; perceived usefulness; perceptions of aging; mortality

Engagement in social and productive activities, especially those which contribute to the well-being of others and society, are often cited indicators of healthy or successful aging in later life (Fischer, 1995; Moody, 2001; Rowe & Kahn, 1998). The desire to contribute to others, be productive, and feel useful have also been cited as important motives for volunteerism and social activity in older adulthood (Hainsworth & Barlow, 2001; Okun, 1994). Such activity may, in turn, benefit older adults' mental and physical well-being. A sizable body of research indicates that greater engagement in social and productive activity is linked to better functioning and health and greater longevity in later life (e.g., Glass, de Leon, Marottoli, & Berkman, 1999; Mendes de Leon, Glass, & Berkman, 2003; Menec, 2003; Musick, Herzog, & House, 1999).

A handful of studies have also shown that what older adults *think* about their social value and usefulness may be as important as their actual activity in terms of an impact on health. Such work has focused on whether *perceptions* of social usefulness are linked with disability and mortality outcomes in later life. Studies of rural-dwelling French (age 60 years and older) and Japanese (aged 65 years and older) elders have shown that compared to older adults who frequently felt useful to others, those with low feelings of social usefulness were more likely

to experience increases in physical disability and impairments in the ability to perform activities of daily living (ADLs) and more likely to die over follow-up periods of four to six years (Grand, Grosclaude, Bocquet, Pous, & Albareda, 1988; Okamoto & Tanaka, 2004). Similarly, not feeling needed by others predicted greater risk of institutionalization and mortality in a study of older Finnish adults (those age 75, 80, and 85 years; Pitkala, Laakkonen, Strandberg, & Tilvis, 2004)). These findings were recently replicated in a sample of older Americans; compared to elder Americans (those age 70–79 years) with high feelings of usefulness to others at study entry, those with low feelings of social usefulness were more likely to show increases in physical disability (ADL and mobility impairments) or to die over a seven-year follow-up period (Gruenewald, Karlamangla, Greendale, Singer, & Seeman, 2007).

To date, studies on feelings of social usefulness in older adults demonstrate that characteristics of usefulness perceptions, such as having low versus high feelings of social usefulness, predict the likelihood of poor functioning and health outcomes years later. However, there has been relatively little work that has explored how these feelings change over time and the health correlates of different patterns of change in these perceptions. Older adults who maintain high feelings of usefulness may experience quite different health trajectories from those with persistently low or declining feelings of usefulness over time. A study of Japanese community-dwelling elders reported that feelings of usefulness to others were essentially stable over a six-year period (Okamoto & Tanaka, 2004). However, the stability of feelings of usefulness for other samples of elders, including older Americans, has not been examined.

In addition, little is known regarding the social, behavioral or health correlates of change in perceptions of social usefulness. A number of characteristics of older adulthood, including declines in social, productive and physical activity, shrinking social networks, and deteriorations in health and functioning may have a negative impact on feelings of social usefulness. Although there is substantial variability in rates of participation in productive and social activity among older adults (Glass, Seeman, Herzog, Kahn, & Berkman, 1995), in general, older adulthood is characterized by a decline in such activities (Herzog, Kahn, Morgan, Jackson, & Antonucci, 1989; Rossi, 2004). Declines in social and productive activity may act to erode feelings of social usefulness, as older adults lose sources of activity in which a focus is on helping or doing for others. Another factor that may impact feelings of social usefulness are changes in the social networks of older adults, including a decrease in number of social ties and the frequency of interactions with ties due to poor health of network members, declines in social and productive activity, and deteriorations in functioning and health (Benjamins, Musick, Gold, & George, 2003; Cerhan & Wallace, 1993; Wenger & Burholt, 2004). The shrinking size of social networks in later adulthood limits the number of social targets to whom older adults can feel useful. Declines in functioning and health status may also constrain older adults' ability to provide meaningful services to others, and may thereby have a negative impact on older adults' perceptions of their level of usefulness to others.

On the other hand, changes in feelings of social usefulness may themselves have an impact on social factors, health behaviors and health and functioning. As previously noted, the desire to be useful and productive is one motivator of social and productive activity (Hainsworth & Barlow, 2001; Okun, 1994); older adults with persistently low or declining feelings of usefulness may perceive that they have little to offer others and as a consequence may be less likely to initiate social interaction or engage in productive social activity. Negative changes in feelings of social usefulness may also impact self-care and engagement in health promotion behaviors. Less positive self-perceptions of aging, including the belief that one remains useful as one ages, predicted lower engagement in preventative health behaviors over a 20-year follow-up in a study of older adults (Levy & Myers, 2004). Previous investigations have also noted concurrent associations between low feelings of usefulness and poor health behaviors, including low levels of physical activity and smoking in older adults (Grand et al., 1990;

Gruenewald et al., 2007). Although no study to date has examined associations between changes in perceptions of social usefulness and changes in health behavior over time, declining feelings of social usefulness may sap elders' motivation to engage in health-promoting activities. As also previously reviewed, low feelings of social usefulness measured at a baseline point have been found to predict poor functioning and health outcomes years later, thus it is likely that the persistent experience of low feelings of usefulness or declines in these feelings over time may be detrimental for functioning and health in later life.

The present study extends research in this area by examining how feelings of social usefulness change over time in older adulthood, the social, behavioral and health correlates of change in these feelings, and whether specific patterns of change in feelings of social usefulness differentially predict mortality risk in later life. Specifically, this study examines patterns of change in feelings of usefulness over a 3-year period in a cohort of older adults (age 70–79 at study entry) from the MacArthur Study of Successful Aging, and the association between change in usefulness perceptions over this period and hazard of mortality over a subsequent 9-year period. Associations between patterns of change in feelings of social usefulness and concurrent patterns of social, behavioral, health and functioning variables are also assessed. Given the concurrent measurement of these variables, it is difficult to disentangle whether changes in feelings of social usefulness might alter social, behavioral and health states, or whether changes in social relationships/activity, behavior and health status might impact feelings of social usefulness. As reviewed above, it is likely that relationships between perceptions of usefulness and these social, behavioral and health factors are bidirectional, affecting each other in a reciprocal fashion over time. However, alterations in the association between patterns of change in feelings of social usefulness and mortality hazard when including social, behavioral and health covariates into analytic models will at the very least provide knowledge as to mechanisms that may be involved in links between usefulness perceptions and mortality.

Method

Participants

Participants were from the MacArthur Study of Successful Aging (MSSA), a prospective investigation of the psychosocial, behavioral and health status factors associated with successful aging in a sample of older adults (aged 70–79). Participants were recruited on the basis of age and physical and cognitive 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. (Cornoni-Huntley, Ostfeld, Taylor, Wallace, Blazer, Berkman et al., 1993) MSSA study selection criteria were designed to eliminate individuals with manifest functional disability and obtain a cohort of elders performing in the top third of their age group with regard to physical and cognitive functioning. (Berkman, Seeman, Albert, Blazer, Kahn, Mohs et al., 1993) Criteria included: (1) no more than one reported functional limitation on eight items assessing gross mobility and range of motion (Nagi, 1976; Rosow & Breslau, 1966); (2) no reported disability on the seven-item Activities of Daily Living (ADL) Scale (Katz, Downs, Cash, & Grotz, 1970; Katz, Ford, Moskowitz, Jackson, & Jaffe, 1963); (3) ability to stand from a seated position at least five times within twenty seconds; (4) ability to hold a semi-tandem balance for at least ten seconds; (5) remembering three or more of six elements on a delayed recall of a short story, (Pfeiffer, 1975) and (6) scoring six or more correct on the nine-item Short Portable Mental Status Questionnaire. Of 4,030 age-eligible men and women screened, a cohort of 1,313 met all screening criteria. Of these, 1,189 (90.6%) agreed to participate and provided informed consent. The sample was predominantly White (80.7% White, 18.8 % African-American, 0.5% other) and had slightly more women than men (women 55.4%, men 44.6%). Data were collected at a baseline (1988–1989) and 3-year (1991–1992;

$n = 1103$) and 7-year (1995–1996; $n = 853$) follow-up exams via in-home and phone interviews. Mortality was ascertained through the year 2000. All study procedures were approved by Institutional Review Boards at study sites.

Measures

Perceptions of usefulness—Participants' ratings of their perceived level of usefulness to others were assessed at the baseline and 3-year follow-up exam with the following question: "How often do you feel useful to your friends and family?" Response options were never, rarely, sometimes, and frequently. For the purpose of analyses, these response categories were labeled *low* (never/rarely feel useful), *moderate* (sometimes feel useful), and *high* (frequently feel useful). Usefulness ratings at both exams were used to construct nine categories representing the pattern of ratings across the first three years of the study: *consistently low*, *consistently moderate or consistently high*, a decrease in perceptions of usefulness (*decrease from high to moderate, from high to low, from moderate to low*), or an increase in perceptions of usefulness (*increase from low to moderate, from low to high, from moderate to high*).

Covariates—Sociodemographic measures and variables reflecting baseline and 3-year change in social, health behavior, and health status/disability domains were included as covariates in multivariable analyses. Sociodemographic measures included sex, age at baseline interview, race/ethnicity (White/Caucasian or African-American), and educational attainment coded as a high school degree or greater, or less than a high school degree. Social relationship and activity covariates included number of social ties, marital status, attendance at social clubs/organizations and at religious services, and engagement in volunteerism, paid employment and childcare as measures of social and productive activity. Number of social ties was assessed as the sum of self-reported number of children, close friends, and close relatives at each exam; change in tie numbers was computed as the simple difference between the total number at the baseline and follow-up exams. Marital status was coded as married or not married at the baseline exam, and widowed/divorced or no change in marital status/gained spouse over the 3-year follow-up. Attendance at social clubs/organizations and religious services were each assessed with dummy variables representing frequency of attendance at each exam (social clubs/organizations: attend monthly, weekly or never attend (never attend as referent group); religious service attendance: attend weekly or less than weekly (less than weekly as referent group). Engagement in volunteer activities over the previous year was assessed with two dummy variables (yes/no) at the baseline and at 3-year follow-up exam. Current engagement in paid employment at the baseline and 3-year follow-up exam was also represented with two dummy variables (yes/no at each exam). Caring for a child living inside or outside the home (yes/no) was also assessed at the baseline and 3-year follow-up exam.

Health behavior covariates included levels of physical activity and smoking behavior. Summary scores of the number of days spent each month engaged in housework, yardwork, and recreation/fitness activities were computed at the baseline and three-year follow-up exams, using items from commonly-used measures of physical activity (Dipietro, Caspersen, Ostfeld, & Nadel, 1993; Taylor, Jacobs, Schucker, Knudsen, Leon, & Debacker, 1978). Change in physical activity from the baseline exam to the 3-year follow-up exam was computed as the difference between scores at the two exams (positive scores indicate an increase in activity). Smoking status was coded as non-smoker, ex-smoker, or current smoker at baseline, and consistent non-smoker, current smoker, or long-term/recent ex-smoker as of the 3-year follow-up exam.

Health status and disability covariates included measures of major/chronic disease burden, depressed mood, physical disability and limitations in activities of daily living (ADLs). Current or past experience of six health conditions as diagnosed by a physician (myocardial infarction,

stroke, diabetes, hypertension, cancer, broken hip) was used to construct a summary measure of chronic health conditions at the baseline exam (coded as the presence of none, one, or two or more self-reported chronic conditions). An additional variable represented the experience (yes/no) of one or more new chronic conditions by the follow-up exam. Depressive symptomatology was assessed with the depression subscale of the Hopkins Symptom Checklist (Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974); change in depression across the 3-year follow-up was computed as the simple difference in scores between the baseline and follow-up exams. The presence or absence of physical disability at baseline was assessed with the gross mobility, range of motion and strength screener (see above - all participants screened to have one or no physical ability impairments at baseline). A second variable represented change in number of physical impairments from the baseline to the 3-year follow-up exam (increase or no change/slight improvement (i.e., moving from 1 to 0 impairments)). An additional variable represented the onset of one or more ADL impairments from the baseline to 3-year follow-up (all participants screened to have a score of 0 at baseline).

Mortality—The occurrence and date of death of MSSA participants through the year 2000 was obtained through links with the National Death Index (NDI) and contact with next of kin at follow-up exams. Date of death information from the NDI was available for all but three of the deceased participants, whose deaths were confirmed by next of kin contact at the 7-year follow-up (1995) exam. As the actual date of death was unknown for these subjects, they were assigned a date of death that occurred approximately halfway in between their 3-year follow-up (1991) exam date and their 7-year follow-up (1995) exam contact date. Survival time was calculated as the time that elapsed between participants' 3-year follow-up exam date and date of death, or the date 12/31/00, which served as the censor date for participants still alive as of the year 2000.

Missing data—Of the 1,189 participants enrolled into the study, 1,027 provided usefulness ratings at the baseline and 3-year follow-up exam. Of the 149 participants missing information on usefulness ratings, 71 died, 43 refused participation, and 2 were lost to follow-up for unknown reasons as of the 3-year exam; 33 participated in the 3-year follow-up exam but did not provide perceived usefulness ratings. Of the 1,027 participants available for analyses, 2 were missing data on change in number of social ties, 2 were missing data on change in marital status, 1 was missing information on social club attendance at the 3-year follow-up exam, 4 and 2 were missing data on religious service attendance at baseline and the 3-year follow-up, respectively, 8 and 12 were missing data on child care participation at the baseline and follow-up exam, respectively, and 52 were missing data on change in depression scores. These missing values were replaced with the sample mode or mean.

Analyses

Kaplan-Meier analyses were used to compute unadjusted mean survival times for categories of change in perceptions of usefulness over the 3-year follow-up. Cox regression analyses examined patterns of change in feelings of usefulness over the first three years of the study as predictors of the hazard of dying over a subsequent nine-year follow-up period when adjusting for covariate factors. A baseline model (Model A) assessed hazard ratios for change in feelings of usefulness predictors when adjusting for sociodemographic factors. A second model (Model B) additionally adjusted for baseline measures of social factors, health behaviors, and health and disability measures. Three additional models additionally adjusted for concurrent patterns of social activity or changes in social activity over the 3-year follow-up (Model C), patterns of health behaviors at or over the 3-year follow-up (Model D), or changes in health or disability over the 3-year follow-up (Model E). A final model (Model F) included all sociodemographic, social, behavioral, and health covariates from the baseline and 3-year follow-up exam. Visual inspection of the log minus log plot of the survival function and an additional model including

interaction terms representing the interaction between the usefulness change category predictor and time confirmed that the proportional hazards assumption of the Cox regression model was not violated for the usefulness change predictor. All analyses were run with SPSS version 15.0 (SPSS Inc, Chicago, IL).

Results

Most participants had consistently high or moderate ratings of perceived usefulness at both the baseline and 3-year follow-up exam, and substantial numbers also changed from moderate to high or from high to moderate ratings over the follow-up (see Table 1). A small number of subjects had consistently low ratings ($n = 18$), decreased from a high or moderate to a low rating ($n = 33$ and 28 , respectively), or increased from a low to a moderate or high rating ($n = 23$ and 16 , respectively). Given the low number of participants in some change pattern categories, those who had consistently low ratings or decreased to a low rating at the follow-up exam were combined into one category ($n = 79$), and those that increased from a low to a moderate or high rating ($n = 39$) were combined into a single category (see Table 1).

The profile of scores on sociodemographic, social, behavioral and health status variables at baseline and across the first three years of the study for those with different patterns of change in perceptions of social usefulness over the three-year period are detailed in Table 1. In general, those with persistently high perceptions of usefulness had a more favorable profile of scores on the covariate measures as compared to the other groups, with higher levels of social integration, greater levels of social activity, lower levels of depressed mood and a lower proportion experiencing the presence of a physical disability at baseline. There was little variation in health behaviors between the groups, although those with persistently high perceptions of usefulness did engage in slightly higher frequency of physical activity and reported lower rates of current smoking. Those with persistently low or those who declined to low feelings of social usefulness over the first three years of the study tended to have the poorest profile on the social, behavioral and health measures, and also showed much higher rates of the onset of ADL impairment and the emergence of new chronic health conditions over the three year follow-up, while those with a mixture of moderate and high feelings of usefulness tended to have more moderate profiles of social, behavioral and physical well-being. Those who increased from low to moderate or high perceptions of usefulness over the first three years of the study also evidenced poor levels of well-being in terms of levels of social integration and social activity, and presence of a physical disability at baseline.

Average survival time for each change in usefulness perceptions category is also detailed in Table 1. Those with persistently low/declining to low perceptions of usefulness had the lowest average survival time (7.1 years), while those with persistently high feelings of usefulness lived the longest, on average (8.3 years). Mortality hazard ratios from Cox regression analyses adjusting for covariate factors are presented in Table 2. Compared to older adults with persistently high perceptions of usefulness over the 3-year period, those in every other group had a higher hazard of death over the subsequent 9-year follow-up period. Those with persistently low/declining to low perceptions of usefulness, as well as those who started out with low perceptions of usefulness but increased to moderate or high levels by the 3-year exam, experienced a significantly greater hazard of death as compared to those with persistently high perceptions of usefulness in a model (Model A) adjusting for sociodemographic covariates ($HR = 1.75$ (95% CI = 1.22, 2.51) and $HR = 1.72$ (95% CI = 1.08, 2.73), respectively). The greater mortality hazard for those with persistently low/declining to low feelings of usefulness remained significant, albeit slightly reduced ($HR = 1.59$ (95% CI = 1.09, 2.31)), when including baseline social, behavioral, and health/disability covariates into the model (Model B). Number of major/chronic health conditions, physical activity frequency and smoking behavior at the baseline exam were significant covariate predictors in this model. The inclusion of covariates

reflecting concurrent changes in social ties or patterns of social activity as of the 3-year follow-up (Model C) led to a moderate reduction (16% reduction) in the hazard ratio for those with persistently low or declining to low feelings of usefulness ($HR = 1.47$ (95% CI = 1.01, 2.15)), as compared to the model with the full set of baseline covariates (Model B), although only change in number of social ties was an additional marginally significant covariate predictor in this model. The inclusion of covariates reflecting concurrent changes in health behaviors, or health behaviors as of the 3-year follow-up (Model D), had no significant impact on the greater mortality hazard in those with persistently low or declining to low feelings of usefulness. However, the inclusion of covariates reflecting changes in health and disability status over the first three years of the study (Model E) was associated with a moderate reduction (18% reduction) in the hazard ratio for those with persistently low or declining to low feelings of usefulness ($HR = 1.46$ (95% CI = 1.00, 2.13)). Both the emergence of one or more new major/chronic conditions and an increase in physical disability were additional significant covariate predictors in this model (Model E). In a final model (Model F) adjusting for sociodemographic and all baseline and 3-year follow-up social, behavioral and health/disability variables, the hazard ratio for those with persistently low or declining to low feelings of usefulness was reduced in magnitude (32% reduction from Model B which included all baseline covariates) and significance ($HR = 1.37$ (95% CI = 0.93, 2.00)). In this final model, only number of major/chronic health conditions and physical activity frequency at baseline, and the emergence of one or more new major/chronic health conditions and an increase in physical disability over the first three years of the study, were significant covariate predictors of mortality hazard.

Discussion

The goals of the current investigation were to examine how older adults' perceptions of usefulness to others change over time, the social, behavioral and health correlates of different patterns of change in perceptions of usefulness, and the potential impact of change in perceptions of social usefulness on mortality hazard. The majority (~60%) of participants reported stable perceptions of usefulness to others over the first three years of the study, with most reporting consistently high or moderate levels of perceived usefulness, and a small minority reporting consistently low levels of perceived usefulness. This finding is consistent with previous research suggesting a fair degree of stability in these perceptions in later adulthood (Okamoto & Tanaka, 2004). However, roughly 40% of participants in this cohort reported a change in perceived usefulness over time, with patterns of increase occurring almost as frequently as patterns of decline, indicating that these perceptions are mutable even in older age.

In general, older adults who maintained high feelings of social usefulness over time exhibited the most favorable profiles of social functioning, health behavior, and health/disability status at study entry and over the first three years of the study. Elders with persistently moderate perceptions of social usefulness or a mixture of moderate and high levels over time exhibited more moderate levels of social, behavioral and physical well-being, while those with persistently low feelings of usefulness or who declined to a low level over the first three years of the study tended to have the most negative profile on social, behavioral and health measures. Older adults who started out with low levels of perceived social usefulness but who increased to moderate or high levels over the first three years of the study had a more mixed profile of scores on covariate measures, resembling their peers with moderate or high levels of perceived social usefulness at both timepoints on some measures, while exhibiting similarly poor levels of functioning like their counterparts with low levels of perceived social usefulness on other measures of well-being. Unfortunately, the concurrent measurement of changes in feelings of usefulness and changes in social, behavioral and physical factors precludes the ability to discern the exact temporal nature of associations between these variables, and reciprocal changes among these factors are likely.

Feeling useful and valued by others has been noted as both a motivator and a consequence of social and productive activity in later life (Barlow & Hainsworth, 2001; Hainsworth & Barlow, 2001; Okun, 1994). The current findings clearly paint a picture of those with persistently high perceptions of usefulness over the first three years of the study as those most actively engaged in volunteerism, child care, and social and religious organizations over the same time period. These activities may serve to reinforce the feeling that one plays a useful role in the lives of others. However, it is also possible that those with high feelings of social usefulness may self-select to participate in social and productive activity and actual engagement in such activities has little impact on perceptions of usefulness.

Previous research has shown that older adults with less positive self-perceptions of aging and who feel less useful to others are more likely to experience increases in physical disability and functional limitations (Grand et al., 1988; Grand, Grosclaude, Bocquet, Pous, & Albaredo, 1990; Levy, Slade, & Kasl, 2002). The current analyses extend those findings by documenting that those elders with persistently low or declining to low perceptions of usefulness are much more likely to experience concurrent increases in physical disability, the onset of ADL impairment, and the emergence of new major/chronic health conditions as compared to those who maintain high perceptions of social usefulness. Given the concurrent measurement of changes in perceptions of usefulness and changes in health and disability, it is not possible to determine the exact temporal nature of relationships among these states. It is also plausible that these factors are reciprocally related, with persistently low or declining feelings of usefulness leading to deteriorations in health and functioning, which, in turn, have a negative impact on feelings of usefulness.

An important objective of this investigation was to examine whether specific patterns of change or stability in perceptions of usefulness were associated with differential mortality risk over time. Compared to elder adults with persistently high perceptions of usefulness, those with persistently low perceptions of usefulness or those who decreased from a higher level to low perceived usefulness over the first three years of the study had a greater hazard of death, dying, on average, a year earlier over the subsequent nine-year period. This greater hazard was attenuated slightly after adjustment for baseline social, behavioral and health/disability factors. Moderate reductions in the mortality hazard ratio for those with persistently low/declining to low perceptions of usefulness were observed in additional models that included covariates reflecting concurrent patterns of change in, or characteristics of, social or health/disability factors over the first three years of the study. However, only change in number of social ties or the emergence of one or more new major/chronic health conditions and an increase in physical disability were significant covariate predictors in these models. In a final model adjusting for all baseline and 3-year follow-up covariates, the greater mortality hazard in those with persistently low/declining to low perceptions of usefulness was reduced in magnitude and significance, although only the emergence of one or more new health conditions and an increase in physical disability over the follow-up, were significant or marginally significant change covariates in this model. Those with persistently low or declining to low feelings of usefulness were more likely than those with persistently high feelings of usefulness to experience increases in physical disability or the emergence of one or more new major/chronic health conditions, and thus deteriorations in health may account for the greater mortality hazard of this group. As noted previously, the concurrent measurement of changes in perceptions of usefulness and health/disability factors makes it difficult to precisely determine the temporal associations among these variables. However, the current analyses do document that increased comorbidity and disability occurs in older adults with persistently low or who decline to low feelings of usefulness, and that this group experiences decreased survival in later adulthood as compared to older adults with persistently high feelings of usefulness.

One unexpected finding is that those who showed an increase from low to moderate or high perceptions of usefulness by the 3-year follow-up also had a greater hazard of mortality as compared to those with persistently high usefulness perceptions, although this greater hazard was reduced to nonsignificance in models adjusting for baseline and follow-up social, health behavior and health/disability factors. This finding may suggest that a history of low perceived usefulness, despite a subsequent improvement in this perception, can have a negative impact on health. This group had relatively poor profiles of health status (e.g., high levels of disability and chronic health conditions) and health behaviors (e.g., smoking) at the baseline exam and over the 3-year follow-up, suggesting that improvements in usefulness perceptions were not mirrored by improvements in factors that might have attenuated mortality risk. Developmental factors may also play an important role in moderating the impact of improvement in perceived usefulness on health; maintenance of, or improvement to high feelings of usefulness, may be most beneficial early in older adulthood when such feelings can help to promote maintenance of relatively favorable health and the management of major life transitions (e.g., retirement). In essence, our findings may indicate that improvements in perceived usefulness that occur late in the lifecourse cannot alter the greater risk for earlier mortality that a prior history of low perceived usefulness and its poor functioning, health and behavioral correlates has already conferred.

An important limitation in this study is the relatively low number of participants in those groups that had the greatest mortality hazard in analyses (e.g., those with persistently low or who declined to low perceptions of usefulness over the follow-up). The low proportion of sample participants in these risk groups might imply that low perceived usefulness is a rare risk factor for poor health outcomes in older adults, with little public health relevance. However, more likely, the small proportion of respondents in these groups in the current study is the result of study selection procedures that selectively sampled high functioning older adults. A study of elder Japanese adults (Okamoto & Tanaka, 2004) that did not selectively recruit on the basis of functional status and which employed a similar measure of perceived usefulness, had a more balanced distribution of participants with low, moderate and high perceptions of usefulness and similarly found that those with low perceptions of usefulness had a greater risk of mortality as compared to those with high perceptions of usefulness. Thus, it is plausible that a larger proportion of older Americans in the general population may experience persistently low or decline to low feelings of usefulness in later life, and may be vulnerable to the negative health outcomes associated with such perceptions. A related limitation is that study findings may not generalize to older adults with lower levels of cognitive and physical functioning. Although it is likely that our examination of links between perceived usefulness and mortality risk in a group of high functioning older adults led to an underestimation of the impact of low perceived usefulness on mortality risk, it is also possible that persistently low or declining perceptions of usefulness may only have an adverse effect on longevity when assessed in high functioning elders.

The small proportion of the sample in some of the groups reflecting specific patterns of change in usefulness perceptions also limited our ability to study more complex interactions among change in perceptions of usefulness and change in social, behavior and health variables. For example, different patterns of change in usefulness perceptions may serve to differentially buffer the mortality risk associated with declines in health, functioning or social activity. The ways in which change in usefulness perceptions and change in these factors affect health over time should be an important focus of future research with larger samples.

A final limitation that should be noted regards our measure of usefulness to others. The measure queried how often respondents felt useful to their family and friends without providing respondents with a specific timeframe regarding this estimate. Thus, different time perspectives

might have been employed in this estimation by different respondents, potentially weakening the reliability of this measure.

An important strength of this study is the examination of specific patterns of stability or change in perceptions of social usefulness in later adulthood. To our knowledge, this is the first investigation that has carefully examined the mutability of perceptions of social usefulness over time in older adulthood, and important social, behavioral and health correlates of different patterns of change or stability in these perceptions. The finding that different patterns of change or stability predict differential longevity in later life further underscores the importance of examining trajectories of these perceptions over time.

Conclusion

Persistently low perceived usefulness or the development of low perceived usefulness over time was associated with decreased longevity in a sample of elder Americans. Low perceptions of social usefulness were also associated with poorer profiles of psychosocial, behavioral and physical well-being, which may partially account for the greater mortality hazard of older adults with persistently low or declining perceptions of social usefulness. Conversely, older adults with persistently high perceptions of social usefulness in older adulthood had a more positive social and health profile. Taken together, these findings suggest that older adults' perceptions of their usefulness to others may impact trajectories of health and longevity in later life, and indicate that older adults with persistently low feelings of social usefulness or whose perceptions decline to a low level may be an important group to target for psychosocial and medical attention, while those with high perceptions of usefulness may benefit from interventions aimed at maintaining that state. Although our data did not indicate a survival advantage for those who showed improvements in feelings of usefulness in later adulthood, it could be the case that increases in perceived usefulness earlier in older adulthood, and associated improvements in social, behavioral and physical well-being, may confer benefits for health and longevity in later life. Future research aimed at identifying the developmental periods when interventions to increase feelings of social usefulness may have the greatest health impact is needed.

Acknowledgments

This work was supported by National Institute on Aging (NIA) Grant K01 AG028582, the USC/UCLA Center for the Study of Biodemography and Population Health (NIA Grant P30 AG017265), the UCLA Claude D. Pepper Older Americans Independence Center (NIA Grant AG10415), and the MacArthur Research Network on Successful Aging, which funded the MacArthur Study of Successful Aging, through grants from the John D. and Catherine T. MacArthur Foundation.

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Sociodemographic, psychosocial, behavioral and health status variables assessed at the baseline and 3-year follow-up exams: Crude associations with change in perceptions of usefulness over the 3-year follow-up

Table 1

	Pattern of Usefulness Perceptions Over 3-Year Follow-Up:					Significance of association with usefulness
	Persistently low or decrease to low (n = 79)	Increase from low to mod./high (n = 39)	Decrease from high to moderate (n = 155)	Persistently moderate (n = 183)	Increase from mod. to high (n = 134)	Persistently high (n = 437)
	M (SD) or %	M (SD) or %	M (SD) or %	M (SD) or %	M (SD) or %	M (SD) or %
Sociodemographic variables:						
Age	74.3(2.6)	75.5(2.6)	74.3(2.8)	74.1(2.7)	74.5(2.8)	74.1(2.7)
Gender						
Female	44.3	43.6	44.5	41.5	46.3	39.6
Male	55.7	56.4	55.5	58.5	53.7	60.4
Race/Ethnicity						
Caucasian	77.2	74.4	79.4	89.6	80.6	78.0
African-American	22.8	25.6	20.6	10.4	19.4	22.0
Educational attainment						
≥HS degree	32.9	20.5	44.5	47.0	53.7	48.7
<HS degree	67.1	79.5	55.5	53.0	46.3	51.3
Social ties/activity:						
# of social ties	7.9(5.2)	8.5(5.2)	10.5(5.3)	9.3(4.5)	9.3(4.8)	11.2(5.4)
Δ # of social ties	-8(4.8)	-1.6(5.0)	-1.2(4.6)	-7(3.8)	2(4.6)	-8(5.0)
Marital status (baseline)						
Married	36.7	41.0	47.7	45.4	46.3	48.5
Not married	63.3	59.0	52.3	54.6	53.7	51.5
Change in marital status (over follow-up)						
Widowed/divorced	1.3	2.6	7.1	3.3	1.5	3.0
No change/gained spouse	98.7	97.4	92.9	96.7	98.5	97.0
Volunteered (baseline)						
Yes (in last year)	11.4	15.4	29.0	21.9	25.4	35.2
No (in last year)	88.6	84.6	71.0	78.1	74.6	64.8
Volunteered (follow-up)						

	Pattern of Usefulness Perceptions Over 3-Year Follow-Up:					Significance of association with usefulness
	Persistently low or decrease to low (n = 79)	Increase from low to mod./high (n = 39)	Decrease from high to moderate (n = 155)	Persistently moderate (n = 183)	Increase from mod. to high (n = 134)	Persistently high (n = 437)
	M (SD) or %	M (SD) or %	M (SD) or %	M (SD) or %	M (SD) or %	p (F or χ^2 test)
Yes (in last year)	12.7	10.3	34.2	27.9	22.4	36.2
Yes (in last year)	12.7	10.3	34.2	27.9	22.4	36.2
No (in last year)	87.3	89.7	65.8	72.1	77.6	63.8
Club attendance (baseline)						.05
Never	46.8	61.5	55.5	53.0	56.0	44.4
Monthly	35.4	23.1	20.6	25.1	19.4	29.5
Weekly	17.7	15.4	23.9	21.9	24.6	26.1
Club attendance (follow-up)						.09
Never	64.6	59.0	63.9	56.8	61.2	50.7
Monthly	22.8	25.6	18.1	25.7	20.9	31.0
Weekly	12.7	15.4	18.1	17.5	17.9	18.3
Religious service attendance(baseline)						.10
Less than weekly	43.6	41.0	39.4	45.9	41.8	34.1
Weekly	56.4	59.0	60.6	54.1	58.2	65.9
Religious service attendance(follow-up)						.01
Weekly	51.3	46.2	61.9	53.6	54.5	65.4
Childcare (baseline)						.02
No	79.5	79.5	75.8	81.3	80.5	69.6
Yes	20.5	20.5	24.2	18.7	19.5	30.4
Childcare (follow-up)						.00
No	88.2	92.3	82.9	86.8	80.5	75.8
Yes	11.8	7.7	17.1	13.2	19.5	24.2
Paid employment (baseline)						.82
No	84.8	76.9	81.3	83.1	81.3	79.6
Yes	15.2	23.1	18.7	16.9	18.7	20.4
Paid employment (follow-up)						

	Pattern of Usefulness Perceptions Over 3-Year Follow-Up:						Significance of association with usefulness
	Persistently low or decrease to low (n = 79)	Increase from low to mod./high (n = 39)	Decrease from high to moderate (n = 155)	Persistently moderate (n = 183)	Increase from mod. to high (n = 134)	Persistently high (n = 437)	
	M (SD) or %	M (SD) or %	M (SD) or %	M (SD) or %	M (SD) or %	M (SD) or %	p (F or χ^2 test)
No	87.3	79.5	89.7	86.3	85.8	83.3	.38
Yes	12.7	20.5	10.3	13.7	14.2	16.7	
Health behavior:							
Physical activity	9.8(4.1)	10.1(4.3)	10.4(4.0)	10.3(4.0)	9.9(4.2)	10.9(4.0)	.08
Δ physical activity	-0.4(3.8)	-0.3(4.3)	-0.1(3.5)	-0.5(3.7)	0.2(3.6)	-0.1(3.7)	.65
Smoking status (baseline)							.25
current smoker	13.9	17.9	18.7	16.9	14.9	11.4	
ex-smoker	39.2	28.2	32.3	39.9	39.6	34.8	
non-smoker	46.8	53.8	49.0	43.2	45.5	53.8	.07
Smoking status (follow-up)							
current smoker	11.4	17.9	17.4	12.6	14.9	8.7	
long-term/recent ex-smoker	41.8	28.2	34.8	44.3	39.6	37.5	
consistent non-smoker	46.8	53.8	47.7	43.2	45.5	53.8	
Health status/disability:							
Disability (baseline)							.08
Presence of 1 disability	29.1	38.5	23.2	29.0	29.9	22.0	
Absence of 1 disability	70.9	61.5	76.8	71.0	70.1	78.0	
Change in physical disability							.13
Increase	30.4	33.3	26.5	33.9	29.9	23.6	
No change/improvement	69.6	66.7	73.5	66.1	70.1	76.4	
Onset of ADL impairment (over follow-up)							.02
Onset of 1+ impairments	10.1	5.1	3.2	3.3	3.0	2.3	
No change (no impairment)	89.9	94.9	96.8	96.7	97.0	97.7	
# Chronic conditions (baseline)							.52
none	32.9	25.6	37.4	32.2	32.1	36.2	
one	36.7	41.0	40.0	40.4	44.0	43.2	

	Pattern of Usefulness Perceptions Over 3-Year Follow-Up:						Significance of association with usefulness
	Persistently low or decrease to low (n = 79)	Increase from low to mod./high (n = 39)	Decrease from high to moderate (n = 155)	Persistently moderate (n = 183)	Increase from mod. to high (n = 134)	Persistently high (n = 437)	
	M (SD) or %	M (SD) or %	M (SD) or %	M (SD) or %	M (SD) or %	M (SD) or %	p (F or χ^2 test)
two or more	30.4	33.3	22.6	27.3	23.9	20.6	
Change in # chronic health conditions (over follow-up)							.00
≥ 1 new chronic conditions	34.2	17.9	20.0	24.0	23.9	14.2	
No change	65.8	82.1	80.0	76.0	76.1	85.8	
Depressed mood	14.6(3.8)	14.7(2.6)	14.2(3.5)	14.7(3.5)	14.6(3.4)	13.7(2.7)	.00
Δ depressed mood	0.1 (3.0)	-0.3(3.1)	0.0(2.6)	0.2(3.2)	-0.3(2.9)	0.2(2.6)	.63
Mean survival time (years)	7.1	7.3	8.0	8.1	7.8	8.3	
Δ = change							

Table 2
Mortality hazard ratios for 3-year pattern of usefulness ratings predictors in models adjusted for covariates

	Model A adjusted for sociodemographic variables	Model B Model A + baseline social, behavioral, health/disability variables	Model C Model B + 3-year follow-up social variables	Model D Model B + 3-year follow-up health behavior variables	Model E Model B + 3-year follow-up health/ disability variables	Model F Model B + all 3- year follow-up variables
	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)
3-year pattern of usefulness perceptions:						
persistently low/decrease to low ^a	1.75 (1.22, 2.51)	1.59 (1.09, 2.31)	1.47(1.01, 2.15)	1.58 (1.09, 2.31)	<i>1.46 (1.00, 2.13)</i>	1.37 (0.93, 2.00)
increase from low to mod./high ^a	1.72 (1.08, 2.73)	1.48 (0.92, 2.39)	1.34 (0.83, 2.19)	1.43 (0.92, 2.39)	1.44 (0.89, 2.34)	1.27 (0.78, 2.08)
decrease from high to moderate	1.21 (0.89, 1.64)	1.11 (0.82, 1.51)	1.08 (0.79, 1.47)	1.08 (0.82, 1.51)	1.11 (0.81, 1.50)	1.04 (0.76, 1.43)
persistently moderate ^a	1.15 (0.85, 1.84)	1.04 (0.77, 1.41)	1.02 (0.76, 1.38)	1.03 (0.77, 1.41)	0.99 (0.73, 1.34)	0.97 (0.72, 1.32)
increase from moderate to high ^a	1.20 (0.86, 1.65)	1.10 (0.79, 1.53)	1.09 (0.78, 1.53)	1.08 (0.79, 1.53)	1.07 (0.77, 1.49)	1.04 (0.74, 1.46)
Sociodemographic covariates:						
Age (at study entry)	1.10 (1.06, 1.14)	1.10 (1.06, 1.14)	1.10 (1.06, 1.14)	1.10 (1.06, 1.14)	1.10 (1.06, 1.14)	1.10 (1.06, 1.14)
Ethnicity (Black) ^b	0.89 (0.68, 1.16)	0.89 (0.66, 1.18)	0.92 (0.68, 1.23)	0.89 (0.66, 1.18)	0.92 (0.69, 1.23)	0.95 (0.71, 1.27)
Gender (female) ^c	0.51 (0.42, 0.63)	0.54 (0.42, 0.69)	0.54 (0.42, 0.69)	0.54 (0.42, 0.69)	0.52 (0.41, 0.67)	0.52 (0.41, 0.67)
Education (≥HS degree) ^d	0.82 (0.66, 1.01)	0.89 (0.72, 1.11)	0.88 (0.71, 1.10)	0.90 (0.72, 1.11)	0.89 (0.71, 1.11)	0.88 (0.71, 1.11)
Baseline social, behavioral, health/disability variables (baseline):						
1 chronic conditions ^e		1.18 (0.92, 1.51)	1.15 (0.90, 1.48)	1.19 (0.92, 1.51)	1.10 (0.86, 1.42)	1.10 (0.85, 1.41)
2+ chronic conditions ^e		1.46 (1.10, 1.92)	1.41 (1.06, 1.86)	1.46 (1.10, 1.92)	1.39 (1.06, 1.84)	1.36 (1.03, 1.80)
1 physical disability ^f		1.12 (0.88, 1.41)	1.10 (0.87, 1.40)	1.12 (0.88, 1.41)	1.08 (0.85, 1.37)	1.08 (0.85, 1.37)
Physical activity frequency		0.96 (0.93, 0.98)	0.96 (0.93, 0.99)	0.95 (0.93, 0.98)	0.96 (0.93, 0.99)	0.96 (0.93, 0.99)
Current smoker ^g		1.87 (1.39, 2.52)	1.81 (1.34, 2.44)	0.52 (1.39, 2.52)	1.79 (1.33, 2.42)	0.46 (0.06, 3.71)
Ex-smoker ^g		1.29 (1.02, 1.64)	1.30 (1.02, 1.66)	0.49 (1.02, 1.64)	<i>1.25 (0.98, 1.59)</i>	0.47 (0.06, 4.00)
Depression		0.99 (0.96, 1.02)	0.99 (0.96, 1.03)	0.99 (0.96, 1.02)	0.99 (0.95, 1.02)	0.99 (0.95, 1.02)
Social integration		1.01 (0.99, 1.03)	1.00 (0.97, 1.02)	1.01 (0.99, 1.03)	1.01 (0.98, 1.03)	1.00 (0.97, 1.02)
Married (yes) ^h		0.88 (0.70, 1.11)	0.89 (0.71, 1.13)	0.87 (0.70, 1.11)	0.89 (0.71, 1.13)	0.90 (0.71, 1.14)
Attend clubs monthly ⁱ		0.89 (0.69, 1.16)	0.92 (0.69, 1.22)	0.89 (0.69, 1.16)	0.90 (0.69, 1.17)	0.93 (0.70, 1.24)

	Model A adjusted for sociodemographic variables	Model B Model A + baseline social, behavioral, health/disability variables	Model C Model B + 3-year follow-up social variables	Model D Model B + 3-year follow-up health behavior variables	Model E Model B + 3-year follow-up health/ disability variables	Model F Model B + all 3- year follow-up variables
	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)	HR (95% CI)
Attend clubs weekly ⁱ		0.93 (0.69, 1.25)	1.02 (0.73, 1.43)	0.84 (0.69, 1.25)	0.93 (0.69, 1.25)	1.02 (0.73, 1.43)
Attend religious svcs. weekly ^j		0.95 (0.76, 1.18)	1.10 (0.80, 1.50)	0.96 (0.76, 1.18)	0.94 (0.76, 1.17)	1.09 (0.80, 1.50)
Care for child (yes) ^k		1.08 (0.84, 1.40)	1.14 (0.86, 1.52)	1.08 (0.84, 1.40)	1.08 (0.84, 1.40)	1.13 (0.85, 1.50)
Work for pay (yes) ^l		0.87 (0.66, 1.14)	1.00 (0.72, 1.39)	0.86 (0.66, 1.14)	0.89 (0.67, 1.17)	1.02 (0.73, 1.42)
Volunteer (yes) ^m		0.83 (0.63, 1.10)	0.91 (0.67, 1.25)	0.83 (0.63, 1.10)	0.82 (0.63, 1.09)	0.88 (0.65, 1.20)
<u>Social variables (follow-up):</u>						
Δ in # of social ties			0.98 (0.95, 1.00)			0.98 (0.95, 1.00)
Lost spouse (divorced/widowed) ⁿ			0.96 (0.51, 1.80)			0.94 (0.49, 1.79)
Attend clubs monthly ⁱ			0.96 (0.72, 1.28)			0.98 (0.74, 1.31)
Attend clubs weekly ⁱ			0.96 (0.68, 1.35)			1.00 (0.71, 1.41)
Attend religious services weekly ^j			0.83 (0.60, 1.13)			0.82 (0.60, 1.13)
Care for child (yes) ^k			0.85 (0.62, 1.18)			0.88 (0.63, 1.22)
Work for pay (yes) ^l			0.79 (0.54, 1.15)			0.79 (0.54, 1.16)
Volunteer (yes) ^m			0.85 (0.63, 1.14)			0.88 (0.65, 1.18)
<u>Health behavior variables (follow-up):</u>						
Δ in physical activity frequency				0.98 (0.96, 1.02)		0.99 (0.96, 1.03)
Current smoker ^o				3.89 (0.47, 28.59)		4.23 (0.53, 33.59)
Ex-smoker ^o				2.65 (0.28, 19.16)		2.67 (0.31, 22.61)
<u>Health and disability variables (follow-up):</u>						
≥1 new chronic condition ^p					1.37 (1.07, 1.75)	1.35 (1.05, 1.72)
Increase in physical disability ^q					1.28 (1.01, 1.62)	1.26 (0.99, 1.60)
Onset of 1+ ADL impairments ^r					1.35 (0.82, 2.24)	1.41 (0.84, 2.35)
Δ in depression					1.00 (0.96, 1.04)	1.00 (0.96, 1.05)

^aParticipants that: had persistently high feelings of usefulness,
^bwere White,
^cmale,
^dhad less than a high school education,
^ehad no chronic health conditions at baseline,
^fhad no physical disability at the baseline exam,
^gwere non-smokers at baseline,
^hwere not married at baseline,
ⁱnever attended social clubs,
^jattended religious services less than weekly,
^kdid not engage in child care,
^ldid not work for pay,
^mdid not volunteer,
ⁿexperienced no change in marital status/gained a spouse over the 3-year follow-up,
^owere consistent non-smokers over the 3-year follow-up,
^pdid not show an increase in number of chronic health conditions over the 3-year follow-up,
^qshowed no change/slight improvement in physical disability over the 3-year follow-up, and
^rdid not experience the onset of an ADL impairment over the 3-year follow-up, used as reference group in analyses.
 Δ = change
* $p \leq .05$,
** $p \leq .01$,
*** $p \leq .001$,
[†] $p \leq .10$