

# Meaning in Life and Mortality

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**Objectives.** The purpose of this exploratory study was to see if meaning in life is associated with mortality in old age.

**Methods.** Interviews were conducted with a nationwide sample of older adults ( $N = 1,361$ ). Data were collected on meaning in life, mortality, and select control measures.

**Results.** Three main findings emerged from this study. First, the data suggest that older people with a strong sense of meaning in life are less likely to die over the study follow-up period than those who do not have a strong sense of meaning. Second, the findings indicate that the effect of meaning on mortality can be attributed to the potentially important indirect effect that operates through health. Third, further analysis revealed that one dimension of meaning—having a strong sense of purpose in life—has a stronger relationship with mortality than other facets of meaning. The main study findings were observed after the effects of attendance at religious services and emotional support were controlled statistically.

**Discussion.** If the results from this study can be replicated, then interventions should be designed to help older people find a greater sense of purpose in life.

**Key Words:** Meaning in life—Mortality.

THE purpose of this study was to see if older people who have a strong sense of meaning in life tend to live longer than older adults whose sense of meaning is not as strong. Although researchers do not agree about how to define meaning in life, the definition proposed by Reker (2000) provides a useful point of departure. He defines a sense of meaning as “a cognizance of order, coherence, and purpose in one’s existence, the pursuit and attainment of worthwhile goals, and an accompanying sense of fulfillment” (p. 41).

The roots of sociological interest in meaning go back at least to the work of Weber (Gerth & Mills, 1958). Weber argued that behavior is not determined by an objective sense of meaning. Instead, he maintained that behavior arises from subjective meanings that are developed by the individual. However, the notion of meaning is perhaps most evident in the discussion by Weber of religious theodicies, which are religious explanations that provide meaning in situations where meaning has been threatened. More recently, Berger built upon the Weberian tradition by proposing that meaning is a subjective phenomenon that is created jointly during the process of social interaction: “[M]en together engage in constructing a world, which then becomes their common dwelling” (Berger & Pullberg, 1965, p. 201, emphasis in the original). Antonovsky (1987) was one of the first sociologists to examine meaning in life empirically. Embedded in his multifaceted Sense of Coherence Scale is a dimension he calls “meaningfulness.”

A number of studies suggest that a strong sense of meaning in life is associated with better physical health (e.g., Krause, 2004) and better mental health (e.g., Reker, 1997), but there appears to be only one study that empirically eval-

uates the relationship between meaning in life and mortality (O’Connor & Vallerand, 1998). These investigators found that at the bivariate level, a stronger sense of meaning in life is associated with a lower mortality risk. However, they go on to report that the relationship between meaning and mortality is no longer statistically significant once the effects of age, sex, and self-rated health have been added to the model. Taken as a whole, the results provided by O’Connor and Vallerand appear to suggest that meaning in life plays a relatively inconsequential role in determining mortality. Even so, there are two reasons why the relationship between meaning in life and mortality needs to be reevaluated.

First, the data for the study by O’Connor and Vallerand (1998) were provided by 129 nursing home residents. Moreover, 86% of these older study participants were women. As a result, it is difficult to tell if the findings from this study can be generalized to older men and women who are not living in nursing homes.

Second, the fact that the relationship between meaning and mortality is no longer statistically significant once self-rated health was entered into the model points to a potentially important mechanism that should be investigated further. More specifically, this pattern of findings suggests that meaning in life may exert an indirect effect on mortality that operates through health: Meaning affects health, and health, in turn, influences the odds of dying. There are three reasons why it makes sense to focus on this indirect effect. First, the overwhelming majority of older people die because they are physically ill (U.S. Department of Health and Human Services, 2004). So, if psychosocial factors such as meaning influence the odds of dying, then they are likely to do so because they affect an older person’s health. If

researchers focus solely on the direct effect of meaning on mortality while ignoring the indirect effect that may operate through health, then the overall or total effect of meaning on mortality may be underestimated.

In order to properly test for the proposed indirect effect of meaning on mortality, researchers must provide evidence that meaning in life is also significantly associated with health (see Baron & Kenny, 1986, for a detailed discussion on how to estimate mediating effects). Fortunately, some insight into this issue has already been provided by Krause (2004). He reports that a diminished sense of meaning in life is associated with less favorable self-ratings of health (see also Parquart, 2002). Further evidence that meaning may affect a person's physical health status is provided by studies that have been conducted with people who are already ill. For example, Park, Malone, Suresh, and Rosen (2008) studied the influence of meaning in life on health over time among men and women who had been diagnosed with congestive heart failure. Park and colleagues report that a stronger sense of meaning in life was associated with improved health assessments over time.

Although the empirical steps that must be followed to estimate indirect effects are important, it is also necessary to develop a theoretical rationale that explains how meaning in life may influence health and mortality. Several potentially important mechanisms have been identified in the literature. For example, Park (2007) proposes that people who do not have a strong sense of meaning in life are more likely to engage in detrimental health behaviors. Other investigators focus on the potentially important stress-buffering properties of meaning in life (Krause, 2007a). More specifically, Krause (2007a) suggests that the effect of traumatic life events on depressive symptoms was buffered or offset for older people who have a deeper sense of meaning in life.

But if meaning affects health and mortality, then it must ultimately be linked with physiological changes in the body. An intriguing study by Bower, Kemeny, Taylor, and Fahey (2003) helps shed some light on this issue. Their work reveals that women who experienced an increased sense of meaning in life subsequently showed an increase in natural killer cell cytotoxicity, which is an important marker of successful immune functioning. Research reviewed by Salovey, Rothman, Detweiler, and Steward (2000) shows how the beneficial effects of meaning on immune functioning arise. These investigators report that positive emotions have a beneficial effect on a wide range of immune functioning measures, including secretory immunoglobulin A, lymphocyte proliferation, and natural killer cell activity. The central role of positive emotions is important because there is some evidence that they are an integral facet of the meaning-making process. More specifically, as Reker (2000) argues, meaning encompasses several factors, including an affective component that "comprises feelings of satisfaction and fulfillment individuals get from their experiences and from achieving their goals. Although the pursuit of individual

happiness may not result in meaningfulness, whatever is meaningful must provide satisfaction to the pursuer" (p. 42). Clearly, feelings of satisfaction, fulfillment, and happiness are positive emotions. If meaning generates positive emotions and positive emotions have a beneficial effect on immune functioning, then it is not difficult to see why older adults who have a strong sense of meaning in life experience better health and live longer than older people who do not have a strong sense of meaning in their lives.

## ELABORATIONS AND EXTENSIONS

In order to properly evaluate the potentially important relationship between meaning in life and mortality, steps must be taken to rule out competing explanations. Two psychosocial factors are especially important in this respect. First, a growing number of studies suggest that people who attend religious services more often are less likely to die over the course of a study follow-up period than individuals who do not go to religious services as frequently (e.g., Hummer, Rogers, Nam, & Ellison, 1999). Second, a small cluster of studies reveal that greater involvement in religion is also associated with a strong sense of meaning in life (e.g., Krause, 2008a). Taken together, these two bodies of research indicate that the proposed relationship between meaning and mortality may be explained by the common dependence of these constructs on religious involvement. In order to rule out this possibility, the relationship between meaning in life and mortality is evaluated subsequently after the effects of attendance at religious services have been controlled statistically.

Research reveals that people who have more well-developed social networks tend to live longer than individuals who are socially isolated (House, Landis, & Umberson, 1988). This research is especially relevant for the current study because research also indicates that people with well-developed social support systems are likely to have a stronger sense of meaning in life than individuals who do not maintain close ties with others (Krause, 2007b). Consequently, it is important to rule out the possibility that the potentially important relationship between meaning in life and mortality is spurious and reflects little more than the influence of social support. It is for this reason that social support is also evaluated in the analyses that are presented subsequently.

## METHODS

### *Sample*

The data for this study come from a nationwide longitudinal survey of older adults. Altogether, six waves of interviews have been conducted. The population for the current study was defined as all household residents who were noninstitutionalized, English speaking, aged 65 years or older, and retired (i.e., not working for pay). In addition, residents of Alaska and Hawaii were excluded from the study population.

The sampling frame consisted of all eligible persons contained in the beneficiary list maintained by the Centers for Medicare and Medicaid Services (CMS). Study participants were selected at random from the CMS files. The CMS files do not contain individuals who are living in institutions. All interviews were conducted face-to-face in the homes of the study participants by interviewers from Harris Interactive (New York). The first three waves of data were collected between 1992 and 1999. A total of 1,103 interviews were completed at the baseline in 1992–1993. The response rate was 69.1%. Following this, 605 of the Wave 1 study participants were reinterviewed in 1996–1997. Then, a third wave of interviews was conducted in 1998–1999. A total of 530 older people who participated in earlier rounds of interviews were successively reinterviewed at Wave 3.

In 2002–2003, a fourth wave of interviews was conducted. However, the sampling strategy for the Wave 4 survey was complex. Two groups of older people were interviewed at this time. All survivors from Waves 1 to 3 were interviewed first ( $N = 269$ ). This group was then supplemented with a sample of new study participants who had not been interviewed previously. This supplementary sample was also selected at random from the CMS files. However, in this case, an effort was made to select the sample so that there would be approximately equal numbers of older people in the following age groups: young-old (aged 65–74 years;  $N = 491$ ), old-old (aged 75–84 years;  $N = 515$ ), and the oldest-old (aged 85 years and older;  $N = 509$ ). Altogether, the Wave 4 sample consisted of 1,518 older adults. The overall response rate for the Wave 4 survey was 54%.

A fifth wave of interviews was completed in 2005. A total of 1,166 of the Wave 4 study participants were successfully reinterviewed. Not counting those who had moved to a nursing home or had died, the reinterview rate for the Wave 5 survey was 83.9%.

A sixth wave of interviews was completed in 2007. A total of 1,011 older people were reinterviewed at this time. Not counting older adults who had moved to a nursing home or older people who died, the reinterview rate for Wave 6 was 76.9% of those older people who participated at Wave 4.

The data that are used in the current study come primarily from the Waves 4, 5, and 6 surveys. These data points were selected for the following reasons. To begin with, measures of meaning in life were administered for the first time at Wave 4. In addition, the last round of interviews for this study was conducted at Wave 6. Assessing the relationship between meaning and mortality between Waves 4 and 6 provides the longest between-round interval that is available in this study. This helps ensure that there will be greater variance in the mortality outcome measure. As discussed earlier, supplementary analyses are performed that focus on the frequency of attendance at religious services. However, measure of attendance at religious services was administered for the first time at Wave 5. Consequently, the analyses involving attendance at religious services and mortality are

based on Waves 5 and 6 data. After using listwise deletion of cases to deal with item nonresponse, the analyses presented subsequently are based on data that have been provided by between 1,135 and 1,361 older study participants. Preliminary data analysis of the sample comprising 1,361 older people revealed that the average age of the study participants at the Wave 4 interview was 78.6 years ( $SD = 8.4$  years), 40% were older men, 49.7% were married at Wave 4, and the study participants reported completing an average of 12.0 years of schooling ( $SD = 3.5$  years).

### Measures

Table 1 contains the core measures that were used in this study. The procedures used to code these items are presented in the footnotes of this table.

*Mortality status.*—Mortality status at the Waves 5 and 6 interviews was determined by informant report. Because no effort was made to determine why study subjects had died, the measure of mortality used in this study reflects death from all causes. This indicator is coded so that a value of 1 stands for older people who died and a score of 0 denotes those who were not known to have died at the follow-up interviews. Preliminary analysis revealed that 217 older people had died between the Waves 4 and 6 interviews, 89 died between Waves 4 and 5, and 128 older study participants died between Waves 5 and 6.

Death certificates are used to verify mortality in many studies. Even so, there are two reasons why informant reports of mortality are useful. The first is found in a study by Wolinsky and Johnson (1992). Using data from the Longitudinal Study on Aging, these investigators compared informant reports of death with data contained in the National Death Index (NDI—compiled by the Centers for Disease Control and Prevention, U.S. Department of Health and Human Services, Atlanta, GA). Wolinsky and Johnson found virtually no difference in the study results when informant reports were used in place of NDI data. They, therefore, conclude that informants provide valid data on mortality. Second, this is not the first study to use informant reports of death. Several other investigators have used informant reports to conduct meaningful research on the correlates of mortality in late life (e.g., Bernard et al., 1997; Borawski, Kinney, & Kahana, 1996; Wolinsky & Johnson).

*Meaning in life.*—Meaning in life is assessed with a shortened version of the scale devised by Krause (2004). Some of the items in this scale were taken from the work of others (e.g., Battista & Almond, 1973; Wong, 1998), whereas other indicators were devised by Krause (2004). This abbreviated index was created by conducting a confirmatory factor analysis (data not shown) and selecting two indicators that best measure each of four dimensions of meaning: having values, a sense of purpose, goals, and the ability to reconcile things that have happened in the past.

Table 1. Core Study Measures

Mortality status <sup>a</sup>
Informant report
Meaning in life—Wave 4 <sup>b</sup>
Values
I have a system of values and beliefs that guide my daily activities.
I have a philosophy of life that helps me understand who I am.
Purpose
I feel like I am living fully.
I feel I have found a really significant meaning in my life.
Goals
In my life, I have clear goals and aims.
I have a sense of direction and purpose in life.
Reconciling the past
I feel good when I think of what I have done in the past.
I am at peace with my past.
Self-rated health <sup>c</sup>
How would you rate your overall health at the present time?
Serious health conditions <sup>d</sup>
Do you have hypertension, sometimes called high blood pressure, or have you taken medication for it?
A heart attack or other heart trouble
Diabetes or high blood sugar, or have you taken medication for it?
Liver disease
Cancer or a malignant tumor of any kind
Nonserious health conditions <sup>d</sup>
Arthritis or rheumatism
Cataracts, glaucoma, or other eye diseases
Asthma, emphysema, chronic bronchitis, tuberculosis, or other respiratory diseases
Kidney disease
Ulcers (of the digestive system) or other stomach or intestinal disorders
Other urinary tract disorders
Prostate trouble (for men)
Functional disability <sup>e</sup>
Because of your health or physical problems, do you have any difficulty shopping for personal items, such as toilet items and medicines?
Using the telephone?
Bathing yourself?
Climbing 2–3 flights of stairs?
Walking about one quarter mile?
Doing heavy work around the house, such as shoveling snow or washing walls?
Taking a train or bus by yourself?
Standing or being on your feet for about 2 hr?
Stooping, crouching, or kneeling?
Reaching over your head?
Using your fingers to grasp or handle?
Lifting or carrying something as heavy as 25 pounds?
Dressing or undressing yourself?
Feeding yourself?
Getting out of bed?
Attendance at religious services <sup>f</sup> Wave 5 only
How often do you attend religious services?
Emotional support from family and friends <sup>g</sup>
How often has someone been right there with you (physically) in a stressful situation?
How often has someone comforted you by showing you physical affection?
How often has someone listened to you talk about your private feelings?
How often has someone expressed interest and concern in your well-being?

Notes: <sup>a</sup>This variable is scored in the following manner (coding in parentheses): *alive* (0) and *dead* (1).

<sup>b</sup>These variables are scored in the following manner: *disagree strongly* (1), *disagree* (2), *agree* (3), and *agree strongly* (4).

<sup>c</sup>This variable is scored in the following manner: *poor* (1), *fair* (2), *good* (3), and *excellent* (4).

<sup>d</sup>Two measures were created by making a simple count of the number of serious or non-serious health conditions that study participants experienced in the year prior to the survey.

<sup>e</sup>An index was created by making a simple count of the number of activities that study participants had difficulty performing.

<sup>f</sup>This indicator was scored in the following manner: *never* (1), *less than once a year* (2), *about once or twice a year* (3), *several times a year* (4), *about once a month* (5), *2–3 times a month* (6), *nearly every week* (7), *every week* (8), and *several times a week* (9).

<sup>g</sup>These indicators were scored in the following manner: *never* (1), *once in a while* (2), *fairly often* (3), and *very often* (4).

A system of values helps guide or direct behavior. In a world where the utility and worthiness of specific thoughts and actions are often unclear, values provide a basis for selecting among different options by giving the assurance that personal choices are, in the words of Baumeister (1991), right, good, and justifiable. Although clearly linked to values, a sense of purpose is conceptually distinct. It has to do with believing that one's actions have a set place in the larger order of things and that one's behavior fits appropriately into a larger, more important social whole. Values are codes or standards that define thoughts and actions that are desirable, whereas a sense of purpose arises from seeing the reasons or intent behind the values and understanding how these codes or standards integrate the individual into the larger currents of social life. A sense of meaning also involves expectations for the future and arises from having goals for which to strive. Goals help organize current activities and provide conduits for focusing and implementing energies, efforts, and ambitions. Although they are guided by values, goals refer to specific concrete behaviors that represent the implementation or manifestation of values. Finally, as research by Krause (2004) reveals, an important component of meaning for older people involves the ability to reconcile events that have happened in the past. The widely cited theory of adult development by Erikson (1959) helps show why this is so. According to this perspective, the life span is divided into eight stages. Each stage presents a person with a unique developmental challenge. The final stage is characterized by the crisis of ego integrity versus despair. This is a time of deep introspection when individuals try to reconcile the inevitable gap between what they set out to do in life and what they were actually able to accomplish. If this crisis is resolved successfully, older people are thought to have a deep sense of meaning in life, but if it is not resolved successfully, they slip into despair. Simply put, a sense of meaning can be derived by looking backward in time and seeing how events that have arisen in one's life can be woven into a coherent whole.

The correlation between the short and the long version of the meaning scale that was devised by Krause (2004) is .979 ( $p < .001$ ). The eight items that assess meaning were summed to form a single composite score in most of the analyses that follow. A high score represents a strong sense of meaning in life. The internal consistency reliability estimate for this composite measure at Wave 4 is .856. The mean at Wave 4 is 28.4 ( $SD = 3.7$ ). The reliability estimate for the measure of meaning at Wave 5 is .898, and the mean at Wave 5 is 27.7 ( $SD = 4.1$ ).

*Self-rated health.*—Global self-rated health is assessed with a single item that asks study participants to rate their overall health as excellent, good, fair, or poor. A high score on this item denotes a more favorable health rating. The mean of this widely used indicator at Wave 4 is 2.7 ( $SD = 0.9$ ), and the mean at Wave 5 is 2.7 ( $SD = 0.8$ ).

*Acute and chronic health conditions.*—Two additional measures of health were developed from a checklist of acute and chronic health problems. Based on the work of Ferraro and Wilmoth (2000), these items were used to create measures that assess serious and nonserious health problems. Serious health problems include hypertension, heart disease, diabetes, cancer, and liver disease. A high score on either variable denotes more physical health problems. The mean for the measure of serious health problems at Wave 4 is 1.0 ( $SD = 0.9$ ), and the mean at Wave 5 is 1.0 ( $SD = 0.9$ ). The mean for nonserious health problems at Wave 4 is 1.4 ( $SD = 1.1$ ), and the mean at Wave 5 is 1.4 ( $SD = 1.1$ ).

*Functional disability.*—The final health measure that is used in this study assesses functional disability. This measure was created by summing the number of instrumental activities of daily living and activities of daily living that older people had difficulty performing. These items were taken from the work of Liang (1990). A high score represents greater functional disability. The mean at Wave 4 is 3.5 ( $SD = 3.6$ ), and the mean at Wave 5 is 3.7 ( $SD = 3.8$ ).

*Frequency of attendance at religious services.*—This construct is assessed with a single item that asked older study participants how often they attend religious services. The mean of this variable, which was measured at Wave 5, is 5.5 ( $SD = 3.0$ ).

*Emotional support.*—Social support was measured with a scale that reflects how often older study participants receive emotional support from their family members and friends. This measure was developed by Krause and Borawski-Clark (1994). The mean of this four-item index at Wave 4 is 11.3 ( $SD = 3.6$ ). The internal consistency reliability estimate is .860.

*Demographic control variables.*—The relationships among the substantive constructs that were discussed previously were assessed after the effects of age, sex, education, and marital status were controlled statistically. Age is scored in a continuous format. Similarly, education is coded in a continuous format denoting the total number of years of completed schooling. In contrast, sex (1 = men; 0 = women) and marital status (1 = married; 0 = otherwise) are represented with binary indicators.

## RESULTS

The findings from this study are presented subsequently in six sections. First, given the centrality of meaning in the current study, bivariate correlations are presented for the relationship between meaning in life and all the other study measures. Then, the relationships between meaning in life, health, and mortality are reviewed in *Meaning in Life and Mortality*. *Meaning in Life and Health* contains the results of the analysis that evaluate the relationship between meaning

in life and health. As noted previously, the measure of meaning in life is multidimensional. This raises the possibility that some dimensions of meaning are associated with mortality, whereas others are not. The analyses presented in *Dimensions of Meaning in Life and Mortality* were designed to explore this issue. *Examining the Influence of Potential Confounders* contains a review of the findings that were obtained after the influence of attendance at religious services and emotional support were taken into account. *Meaning and Mortality at Different Data Collection Points* takes a more fine-grained approach to assessing the relationship between meaning in life and mortality. This involves looking at the influence of meaning on mortality between Waves 4 and 5 as well as the effect of meaning on mortality between Waves 5 and 6.

### *Bivariate Relationships Between Meaning and All Study Measures*

The following bivariate correlations were observed between the Wave 4 measure of meaning in life and the other Wave 4 variables: age ( $-.053$ ; *ns*), sex ( $-.011$ ; *ns*), education ( $.095$ ;  $p < .01$ ), marital status ( $.056$ ;  $p < .05$ ), self-rated health ( $.265$ ;  $p < .01$ ), serious illness ( $-.097$ ;  $p < .01$ ), non-serious illness ( $-.137$ ;  $p < .01$ ), functional disability ( $-.285$ ;  $p < .01$ ), and emotional support ( $.092$ ;  $p < .01$ ). In addition, the bivariate correlation between the Wave 5 measure of meaning in life and the frequency of attendance at religious services was  $.343$  ( $p < .01$ ).

### *Meaning in Life and Mortality*

Table 2 contains the results of the analysis that were designed to evaluate the relationship between meaning in life and mortality. Logistic regression models were estimated for this purpose. Two models are provided in Table 2. The first contains the results from the analyses that estimate the effects of the demographic variables and meaning in life on mortality (Model 1). The second model was estimated after the health measures were added to the equation (Model 2). The data provided by Model 1 suggest that older adults with a strong sense of meaning in life are less likely to die over the course of the study follow-up period than older people who do not have a strong sense of meaning in life (odds ratio [OR] = 0.923;  $p < .001$ ).

Four important findings emerge when the measures of physical health status are added in Model 2. First, the data suggest that older adults who rate their health favorably are less likely to die over the course of the study than older people who report that their health is not as good (OR = 0.721;  $p < .01$ ). Second, the findings reveal that older adults with greater functional disability had an elevated mortality risk (OR = 1.106;  $p < .001$ ). Third, neither the measure of serious health conditions (OR = 1.055; *ns*) nor the indicator of nonserious health conditions (OR = 1.002; *ns*) were associated with greater odds of dying. Fourth, the

Table 2. Meaning in Life and Mortality Waves 4–6 ( $N = 1,361$ )

Independent variables	Model 1			Model 2		
	Odds ratio	Lower CI	Upper CI	Odds ratio	Lower CI	Upper CI
Age	1.088***	1.065	1.111	1.077***	1.054	1.101
Sex	1.795***	1.268	2.541	2.044***	1.382	2.907
Education	0.987	0.946	1.030	1.014	0.971	1.059
Marital status	0.793	0.551	1.141	0.882	0.604	1.269
Meaning	0.923***	0.888	0.959	0.967	0.926	1.007
Self-rated health				0.721**	0.581	0.894
Serious illness				1.055	0.880	1.264
Nonserious illness				1.002	0.868	1.158
Functional disability				1.106***	1.051	1.164
C <sup>2</sup> log likelihood		1080.240			1032.808	

Notes: CI = 95% confidence interval.

\*\* $p < .01$ ; \*\*\* $p < .001$ .

data indicate that once the measures of physical health status were included in the model, meaning in life is no longer significantly associated with mortality (OR = 0.967; *ns*). This finding provides some preliminary evidence that the effect of meaning in life on mortality may operate indirectly through self-rated health and functional disability. The purpose of the analyses presented in *Meaning in Life and Health* was to bring these indirect effects into sharper focus.

#### *Meaning in Life and Health*

The findings that have been presented up to this point reveal that meaning in life and health are associated with mortality. However, as Baron and Kenny (1986) suggest, in order to demonstrate that health mediates the effects of meaning on mortality, it is important to show that meaning in life is also associated with health. Two additional sets of analyses were performed to address this issue. These analyses were conducted by regressing self-rated health and functional disability on meaning in life and the demographic control variables. Only Wave 4 measures were used in these models. The relationships among these constructs were estimated with ordinary least squares (OLS) multiple regression equations. The results (data not shown) indicate that older adults who have a strong sense of meaning in life tend to rate their health more favorably than older people who do not have a strong sense of meaning in life (Beta = .232;  $p < .001$ ). The findings further reveal that older people with a strong sense of meaning in life tend to have fewer functional limitations than older adults who do not have a strong sense of meaning in life (Beta =  $-.257$ ;  $p < .001$ ). When coupled with the findings that were presented in *Meaning in Life and Mortality*, these data provide evidence that self-rated health and functional disability may mediate the effects of meaning in life on mortality.

#### *Dimensions of Meaning in Life and Mortality*

Meaning is assessed in the current study with a scale that is composed of four factors. Up to this point, these items

were summed to form a single composite score. This scale development strategy rests on the assumption that all four components of meaning exert a similar effect on mortality. However, as Alwin (1988) points out, this assumption should be evaluated empirically. This type of analysis is important because greater theoretical insight may be obtained by assessing whether all, or only some, dimensions of meaning are related to mortality.

The first logistic regression model (Model 1) in Table 2 was reestimated after the composite measure of meaning was replaced with measures of each of the four dimensions of meaning in life. The results of these analyses are presented in Table 3. The findings suggest that only one dimension of meaning is significantly related to mortality: having a sense of purpose in life (OR = 0.860;  $p < .05$ ). In contrast, the data further indicate that having values, goals, and the ability to reconcile things that have happened in the past do not exert a statistically significant effect on the odds of dying.

The data in Model 2 indicate that once the influence of self-rated health and functional disability is taken into account, having a strong sense of purpose in life is no longer associated with mortality (OR = 0.996; *ns*). Subsequent OLS regression analyses (data not shown) indicate that older adults with a strong sense of purpose in life tend to rate their health more favorably (Beta = .290;  $p < .001$ ) and experience fewer functional limitations (Beta =  $-.301$ ;  $p < .001$ ) than older study participants who do not have a strong sense of purpose in life. When coupled with the findings in Table 2, these supplemental analyses provide preliminary evidence that self-rated health and functional disability mediate the effects of having a purpose in life on mortality.

#### *Examining the Influence of Potential Confounders*

Further analyses were performed to see if the relationship between meaning in life and mortality can be explained by the frequency of attendance at religious services. However, an important issue must be addressed before the findings are

Table 3. Dimensions of Meaning in Life and Mortality Waves 4–6 ( $N = 1,361$ )

Independent variables	Model 1			Model 2		
	Odds ratio	Lower CI	Upper CI	Odds ratio	Lower CI	Upper CI
Age	1.086***	1.063	1.108	1.076***	1.053	1.100
Sex	1.804***	1.272	2.558	1.998***	1.375	2.903
Education	0.987	0.946	1.030	1.016	0.972	1.061
Marital status	0.808	0.561	1.165	0.880	0.602	1.286
Values	0.982	0.822	1.172	0.951	0.791	1.143
Purpose	0.860*	0.744	0.994	0.996	0.855	1.159
Goals	0.885	0.759	1.033	0.910	0.777	1.065
Reconcile past	1.041	0.883	1.228	1.024	0.868	1.208
Self-rated health				0.721**	0.580	0.896
Serious illness				1.054	0.879	1.263
Nonserious illness				1.008	0.872	1.165
Functional disability				1.1.06***	1.050	1.165
$C^2$ log likelihood		1076.851			1031.808	

Notes: CI = 95% confidence interval.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

reviewed. Recall that the measure of attendance at religious services was administered for the first time in the Wave 5 survey. In contrast, the data that have been presented up to this point were all conducted with independent variables that were taken from the Wave 4 interviews. As a result, fewer study participants were available for analysis involving religion (1,135 instead of 1,361 in the previous models).

A preliminary set of analyses were performed to see if older people who dropped out of the study between Waves 4 and 5 differed from those who remained in the study. More specifically, a logistic regression analysis was conducted to see if older adults who participated at Wave 5 differ from those dropped out at Wave 5 on the following Wave 4 measures: age, sex, education, marital status, meaning in life, self-rated health, and acute and chronic conditions. Older people who died between Waves 4 and 5 ( $N = 89$ ) are not included in these attrition analyses because the variables associated with these deaths are examined in *Meaning and Mortality at Different Data Collection Points*. Not counting deaths, the findings (data not shown) reveal that none of the independent variables in the model were associated with the odds of dropping out of the study between Waves 4 and 5.

The relationship between attendance at religious services and mortality was assessed after the effects of the demographic variables, the health measures, and the measure of meaning in life were included in the model. The findings (data not shown) reveal that the frequency of attendance at religious services at Wave 5 is not associated with mortality status at Wave 6 (OR = 1.014; *ns*; lower 95% confidence interval [CI] = 0.943, upper CI = 1.090).

An additional set of analyses (data not shown) was conducted to see if emotional support from family and friends explains the relationships between meaning in life, health, and mortality. This model was estimated with measures that come from the Wave 4 survey. The data indicate that emotional support that is received from significant others is not significantly associated with the odds of dying during the

study follow-up period (OR = 1.015; *ns*; lower CI = 0.970, upper CI = 1.063).

#### *Meaning and Mortality at Different Data Collection Points*

With the exception of the analyses involving religion, the models that have been estimated up to this point focus on deaths that occurred anytime after Wave 4. However, a more fine-grained approach involves looking at the influence of the key study measures on deaths occurring between Waves 4 and 5 and (separately) deaths between Waves 5 and 6. These analyses can provide a crude sense of whether the influence of meaning in life on mortality emerges fairly quickly or whether there is a longer lag between the measurement of meaning and the subsequent deaths.

Table 4 contains the results of the analyses that focus on deaths between Waves 4 and 5 (89 deaths occurred during this time). The data in the left-hand portion of this table (Model 1) were obtained when the Wave 4 demographic variables and meaning in life were included as independent variables in the model. The findings in this table suggest that a stronger sense of meaning in life is associated with lower odds of dying between the Waves 4 and 5 interviews (OR = 0.905;  $p < .001$ ). However, as the data provided by Model 2 reveal, meaning in life fails to exert a significant effect on mortality once the health measures were included in the equation (OR = 0.951; *ns*).

Table 5 contains the findings from the analyses that involve deaths between Waves 5 and 6 (128 deaths occurred during this time). The independent variables in this model were taken from the Wave 4 interviews. Once again, the findings from Model 1 suggest that meaning in life is associated with mortality (OR = 0.948;  $p < .05$ ) before the health measures were included in the equation. However, the effect of meaning in life does not appear to be as large as that observed with the Waves 4 and 5 mortality data. The results in Table 5 further indicate that once the physical health

Table 4. Meaning in Life and Mortality Waves 4–5 ( $N = 1,361$ )

Independent variables	Model 1			Model 2		
	Odds ratio	Lower CI	Upper CI	Odds ratio	Lower CI	Upper CI
Age	1.073***	1.041	1.106	1.059***	1.026	1.092
Sex	1.820***	1.108	2.990	2.057**	1.211	3.495
Education	1.018	0.957	1.082	1.043	0.980	1.110
Marital status	0.708	0.418	1.200	0.801	0.464	1.382
Meaning	0.905***	0.861	0.952	0.951	0.901	1.004
Self-rated health				0.704*	0.519	0.957
Serious illness				0.923	0.713	1.195
Nonserious illness				1.038	0.850	1.266
Functional disability				1.114**	1.037	1.196
C <sup>2</sup> log likelihood		605.640			579.869	

Notes: CI = 95% confidence interval.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

status measures were included in the equation, meaning in life is not significantly associated with the odds of dying (OR = 0.985; *ns*). Taken together, the findings in Tables 4 and 5 provide further evidence that health mediates the effects of meaning in life on mortality.

## DISCUSSION

Four major findings emerged from this study. First, the data indicate that older adults who have a strong sense of meaning in life are less likely to die over the course of the follow-up period than older people who do not have a strong sense of meaning in their lives. This finding is noteworthy because it represents for the first time that meaning in life has been linked with mortality in a nationally representative sample of older people. Second, the results reveal that the effects of meaning on mortality are mediated by physical health. More specifically, the findings suggest that greater meaning is associated with better health, and better health is, in turn, associated with a lower risk of dying during the study follow-up period. This finding is important for the following reason. Some investigators use health as a control variable in studies of mortality—it is something that is removed statistically in order to demonstrate the effects of constructs that are of greater interest. But researchers who

rely on this practice may be selling their studies short if the effects of their core constructs, like meaning in life, are also related to health. The third main finding from this study has to do with having a sense of purpose in life. More specifically, the data suggest that having a sense of purpose may be more consequential than the three other dimensions of meaning that were evaluated in the present study. The fourth main finding suggests that the effects of meaning in life on mortality appear to be somewhat stronger for deaths that occur between Waves 4 and 5 than deaths occurring between Waves 5 and 6.

The fact that having a sense of purpose is the only facet of meaning that was associated with mortality makes it possible to develop the conceptual underpinnings of this study more fully. Some time ago, Rosow (1976) defined aging as a “role-less role.” More recently, Baltes and Smith (1999) provided some insight into why this may be so. These researchers argue that “relatively speaking, old age is young; therefore neither biological nor cultural evolution has had sufficient opportunity to evolve a full and optimizing scaffolding (architecture) for the later phases of life” (p. 158). Cast in terms of the findings from the current study, these insights suggest that it may be difficult for some older people to develop a strong sense of purpose in life because society has not provided them with the means and the

Table 5. Meaning in Life and Mortality Waves 5–6 ( $N = 1,272$ )

Independent variables	Model 1			Model 2		
	Odds ratio	Lower CI	Upper CI	Odds ratio	Lower CI	Upper CI
Age	1.090***	1.061	1.118	1.082***	1.052	1.112
Sex	1.651*	1.075	2.536	1.799*	1.139	2.842
Education	0.975	0.925	1.028	0.999	0.947	1.055
Marital status	0.902	0.573	1.420	0.988	0.617	1.581
Meaning	0.948*	0.904	0.994	0.985	0.936	1.036
Self-rated health				0.751*	0.577	0.977
Serious illness				1.132	0.909	1.409
Nonserious illness				0.990	0.829	1.181
Functional disability				1.087**	1.021	1.157
C <sup>2</sup> log likelihood		764.836			740.164	

Notes: CI = 95% confidence interval.

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

opportunity to do so. But instead of merely supporting the insights provided by Baltes and Smith, the findings from the current study underscore the importance of this issue because the results reveal that having a strong sense of purpose in life may be associated with mortality. If this finding is valid, then one way to help older adults live longer involves developing programs that provide them with the opportunity to derive a deeper sense of purpose in life and help them realize that they have a meaningful part to play in the wider social order. For example, programs that encourage older people to become involved in volunteer work might serve this purpose (Musick & Wilson, 2008). The results involving purpose in life are especially important because they highlight the benefits of studying the relative contributions of each dimension of meaning.

Although the effects of meaning on mortality may be attributed to physical health, the mechanisms that link meaning with health have not been thoroughly investigated. Perhaps older people who do not have a strong sense of meaning in life lose the will to live and become self-neglectful (Dyer, Pickens, & Burnett, 2007). In contrast, researchers may also wish to explore the potentially important mediating role that positive emotions may play in the relationship between meaning in life and mortality. More specifically, research is needed to see if factors such as happiness and optimism help explain the potentially important impact of meaning in life on health. Researchers may also wish to take a more dynamic approach to the study of meaning in life. The analyses in the current study focus on the influence of meaning at fixed points in time. However, greater insight is likely to be obtained if investigators focus on the effects of within-person change in meaning via individual growth curve models.

The data from this study reveal that the frequency of attendance at religious services was not significantly associated with mortality. This is somewhat surprising given the results from other studies (e.g., Hummer et al., 1999). Perhaps the findings in the current study can be explained by turning to the nature of the sample that was used. Recall that these data came from the Wave 5 survey. By that time, the average study participant was approximately 80 years old. Perhaps the protective effect of attendance at religious services begins to wane for individuals who reach this point in the life course. This makes sense because everyone obviously must die, and because they do, the protective factors that had previously delayed mortality must therefore eventually lose their effectiveness. Further support for this potentially important principle may be found by turning to the findings involving meaning in life. When the Wave 4 data were analyzed, the study sample was somewhat younger, and meaning was associated with mortality before the effects of physical health status were taken into consideration. However, when the Wave 5 data were analyzed, the effects of meaning in life were not as strong. So just like attendance at religious services, the protective effects of meaning may

begin to diminish as people move through advanced old age. The brief explanation that is provided here hardly provides conclusive evidence that key psychosocial resources lose their effectiveness for the oldest-old. Even so, pursuing this issue more rigorously may provide evidence that changes the way researchers study psychosocial resources and mortality in late life.

The findings provided previously further reveal that receiving emotional support from family members and friends is not associated with a decreased mortality risk. Other investigators have come to the same conclusion. For example, Brown, Nesse, Vinokur, and Smith (2008) also were unable to find that emotional support received from significant others reduced the odds of dying. However, these investigators report that giving emotional support is an important factor. Because the correlation between giving and receiving support is fairly strong, investigators who focused solely on received support may have been reporting a spurious effect that arises from the unmeasured influence of support provided to others. Clearly, more research is needed to disentangle the effects of different dimensions of social support on mortality.

In the process of continuing to study the relationship between meaning and mortality, researchers should address the limitations in the current study. Five shortcomings are discussed briefly.

First, the analyses involving the mediating effects of health are based on the assumption that a sense of meaning in life determines an older person's health. However, it is possible to reverse the causal ordering between these constructs and argue that physical health problems tend to erode an older person's sense of meaning in life. This vexing issue of causality can be conclusively resolved only in studies that employ a true experimental design. However, it is difficult to imagine how meaning in life and health could be evaluated in an experiment.

Second, the theoretical rationale that was developed for the current study is based on the assumption that meaning affects health and mortality by influencing immune functioning. However, biomarkers of immune functioning were not available in the current study, making it impossible to empirically evaluate this potentially important intervening pathway. Doing so should be a high priority in the future.

Third, a number of researchers have pointed out that the measurement of meaning in life is fraught with difficulty (e.g., Reker, 2000). Even though the measure of meaning that was used in the current study is multidimensional, it can be improved in a number of ways. For example, Reker (2000) suggests that meaning might also be measured within specific domains or within a particular social context. As evidence regarding the importance of meaning in life continues to mount, it is important to pursue additional work on the measurement of this elusive construct.

Fourth, although the data on mortality that were used in the current study indicate whether respondents died during

the follow-up period, information on the age at death was not obtained. Had data on the date of death been available, it would have been possible to conduct a more fine-grained and sophisticated set of analyses that shed light on whether meaning in life determines the precise timing of death.

Fifth, the only measure of religion that was used in the current study assesses the frequency of attendance at religious services. However, measurement in the field of religion has moved far beyond this simple indicator (Krause, 2008b). Consequently, researchers who wish to study the relationship between religion and mortality should focus on a wider range of religion measures.

Even though there are limitations in the current study, it is hoped that the findings that emerged encourage further research on meaning in life. For decades, social and behavioral scientists have argued that the ability to derive a sense of meaning represents the pinnacle of human development (e.g., Berger, 1967; Frankl, 1984; Maslow, 1968). Yet, empirical work on meaning in life is in its infancy. By showing that meaning in life may be associated with mortality, it is evident that the time has come to pay much more serious attention to this pivotal construct.

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