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Role-Specific Feelings of Control and Mortality

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The purpose of this study is to examine the impact of 2 different measures of personal control on mortality in late life. The 1st reflects control over the 3 roles that are most important to elderly study participants. The 2nd is a global measure that assesses control over life as a whole. Data provided by a nationwide survey of older adults (N = 884) indicate that feelings of control over the single most important role significantly reduce the odds of dying. In contrast, control over the 2nd and 3rd most important roles are not related to mortality, nor are feelings of control over life as a whole. The theoretical implications of these findings are discussed.

A vast literature indicates that feelings of personal control are related to physical as well as mental health across the life course (Bandura, 1995). More specifically, this research suggests that people who feel they can influence the course of events in their lives tend to enjoy better health than individuals who believe the external world is unresponsive to their efforts (Mendes de Leon, Seeman, Baker, & Richardson, 1996).

In view of these results, it is not surprising to find that some investigators have been interested in seeing whether feelings of personal control also affect longevity (Seeman & Lewis, 1995). However, two factors set this work off from the broader intellectual context in which it emerged. First, the sheer number of studies on personal control and mortality is relatively small. Second, and more important, findings from research on control and mortality are inconsistent. Although some investigators report that a greater sense of control increases the odds of living longer (Chipperfield, 1993), other researchers have been unable to replicate these results (Janoff-Bulman & Marshall, 1982).

The purpose of this study is to examine the relationship between feelings of personal control and mortality with data provided by a nationally representative sample of elderly people. In the process, we aim to infuse research in this field with recent advances in the measurement of personal control. The discussion that follows is divided into three main sections. The theoretical underpinnings of the study are developed first. Following this, the sample and measures are presented. Finally, the results are reviewed and discussed.

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Personal Control and Longevity

Although there are undoubtedly many reasons for the inconsistent findings in research on personal control and mortality, we suspect that problems in the measurement of control are an important factor. A number of investigators working in this field rely on global measures of control that are thought to assess feelings of control over life as a whole (Dalgard & Haheim, 1998). This construct is typically operationalized with scales like the Internal–External Locus of Control Scale (I–E; Rotter, 1966). But for some time now, investigators have argued that it is important to evaluate feelings of control that are associated with specific life domains (Lachman & Weaver, 1998; Rotter, 1975; Schulz, Heckhausen, & Locher, 1991). Consistent with this view, a number of domain-specific control measures have appeared in the literature. The work of Lefcourt and his colleagues provides an early example of this measurement strategy (Lefcourt, von Baeyer, Ware, & Cox, 1979). These investigators devised scales that assess feelings of control associated with personal achievement and control involving affiliations with others. But perhaps the most widely used domain-specific measure of control is the Multidimensional Health Locus of Control Scales devised by the Walstons (Walston & Walston, 1978). Not surprisingly, these scales have been found to be especially efficacious in studies of health-related outcomes, such as self-care in late life (Stoller, Forster, & Portugal, 1993).

Assessing control in specific life domains makes sense for two reasons. First, older adults are likely to feel they can exercise more control over some areas of life than others. Evidence of this may be found in a recent study by Lachman and Weaver (1998). Their research indicates that older adults feel they have more control over financial matters than other life domains, such as relationships with children (see also McAvay, Seeman, & Rodin, 1996).

Second, differentiating between global and domain-specific measures of control is important because research indicates that more focused measures of control may exert a greater impact on health and well-being in late life. For example, Krause (1994) found that the impact of domain-specific measures of control on life satisfaction (β = .291; $p < .001$) was twice as large as the corresponding effect of global feelings of control (β = .132, $p <$ .001).

This critique of global control measures, however, is not meant to imply that this measurement strategy no longer has a place in behavioral science research. There are a number of circumstances where it is still useful. For example, feelings of control over life as a whole may help guide behavior in situations that are new, and where role-specific self-knowledge may not be available (Haidt & Rodin, 1995). This may happen, for example, when an elder enters a role for the first time (e.g., the grandparent role). In addition, as Rotter (1975) pointed out, global measures may be useful in situations where the goal of a study is to predict a wide range of outcomes.

But when the theoretical foundations of a study are articulated clearly and focus on a particular health outcome, the use of domain-specific measures of control may provide greater insight. We believe this is true in the study of mortality. Some investigators have assessed the effects of domain-specific control on mortality, but this research has largely been concerned with control over one's health (Rakowski, Fleishman, Mor, & Bryant, 1993) or control in the work environment (Johnson, Stewart, Hall, Fredlund, & Theorell, 1996). Although this work has provided some useful insights, it suffers from at least two limitations. First, this research does not examine all life domains that may be important to elderly people. Second, some life domains, such as employment outside the home, may be less meaningful for studies of older adults because many are no longer in the labor force.

Two tasks must be accomplished to move the literature forward. First, researchers need to devise and test a more comprehensive approach to the assessment of control in specific life domains. Second, a well-articulated theoretical framework is needed to explain how this measurement strategy can contribute to the knowledge base.

Schulz and Heckhausen's (1996) life-span model of successful aging provides a useful point of departure for developing a sound theoretical rationale for linking domain-specific feelings of control with health-related outcomes. The distinction between primary and secondary control figures prominently in their work. Viewed in general terms, primary control refers to efforts aimed at changing the external environment, whereas secondary control is concerned with changing internal cognitions (e.g., one's attitudes, attributions, or perceptions) rather than the external world. Although Schulz and Heckhausen (1996) have been criticized for the way they conceptualize secondary control (Skinner, 1996), we are more interested in the broader processes they identify.

In particular, Schulz and Heckhausen (1996) maintain that as people get older, resources dwindle, and the ratio of gains to losses becomes less favorable. These age-related losses involve changes in mental as well as physical functioning. For example, Baltes and Smith (1999) documented age-related losses in cognitive potential, especially reaction time and perceptual speed. Extensive research also points to a host of physiological changes that occur with age, including diminished kidney-filtration rates, a decline in the pumping efficiency of the heart, and a decline in useful lung volume (Weg, 1983). Similarly, age-related changes in vision and hearing are now widely documented (Marsiske et al., 1999). It is important to emphasize that at least initially, a number of these physiological changes are part of the inevitable process of aging (Nuland, 1994). Moreover, they do not occur at the same rate for all elderly people. Nevertheless, older adults who experience these physical and mental changes may take steps to compensate for the losses they entail. Following the theory of selection, optimization, and compensation (Baltes, 1991), Schulz and Heckhausen (1996) argued that elders gradually relinquish primary control in some areas to ensure available resources can be devoted to maintaining primary control in other life domains. However, Schulz and Heckhausen (1996) did not identify the factors that lead older adults to select one domain over another for this purpose. We believe some useful insights may be found in identity theory (Burke, 1991; Thoits, 1991).

Social roles and identities assume a key position in identity theory. According to this view, a social role is defined structurally as a position in a group (e.g., father, husband, or provider) whereas identities are self-evaluations that emerge from occupying particular roles (e.g., "I am a father"). Associated with each role are clusters of normative or behavioral expectations that guide a person's behavior and provide a basis for evaluating the adequacy of role performance. By providing guidance as well as a mechanism for appraising role enactment, the behavioral expectations associated with roles promote a sense of meaning and purpose in life.

But there is an important qualification in identity theory that is especially relevant for our study. Even casual observation suggests that people occupy multiple roles. Consequently, there is a separate identity associated with each of these social positions. A basic tenet in identity theory specifies that individuals attach greater importance to some role-specific identities than others. As a result, individual identities are arrayed in a salience hierarchy reflecting varying levels of commitment to and investment in the roles underlying these identities (Stryker, 1987).

We believe this last facet of identity theory is especially helpful for flushing out the theoretical perspective developed by Schulz and Heckhausen (1996). Casting their framework in the language of identity theory helps to specify the underlying process more clearly: As people grow older, they concentrate diminishing resources in roles that are most salient to them, while devoting fewer resources to roles they value less highly. But there may be more to it than this.

There is a dynamic element embedded in the model devised by Schulz and Heckhausen (1996) that can be used to further highlight the importance of role-specific feelings of control for older adults. In particular, they noted that as the ratio of gains to losses in late life becomes less favorable, elderly people "... *increasingly* [italics added] resort to secondary control processes" in order to maintain primary control in a progressively smaller subset of roles (Schulz & Heckhausen, 1996, p. 709). Doing so should increase commitment to the few roles that remain. If this is true, then the ability to exercise control in highly salient roles should become increasingly important as people grow older.

Focusing on the interplay between resource allocation and role salience provides a new way of thinking about the relationship between control and mortality in late life. By devoting dwindling resources to maintaining control in highly salient roles, older people can take steps to ensure that behavioral expectations in at least some areas of life will be met and that a limited number of role enactments will be successful. There are at least two reasons why this is important. First, by following this strategy, elderly people can avoid becoming overly dependent on others because they can still maintain a sense of control over a few key life domains. This is essential because research indicates that becom-

ing dependent on social-network members erodes feelings of psychological well-being (Baltes & Wahl, 1992) and may even shorten the life span (Rodin & Langer, 1977). Second, maintaining a sense that the environment is responsive to one's efforts may promote the perseverance, persistence, and drive necessary for the successful execution of role prescriptions. It should be emphasized that elderly people may not always be able to successfully execute role prescriptions. However, if they are able to do so, then identity theory specifies that they will be able to find a deep sense of meaning and purpose in life. This is important because maintaining a sense of personal meaning may have health protective effects. Dramatic evidence of this comes from the seminal work of Frankl (1963), whose experiences in the Nazi concentration camps revealed that people who were able to survive were those who found meaning in the face of this incredible adversity (see also Lukas, 1998; Reker, 1997; Ryff & Singer, 1998). Although the work of Frankl (1963) suggests that meaning is related to health, it doesn't say enough about why this may be so.

We suspect that meaning operates in part by promoting a sense of hope and optimism. To see why this may be the case, it is helpful to examine Reker's definition of meaning. Reker (1997, p. 710) defined personal meaning as "... having a purpose in life, having a sense of direction, a sense of order, a reason for existence...." The emphasis in this definition on having a sense of direction and purpose is important. The *New American Webster Dictionary* defines direction as "the act of aiming or pointing out a course," while purpose is defined as an "intention, aim." Both definitions clearly embody expectations for the future. This suggests that the sense of meaning, arising from successful role enactment, may foster the expectation that things will work out well in the future and that further efforts will continue to bring about desired results. To the extent this is true: Meaning should promote hope and optimism. These constructs are noteworthy, because a convincing literature suggests that people with a strong sense of hope (Nunn, 1996) and optimism (Peterson, Seligman, & Vaillant, 1988) tend to enjoy better health.

Although there are likely to be a number of pathways connecting the loss of hope and optimism with mortality, one potentially important link may be found by extending the work of Schulz, Heckhausen, and O'Brien (1994) on the disablement process. We suspect that older people who no longer have a sense of meaning, hope, and optimism in life are especially likely to succumb to the process described by these investigators. In particular, they are likely to be less compliant with medical regimens, more withdrawn socially, less active physically, and less likely to engage in health promoting behaviors. These states may, in turn, be linked to biological changes that ultimately contribute to an early death.

The theoretical rationale developed up to this point focuses largely on micro-level or individual issues without giving sufficient attention to the larger social context in which the lives of older adults are embedded. Consequently, it is helpful to briefly examine how the gradual concentration of control in a progressively smaller circle of social roles may be further facilitated by social structural factors. Researchers have argued for decades that aging is associated with a decline in social responsibility and role attrition (Cummings & Henry, 1961; Rosow, 1976). Factors such as retirement, widowhood, and children moving out of the home signal role loss, but society provides relatively few new roles to fill this gap. Although this situation may be changing, some investigators still express lingering concern that a significant number of elderly people are unable to find suitable new roles to assume in late life (Rowe & Kahn, 1998). If society provides fewer roles for older adults to occupy, then it follows that the roles that remain may become increasingly important. When coupled with the insights provided by Schulz and Heckhausen (1996), these social structural factors provide yet another reason for focusing on feelings of personal control associated with specific roles in late life.

In the analyses that follow, we contrast the differential impact of role-specific feelings of control and global feelings of control on mortality. Doing so provides an important first step toward evaluating the theoretical rationale we have developed. In particular, the goal of the empirical work presented in this study is to test the following hypotheses:

1. Older adults who feel they can exercise control over roles they value highly will live longer than elderly people who have less control over salient social roles;
2. A greater sense of control over life as a whole will be associated with a reduced mortality risk; and
3. The impact of role-specific feelings of control on mortality will be greater than the corresponding effect of global feelings of personal control.

Method

Sample

The data for this study came from a nationwide longitudinal survey of older adults. Altogether, three waves of data have been collected. When the baseline data were gathered, the study population was defined as all household residents who were noninstitutionalized, English speaking, 65 years of age or older, and retired (i.e., not working for pay). Geographically, the study population was restricted to all eligible persons residing in the coterminous United States (i.e., residents of Alaska and Hawaii were excluded).

The sampling frame consisted of all eligible persons contained in the Health Care Finance Administration (HCFA) Medicare Beneficiary Eligibility List. This list contains the name, address, sex, and race of virtually every older person in the United States. It should be emphasized that elderly people are included in the list even if they are not receiving Social Security benefits. Even so, two groups of older adults are not included in this data base: elderly people who do not have a Social Security number (this may be due to factors such as illegal immigration) and elderly people who are at least 100 years of age (HCFA does not release the names of these individuals).

A three-step process was used to draw the sample. First, 5% of the names in the master file maintained by HCFA were selected with a simple random-sampling procedure. Next, 110 counties across the coterminous United States were identified as primary sampling units (PSUs). These PSUs were selected with probability proportionate to the number of persons who were retired and at least 65 years of age. Following this, eligible persons were selected at random from each PSU. Approximately 10 persons were selected from each PSU, but some counties (e.g., Dade County, Florida) were oversampled because they contain a disproportionately large number of older adults.

Face-to-face interviewing for the baseline survey took place during 1992–1993. The data collection was performed by Louis Harris and Associates. A total of 1,103 interviews were completed successfully. The response rate for the baseline survey was 69%.

During 1996–1997, a second wave of data was gathered from the elderly people who participated in the baseline survey. A total of 605 older adults were reinterviewed successfully. Excluding those who had either died or

were living in a nursing home, the reinterview rate for the Wave 2 survey was 77%.

Finally, a third wave of interviews were conducted during 1998–1999. The disposition of the sample at Wave 3 is as follows: Reinterviewed successfully (N = 530), had died (N = 249), moved to a nursing home (N = 31), refused to be reinterviewed (N = 89), could not be located (N = 85), and too ill to participate (N = 119). Excluding those who had either died or were living in a nursing home, the reinterview rate at Wave 3 was 64% of those participating at Wave 1.

After using listwise deletion of missing values to deal with item nonresponse, complete data were available for 884 study participants. The average age of these individuals at the baseline survey was 73.75 years (SD = 6.55 years). Approximately 41% are men. These older adults indicated at the Wave 1 interview that they had successfully completed an average of 11.34 years of schooling (SD = 3.32 years). Approximately 60% of the study participants were married at the baseline survey. Finally, 91% of the respondents were White. These descriptive statistics, as well as the findings presented below, are based on weighted data.

Measures

The Appendix contains the measures that are evaluated in this study. The procedures used to code these items are provided in the footnotes of this table. Other than mortality status, all measures come from the Wave 1 survey. Table 1 contains descriptive information for all study measures including the range, mean, and standard deviation.

Mortality status. Mortality status at Wave 3 was determined by proxy report. As indicated earlier, 249 people died during the course of this study. Because no effort was made to determine why these individuals died, the measure used in this study reflects death from all causes.

Death certificates are used in many studies to verify mortality. However, this was not economically feasible in the present study because the participants were scattered across the entire coterminous United States. Even so, there are three reasons why informant reports of mortality are useful. The first is provided by Wolinsky and Johnson (1992). Using data from the Longitudinal Survey on Aging, these investigators compared proxy reports of death with data contained in the National Death Index (this index is compiled by the Centers for Disease Control and Prevention, U.S. Department of Health and Human Services, Atlanta, Georgia). They concluded that informants provide valid information on mortality. The results presented later in this report provide a second reason why proxy reports are useful. These data will show that the magnitude of the relationship between variables like self-reported health status and mortality are similar to estimates derived in studies that have verified mortality with death certificates.

Table 1
Descriptive Data for Independent Variables

Variable	Range	M	SD
Control over most salient role	3–15	11.52	2.82
Control over 2nd most salient role	3–15	10.71	3.14
Control over 3rd most salient role	3–15	10.59	3.23
Global feelings of control	3–15	11.40	3.03
Current smoker	0–1	0.12	0.33
Alcohol consumption	0–300	8.14	21.72
Obesity	0–1	0.24	0.43
Self-rated health	1–4	2.29	0.88
Serious chronic illness	1–5	2.70	0.82
Functional disability	0–13	2.87	3.26
Age	65–97	73.75	6.55
Sex	0–1	0.41	0.49
Education	0–20	11.34	3.32
White	0–1	0.91	0.29
Married	0–1	0.60	0.49

Finally, we are not the first to use informant reports of death. In fact, a number of other investigators have used proxy reports to conduct meaningful research on the correlates of mortality in late life (e.g., Bernard et al., 1997; Borawski-Clark, Kinney, & Kahana, 1996; Klerman, Thomas, Kennedy, & Cheng, 1994; McDonough, Williams, House, & Duncan, 1999; Menec, Chipperfield, & Perry, 1999).

Role-specific feelings of personal control. Measures of role-specific feelings of personal control were devised especially for this study. A two-step process was used to develop these indicators. First, we had to determine which roles were important to study participants. This was accomplished in the following manner. Respondents were presented with a list of eight roles: spouse, parent, grandparent, other relative, friend, homemaker, provider, and voluntary worker, church, or club member. This list of roles was compiled from data gathered in a pilot study that preceded the national survey. Initially, respondents in the main nationwide survey were asked to identify three roles that were most important to them. Once three roles were selected, the study participants were asked to rank order them according to whether they were first, second, or third most important.

Table 2 contains a simple frequency distribution of the number of respondents who ranked each role as being highly salient to them. In addition, information is provided on the number of persons occupying each role. Some preliminary findings based on the analysis of the data in this table will be reviewed briefly below because they are related to the theoretical rationale developed for this study.

The data in Table 2 reveal that 4% (1,102 − 1,062 = 40) of the older adults in this study did not identify a second most important role, and 11% (1,102 − 980 = 122) of the elderly study participants did not identify a third most important role. Preliminary logistic-regression analyses (not shown here) were conducted to identify respondents who did not select two and (separately) three salient roles. Eight independent variables were included in these analyses: age, sex, education, marital status, parental status, whether a respondent had grandchildren, and whether a study participant did volunteer work or was a member of a voluntary association. These analyses suggest that respondents who did not identify a second most important role were more likely to be male, older, less well educated, not married, and they were without children, grandchildren, or voluntary association affiliations. Similarly, the logistic regression analyses revealed that those who did not identify a third salient role were more likely to be older, less well educated, not married, and without grandchildren or voluntary association ties.[1] Viewed broadly, these results indicate that some respondents did not select a second or third most salient role simply because they did not occupy a number of roles contained in the list. These findings are consistent with the social structural explanation offered earlier, which states that the number of roles tends to decline as people grow older (Cummings & Henry, 1961; Rosow, 1976).

Once salient roles had been identified, a series of questions were devised to assess feelings of control associated with each of the three selected roles. As shown in the Appendix, these items use a semantic differential format. A high score on these measures denotes greater feelings of personal control. If the theoretical framework developed for this study is valid, then feelings of control over the single most important role should exert the strongest effects on mortality since this is where elderly people are most likely to devote their efforts and resources. To evaluate this proposition empirically, all three measures of role-specific control are included in the analyses. The following intercorrelations were observed among the three measures of role-specific control: control over the most salient role and control over the second salient role (r = .502; $p < .001$); control over the most salient role and control over the third salient role (r = .402; $p < .001$); and control over the second salient role and control over the third salient role (r = .497; $p < .001$).

[1] Tables containing the results of these analyses are available from Neal Krause.

Table 2
Distribution of Salient Roles

Role	No. in role	Most salient	Second most salient	Third most salient	Total
Spouse	618	424	82	44	550
Parent	960	269	317	105	691
Grandparent	909	148	274	252	674
Other relative	—	59	88	132	279
Friend	—	73	149	179	401
Homemaker	677	59	68	116	243
Provider	—	34	43	71	148
Volunteer, club, or church member	755	36	41	81	158
Total		1,102	1,062	980	

Note. Dashes indicate study participants were not explicitly asked whether they had other relatives or friends, or whether they were the family provider.

The internal consistency reliability estimate for the three role-specific control measures is as follows: Control over the most salient role (.808); control over the second most salient role (.865); control over the third most salient role (.894). Although it is easy to compute the reliability, demonstrating that measures are valid is more challenging. One way is to focus on construct validity. Cast within the context of the present study, this means demonstrating that the new measures of role-specific control are related to well-known correlates of control in a theoretically meaningful way. Previous research suggests that feelings of control are bolstered by social support (Caplan, 1981). Consistent with these findings, Krause and Borawski-Clark (1994) used the measures in the present study to demonstrate that social support increases role-specific feelings of control. Similarly, previous research indicates that strong feelings of personal control tend to promote feelings of psychological well-being (Krause, 1987). Research based on the role-specific measures of control contained in the Appendix reveals that more control is associated with greater life satisfaction (Krause, 1994).

Global feelings of personal control. Global feelings of personal control were assessed with three items from Rotter's (1966) I–E Scale. The response format for these indicators was modified slightly (see footnotes in the Appendix). Although a forced-choice response format was used in the original scale, the items in our study were scored in a 5-point Likert scale, ranging from *strongly agree* to *strongly disagree*. This revised coding scheme has been used extensively in previous research (e.g., Krause, 1987). A high score on this measure denotes more internal feelings of control. The internal consistency reliability estimate for this short scale is .676. The correlation between the global measure of control and the role-specific measures of control is as follows: global control and control over the most salient role ($r = .107$, $p < .001$); global control and control over the second salient role ($r = .122$, $p < .001$); global control and control over the third salient role ($r = .073$, $p < .05$).

Health behavior. A number of investigators maintain that people with a strong sense of personal control live longer because they tend to adopt good health behaviors (Carlisle-Frank, 1991). Consequently, indicators of two key health behaviors were included in this study to see whether health behavior can account for the relationship between personal control and mortality. The first measure is a simple binary indicator contrasting elderly people who currently smoke cigarettes with those who do not smoke (for a discussion of this measurement strategy, see Krause, 1997). The second indicator assesses the total number of alcoholic drinks consumed in the month prior to the baseline survey. Recent evidence suggests that drinking small amounts of alcohol has health protective effects (Scherr et al., 1992). However, preliminary analyses (not shown here) failed to replicate these findings. Consequently, the data on alcohol consumption are coded in a continuous format.

Obesity. Research indicates that obesity is related to premature death (e.g., Manson et al., 1995). On the basis of these findings, a measure of obesity was included in the analyses presented below. All study participants were asked to report their height (with shoes on) and body weight (when fully clothed). The formula provided by Abernathy (1991) was then used to compute the body mass index (BMI) for each individual. Finally, a binary variable was computed from the BMI values contrasting those who were obese (i.e., a BMI of 28 or higher) with those who were not obese. It should be emphasized that the cutpoint value used to create this binary measure was devised especially for participants who are age 65 or over (see Abernathy, 1991).

Physical health status. As is the case with virtually every study on mortality, the effects of personal control on longevity are evaluated after the effects of physical health status have been controlled statistically. Three health measures are used in this study: self-rated health, chronic illness, and functional disability.

Self-rated health was assessed with a single item that asked study participants to rate their overall health as either excellent, good, fair, or poor. This measure is reverse coded to ensure a high score represents poor health. This item was included in the analyses because a recent review of 27 community studies revealed it is a remarkably consistent predictor of mortality (Idler & Benyamini, 1997).

When the baseline data were gathered for this survey, respondents were also asked if they suffered from 13 chronic and acute health conditions. However, the full list of health problems is not included in our analyses because it is unlikely that some conditions affect longevity (e.g., cataracts or arthritis). Instead, on the basis of the work of Ferraro and Farmer (1999), we took a simple count of more serious health problems including cancer, heart disease, hypertension, and diabetes. Support for this more focused measurement strategy was provided by a preliminary set of analyses. These data (not shown here) reveal that even though the full index of chronic conditions did not affect mortality, significant results emerge with the measure of more serious health problems (see Footnote 1).

Finally, functional disability is assessed with 14 items taken from the work of Liang (1990). Indicators of instrumental activities of daily living as well as activities of daily living are included in this index. A high score indicates the number of activities that a respondent had at least some difficulty performing.

Demographic control measures. The relationship between feelings of personal control and mortality was estimated after the effects of age, sex, marital status, education, and race were controlled statistically. Age is scored in a continuous format, whereas sex (1 = *men;* 0 = *women*), marital status (1 = *married at Wave 1;* 0 = *otherwise*), and race (1 = *White;* 0 = *otherwise*) are represented by binary variables. Finally, education is scored in a continuous format reflecting the total number of years of completed schooling.

Results

The findings from this study are presented in two sections. As the description of the study sample revealed, some participants could not be located after the baseline survey. Consequently, it is important to see whether this sample attrition may bias the study findings. The first section is devoted to exploring this issue. Following this, tests of the main study hypotheses are reviewed and discussed in section two.

The Effects of Sample Attrition

When the study sample was described earlier, we reported that 85 older adults could not be located after the baseline survey. The loss of participants can bias study findings if this attrition occurs nonrandomly. Although it is difficult to determine the

extent of the problem precisely, some preliminary insight may be obtained by using select baseline data to see if those who were lost to follow-up differ significantly from those who were located successfully (see Norris, 1985, for a discussion of this approach). The following procedures were used to implement this strategy. First, a binary outcome measure was computed by assigning a score of 1 to all participants who were lost to follow-up and a score of 0 to those who were located at Wave 3. Then, using logistic regression, this binary outcome was regressed on all the measures in Table 1 except mortality status. If any of these independent variables are related significantly to the binary outcome, then it would be reasonable to assume that sample attrition had occurred in a nonrandom manner.

Findings from this logistic-regression analysis suggest that the 85 participants who were lost to follow-up did not differ significantly from those who could be located on any of the independent variables used in this study. This tentatively suggests that the loss of participants did occur in a random manner. Even so, there are three reasons why these findings should be viewed with caution. First, the results are obviously limited by the measures used in the analyses. We have no way of knowing whether nonrandom attrition occurred with respect to other variables that were not measured in this study (e.g., nutrition or exercise). Second, the independent variables used in the attrition analysis were measured at the Wave 1 survey only. As a result, it is not possible to capture change in these measures after Wave 1 that might have affected a respondent's disposition at Wave 3. This means, for example, that a respondent may have been healthy at Wave 1 but was subsequently lost to follow-up because his or her health deteriorated after the Wave 1 survey took place. Finally, the attrition analysis in this section involves use of Wave 1 data to predict follow-up status. But if respondents participated in the Wave 1 survey but failed to provide complete information, then they were eliminated from the analysis. Consequently, the effects of item nonresponse figure into the results. This may be especially important with respect to those who failed to list a second and third most salient role. As the preliminary analyses reviewed earlier suggest, these people are likely to be older, male, and have fewer years of schooling. These factors are typically associated with subject attrition in longitudinal surveys (Groves, 1989).

Feelings of Personal Control and Mortality

Table 3 contains the results of the analyses that were designed to assess the effects of global and role-specific feelings of control on mortality. Three coefficients are provided for each independent variable. The first is an unstandardized logistic-regression coefficient, the second is a standardized logistic-regression coefficient, and the third is an odds ratio. Before turning to these findings, a word is in order about why standardized estimates are important and how they were calculated. One of the problems with logistic regression is that it is difficult to determine whether the impact of one independent variable is greater than another. Comparing odds ratios does not help because, as Selvin (1991) pointed out, these coefficients are tied to the metric of the independent variable. Fortunately, Selvin (1991) provided a straightforward way of rank ordering (i.e., "standardizing") the effects of the independent variables. This procedure involves multiplying the unstandardized logistic-regression coefficient by the standard deviation of the independent variable. Cast within the context of the present study, these standardized estimates reveal the change in log-odds of dying for a one standard deviation change in a given independent variable.

Turning to the substantive findings, the data in Table 3 provide partial support for the first study hypothesis. More specifically, the results suggest that older adults with a strong sense of control in the role that is most important to them are less likely to die during the follow-up period than elderly people who feel they do not

Table 3
Feelings of Personal Control and Mortality (N = 884)

Independent variables	b[a]	β[b]	Odds ratio
Age	0.119***	.779	1.126
Sex	1.224***	.600	3.400
Education	0.027	.090	1.028
White	−1.013**	−.288	0.363
Married	0.005	.003	1.005
Control over most salient role	−0.078*	−.220	0.925
Control over 2nd most salient role	−0.052	−.163	0.949
Control over 3rd most salient role	0.046	.149	1.047
Global control	0.031	.094	1.031
Current smoker	0.730**	.241	2.074
Alcohol intake	−0.003	.065	0.997
Obesity	−0.342	−.147	0.710
Self-rated health	0.456***	.401	1.578
Serious chronic illness	0.267*	.219	1.305
Functional disability	0.128***	.418	1.137
−2 Log likelihood			721.688
Hosmer–Lemeshow goodness of fit			4.624[c]

[a] Unstandardized logistic regression coefficient. [b] Standardized logistic regression coefficient computed by multiplying the unstandardized coefficient by the standard deviation of the independent variable. [c] Chi-square (with 8 *df*s) is not significant at the .05 level.
* $p < .05$. ** $p < .01$. *** $p < .005$.

exercise much control over the role that is most salient ($b = -.078, p < .05$). Further insight into the nature of this relationship is provided by the odds ratio (.925). This coefficient reveals that a one-unit increase in control over the single most salient role is associated with a 7% decline in the odds of dying.

In contrast to the results involving control over the most salient role, the data in Table 3 further indicate that feelings of control over the second most salient role ($b = -.052$, *ns*) as well as control over the third most salient role ($b = .046$, *ns*) are not related significantly to the odds of dying during the follow-up period. It is for this reason that the first hypothesis is only partially supported. Perhaps more important, the data in Table 3 further reveal that global feelings of control fail to exert a significant influence on longevity ($b = .031$, *ns*). Additional analyses (not shown here) indicate this was true even when global feelings of control was the only independent variable in the equation. When coupled with the multivariate results in Table 3, these findings fail to provide support for the second study hypothesis.

Hypothesis 3 states that the effects of role-specific control on mortality will be significantly larger than the corresponding impact of global feelings of control. The fact that the role-specific control measure is related significantly to mortality, whereas the global measure is not, obviates the need for a formal test of this proposition.

Two additional aspects of the findings in Table 3 should be emphasized. First, feelings of control over the single most salient role exert a significant effect on longevity even after the impact of well-known predictors of mortality have been controlled statistically. Included among these indicators are smoking ($b = .730, p < .01$), functional disability ($b = .128$, $p < .001$), and self-rated health ($b = .456$, $p < .001$). The second issue has to do with comparing the relative size of the standardized estimate associated with control in the most salient role ($\beta = -.220, p < .05$) with the standardized estimates associated with other well-known correlates of mortality (e.g., smoking, $\beta = .241$; race, $\beta = -.288$). Although clearly smaller in magnitude, the data suggest that the study of control in the most salient role is worthy of further attention in studies of mortality in late life.

Conclusion

The findings from this study suggest that older people may live longer if they are able to maintain a sense of control over the role that is most important to them. There are three reasons why these results are noteworthy. First, the relationship between control in the most highly valued role and mortality was observed after the effects of control over life as a whole, as well as control in the second and third most salient roles, was taken into account. To the best of our knowledge, this is the first time the effects of global and role-specific control have been contrasted in studies of mortality with data provided by a nationwide survey of older people.

The second reason why the findings from this study are important has to do with the fact that the effects of role-specific control were evaluated after the impact of several well-known correlates of mortality were controlled statistically. As noted above, these findings attest to the importance of including role-specific control measures in research on mortality.

The third reason why the results obtained in this survey are significant has to do with the fact that the analyses were based on an explicit theoretical framework that aims to provide a well-developed rationale for why feelings of personal control affect longevity. By elaborating and extending the insightful work of Schulz and Heckhausen (1996), our aim was to embed research on control and mortality in a larger theoretical context that embraces sweeping life-course changes. Throughout, our intent has been to show that merging midrange theory on control and mortality with more global models of successful aging may provide a useful way of advancing research in social and behavioral gerontology.

Although this study takes a necessary first step toward establishing the importance of including role-specific measures of control in mortality studies, a great deal of work remains to be done, and many questions have been left unanswered. Three issues that need to be explored in the future are discussed briefly below. The first deals with the need for greater theoretical development surrounding the potentially important role played by personal meaning in this process. The second has to do with the potential impact that particular roles may have on feelings of personal control. The third is concerned with factors affecting the selection of highly salient roles.

Key elements of the theoretical perspective, which was devised for this study, were not examined fully. In particular, the theoretical rationale we presented suggests that a sense of personal meaning arising from successful role enactment may be an important factor in this regard. Unfortunately, measures of personal meaning and successful role enactment were not included in the baseline survey. Examining the interface between role-specific control, personal meaning, and health-related outcomes should be a top priority.

Second, some roles may afford the opportunity to exercise more personal control than others. For example, the opportunity to manage one's own finances provides a forum for exercising a relatively high degree of control in the provider role. In contrast, the voluntary nature of friendship ties may make it more difficult to exercise similar levels of control in that particular role. If this is true, then the impact of role-specific control on mortality may vary, depending on the role in question. A detailed evaluation of the statistical interaction between role-specific control and the particular social roles should help to extend our understanding in this field.

Finally, we need to know more about how older people select roles that are the most salient to them. One possibility is that elderly people select particular roles as being more highly salient because they feel they will be able to exercise more control in these specific life domains. A thorough assessment of this possibility would require measuring how much control older adults believe they will be able to exercise in a range of social roles before they are occupied. Then, by following these participants over time, it would be possible to see if the roles that are selected as most salient are also the ones in which the level of anticipated control is the highest.

The health of older adults represents yet another potentially important factor that may determine whether particular roles are selected as being highly salient. For example, a woman may not select the role of housewife as being most salient because her current levels of functional disability prohibit her from performing routine household chores. If this rationale is valid, then only relatively healthy women would occupy this role. As this example reveals, the interface between the selection of particular social

roles, health, and mortality may be far more complex than implied in this study.

In the process of examining these, as well as other issues, researchers would be well advised to keep the limitations of this study in mind. Three are reviewed briefly below. First, the study sampling frame should be expanded to include younger adults so more definitive statements can be made about the importance of role-specific feelings of control in late life. Second, the National Death Index Service (NDI) should be used to trace participants who are lost to follow-up. Third, better measures are needed to assess global feelings of personal control.

The theoretical rationale we developed indicates that role-specific feelings of control may become increasingly important as people grow older. However, we are unable to evaluate this issue empirically because we lack data from younger adults. Although one must always be mindful of the problems created by age, period, and cohort effects, an assessment of age differences in the effects of role-specific control may provide useful insight into the coping process across the life course.

As noted earlier, we were unable to determine the disposition status of 85 participants at the Wave 3 interviews. The NDI is especially helpful for tracking these individuals because it contains a listing of all persons who have died in the United States (see James, Miller, Anderson, Worley, & Longino, 1997, for a discussion of this index). Unfortunately, the NDI could not be used in this study because the information needed to identify participants was not available (e.g., social security numbers). Nevertheless, those working in the field should take steps to gather information at the baseline survey that will permit direct access to the NDI.

Finally, measures of global control used in this study contain items that are all keyed in the direction of greater feelings of personal control. However, Mirowsky and Ross (1991) demonstrated that this measurement strategy may be influenced by agreement bias. As a result, these investigators maintain it is important to balance the scale with items keyed in the opposite direction. Those wishing to extend the research we have done would benefit from the use of more sophisticated measures of global control, like the ones devised by Mirowsky and Ross (1991).

The decline of physical and psychological resources is an inevitable part of growing old (Baltes, 1991; Nuland, 1994). However, as many gerontologists maintain, there is considerable individual variation in the aging process (Nelson & Dannefer, 1992). An obvious goal of social and behavioral gerontology should be to explain these individual differences. Viewed broadly, the work presented in this report attempts to address this issue by bringing role-specific feelings of control to the foreground. We hope the theoretical rationale we provide and the empirical evidence we present encourage researchers to delve more deeply into this exciting facet of the aging process.

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(Appendix follows)

Appendix

Survey Measures

1. Mortality: Informant report of death from all causes[a]
2. Role specific feelings of control[b]
   Thinking about yourself as a (MOST SALIENT ROLE), select the number that comes closest to how you feel as a (MOST SALIENT ROLE).

a. *Cannot influence what happens*				*Can influence what happens*
1	2	3	4	5
b. *Cannot manage problems that arise*				*Can manage problems that arise*
1	2	3	4	5
c. *Cannot make plans work*				*Can make plans work*
1	2	3	4	5

3. Global feelings of control[c]
   a. Becoming a success is a matter of hard work; luck has little or nothing to do with it.
   b. In my case, getting what I want has little or nothing to do with luck.
   c. It is impossible for me to believe that luck or chance play an important role in my life.
4. Smoking: Do you smoke cigarettes now?[a]
5. Alcohol consumption[d]
   a. During the past month, on how many days did you drink beer, wine, or liquor?
   b. On the days that you drink, how many cans of beer, glasses of wine, or drinks of liquor do you usually have?
6. Obesity:[e] Binary variable contrasting elders with BMI over threshold for obesity versus those under threshold for obesity.
7. Self-rated health: How would you rate your overall health at the present time?[f]
8. Chronic illness[g]
   Have you experienced any of the following health problems during the past 12 months?
   a. Hypertension, sometimes called high blood pressure, or have you taken medication for it?
   b. A heart attack or other heart trouble?
   c. Diabetes or high blood sugar, or have you taken medication for it?
   d. Cancer or a malignant tumor of any kind?
9. Functional disability[h]
   At least some difficulty performing following activities:
   a. Shopping for personal items
   b. Using the telephone
   c. Bathing
   d. Climbing 2–3 flights of stairs
   e. Walking about one-quarter mile
   f. Doing heavy work around the house
   g. Taking a train or bus
   h. Standing about 2 hr
   i. Reaching over head
   j. Using fingers to grasp or handle
   k. Lifting or carrying something as heavy as 25 lb
   l. Dressing and undressing
   m. Feeding self

[a] This variable is scored in the following way (coding in parentheses): 1 (*yes*) or 0 (*no*).
[b] This series of items was repeated for each of the three roles identified by respondents as being most important to them.
[c] These variables are scored in the following manner: 5 (*agree strongly*); 4 (*agree somewhat*); 3 (*uncertain*); 2 (*disagree somewhat*); 1 (*disagree strongly*).
[d] Responses to the first question are multiplied by answers to the second question to derive the total number of drinks consumed in the past month.
[e] This variable was scored in the following manner: 1 (*obese*); 0 (*not obese*).
[f] This variable is scored in the following manner: 1 (*excellent*); 2 (*good*); 3 (*fair*); 4 (*poor*).
[g] These items are coded in the following manner: 1 (*yes, condition is present*); 0 (*respondent does not have this health problem*).
[h] Responses to these items were summed to create a measure reflecting the number of activities study participants had at least some difficulty performing by themselves.

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