Age, Subjective Life Expectancy, and the Sense of Control: The Horizon Hypothesis

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This article reports a test of the horizon hypothesis, which states that greater subjective life expectancy increases the sense of control over one's own life and in part accounts for the negative association between age and the sense of control. Results of a U.S. survey of 2,029 respondents aged 18 and older (934 aged 50 and older) support the hypothesis. Subjective life expectancy has a significant positive association with the sense of control that does not vanish with adjustment for race, sex, education, income, widowhood, inability to work because of a disability, physical impairment, and physical fitness. Adjustment for subjective life expectancy explains the part of the negative association between age and the sense of control that remains after adjustment for education and physical impairment. Adjusting the three factors together explains 93.1 percent of the total association between age and the sense of control, and renders the remaining association insignificant.

Sense of control. — Controlling your own life means exercising authority and influence over it by directing and regulating it yourself. People vary in the sense of control. Some feel they can do just about anything they set their minds to. They see themselves as responsible for their own successes and failures and view misfortunes as the results of personal mistakes. Others feel that any good things that happen are mostly luck — fortunate outcomes they desire but do not design. They feel that personal problems mostly result from bad breaks and feel little ability to regulate or avoid bad things that happen. The sense of control varies by degree, ranging from fatalism and a deep sense of helplessness to instrumentalism and a firm sense of effectiveness (Mirowsky and Ross, 1991).

The concept of a sense of control appears in the scientific literature under a number of synonyms (Rodin, 1990) that include "mastery" (Pearlin et al., 1981), "efficacy" or "self-efficacy" (Downey and Moen, 1987), "instrumentalism" (Wheaton, 1980), "self-directedness" (Kohn and Schooler, 1961; Wheaton, 1980), "primary control" (Wheaton, 1980), and antonyms that include "powerlessness" (Seeman and Lewis, 1995; Seeman and Seeman, 1983), "helplessness" (Seligman and Elder, 1986), "fatalism" (Kluckholn and Strodtbeck, 1961; Wheaton, 1980), and "external locus of control" (Rotter, 1966). Although their definitions vary somewhat, the terms and their measures refer in common to the perception of effective personal agency: of being the cause of that which happens in one's own life, the means by which it occurs, the authority with power to act, and the author of intended effects.

Gerontologists consider the sense of control important for a number of reasons. Community studies find that a sense of control protects people from depression, anxiety, malaise, distrust, and demoralization (e.g., Benassi, Sweeney, and Dufour, 1988; Krause and Stryker, 1984; Pearlin et al., 1981; Ross and Mirowsky, 1989). Elderly persons constitute a vulnerable population that may be especially susceptible to the effects of a low sense of control (Thompson and Spacapan, 1991). In a U.S. sample of men aged 45 to 59 that was followed for 5 years, a low sense of control significantly increased the odds of mortality, adjusting for initial symptoms and activity limitations (Seeman and Lewis, 1995). In an 18-month experiment...
with nursing home patients, interventions that improved the sense of control appear to have lowered the odds of dying by a factor of 2.5 (Rodin, 1986). In addition to valuing well-being and survival, Americans value the sense of control itself (Kluckhohn and Strudtbeck, 1961; Kluegel and Smith, 1986). According to the ideals of instrumental activism, Americans generally believe people should control their own lives by taking responsibility for outcomes, staying alert to possibilities, choosing a direction, and acting toward ends. Older Americans may find it especially difficult to maintain a valued and valuable sense of control.

The sense of control seems to act as a pivot of social, psychological, and biological processes. Social research finds that the sense of control reflects objective conditions. It increases with education, employment, income, occupational status, and autonomy on the job (Ross and Mirowsky, 1989; Wheaton, 1985). It decreases following layoff, unemployment, demotion, or other job losses (Pearlin et al., 1981). Social-psychological research finds that supportive interpersonal attachments that are not constricting or dependent enhance the sense of control (Krause, 1987). Psychological research finds that a sense of control averts the tendency to behave helplessly in frustrating and aversive situations (Hirotto, 1974). Psycho-physiological research finds that a sense of control apparently subdues biological stress reactions. Behavioral helplessness or a low sense of control correlates with higher circulating catecholamine and corticosteroid under stressful conditions (Gold, Goodwin, and Chrousos, 1988; Rodin, 1986; Rodin and Timko, 1992). The sense of control links the socio-economic, interpersonal, behavioral, and physiological systems. It is the human awareness at their hub.

**Subjective longevity and life expectancy.** — Although actuarial estimates of life expectancy may shape subjective ones, it must be the subjective estimates that influence the sense of control. Demographers define life expectancy as the average years of life remaining to persons of a certain age (Nam, 1994). (Members of the public sometimes use the term as if it meant only life expectancy at birth.) Subjective estimates of life expectancy work backwards from a guess about one's probable length of life. Individuals imagine a longevity that seems reasonable for people such as themselves (Hamermesh and Hamermesh, 1983; Nelson and Honnold, 1980; Robbins, 1988). Almost everyone knows how old they are, so they have an implicit sense of how many years remain.

On the aggregate level, subjective life expectancy corresponds broadly to actuarial estimates, although with optimistic or pessimistic bias in some quarters (Handal, 1969; Hamermesh and Hamermesh, 1983; Robbins, 1988). It is not clear whether the correspondence represents knowledge of the demographic projections or merely coincidence. Subjective estimates seem to draw heavily on personal knowledge about the ages at death of family members, neighbors, coworkers, public personalities, and the like (Handal, 1969; Robbins, 1988). More to the point, subjective life expectancy accounts for personal history, habits, conditions, and perceptions not reflected in the aggregate actuarial estimates.

### Prior Research

The horizon hypothesis proposes that greater subjective life expectancy increases the sense of control. The proposition embodies the idea that a sense of control requires a perceived future — that time acts as an essential resource. The greater the amount of time that seems available, the greater the potential for enjoyment and gratification. Although it seems plausible that subjective life expectancy would influence the sense of control, I could find no prior publication that correlates the two. Indeed, there appear to be surprisingly few studies of subjective life expectancy at all. A search of the major indexes in social science, psychology, and health found four community surveys by economists (Hamermesh, 1985; Hamermesh and Hamermesh, 1983; Pollock and Suyderhoud, 1992; Schoenbaum, 1994), a handful of college laboratory and classroom surveys by psychologists (Denes-Raj and Ehrlichman, 1991; Handal, 1969; Nelson and Honnold, 1980; Robbins, 1988; Teahan and Kastenbaum, 1970), and one high school survey by demographers (Nam and Harrington, 1986). The economists are studying the rationality of retirement planning, the psychologists are studying death anxiety, and the demographers are studying knowledge of population facts. Apparently none of the surveys of subjective life expectancy also measures the sense of control.

In the absence of studies correlating the sense of control with subjective life expectancy, the next best evidence comes from studies correlating it with age. Age stands in for actuarial life expectancy, which correlates positively with subjective life expectancy. Research on older adults seems to suggest that they might feel less in control of their own lives than younger adults do (e.g., Ory, Abeles, and Lipman, 1992; Thompson and Spacapan, 1991). Until recently, however, the studies of age-group differences in the sense of control gave inconsistent and often contradictory results. In a review of the literature, Lachman (1986) says that about one third of the studies find lower levels of control among the older age groups, one third find higher levels, and one third find no association. Rodin and her colleagues conclude, "the data do not provide clear evidence that perceived control decreases as a function of chronological age" (Rodin, 1986, p. 1271).

Many of the inconsistencies among prior studies result from the use of truncated, incomparable, unrepresentative, small, or eroded samples (Mirowsky, 1995). Truncated samples select respondents from a single, limited range of ages, which limits the ability to detect differences between age groups. Incomparable samples use different frames for sampling different age ranges (e.g., the students at a college and the members of a retirement plan), confounding other differences with age group. An unrepresentative sample selects respondents without taking them randomly from a defined population, so that results reflect the peculiarities of the selection procedure. A small sample decreases statistical power and thus increases the possibility of an odd finding, because it increases the standard error of sample statistics. An eroded sample has followed an aging cohort, losing the potential for enjoyment and gratification. Although it seems plausible that subjective life expectancy would influence the sense of control, I could find no prior publication that correlates the two. Indeed, there appear to be surprisingly few studies of subjective life expectancy at all. A search of the major indexes in social science, psychology, and health found four community surveys by economists (Hamermesh, 1985; Hamermesh and Hamermesh, 1983; Pollock and Suyderhoud, 1992; Schoenbaum, 1994), a handful of college laboratory and classroom surveys by psychologists (Denes-Raj and Ehrlichman, 1991; Handal, 1969; Nelson and Honnold, 1980; Robbins, 1988; Teahan and Kastenbaum, 1970), and one high school survey by demographers (Nam and Harrington, 1986). The economists are studying the rationality of retirement planning, the psychologists are studying death anxiety, and the demographers are studying knowledge of population facts. Apparently none of the surveys of subjective life expectancy also measures the sense of control.

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also account for some of the inconsistencies in studies comparing it across age groups. Sometimes researchers try to get information on the sense of control from data not designed for the purpose, using answers to questions about planning, orderliness, perseverance, self-discipline, achievement and the like (Lachman, 1986). Although answers to such questions reflect the sense of control, they also reflect other attributes, attitudes, and habits that may confound correlations with age. Habits may grow more conventional, orderly, and predictable with age without necessarily implying a greater sense of control. Even indexes such as Levinson’s (1973), that are specifically designed to measure perceived control, can reflect other attributes that bias correlations with age (Shewchuck, Foelker, and Niederehe, 1990). In particular, the tendency to agree with statements regardless of their content increases with age or, perhaps more precisely, with being of an older generation (Mirowsky and Ross, 1991, 1996). Comparing the sense of control across the full spectrum of adult ages requires the use of a measure validated across that spectrum.

Two prior community surveys using representative samples and measures validated for age-group comparisons find much lower average sense of control among the older adults than among the young and middle-aged adults (Mirowsky, 1995). One is a 1985 survey of 800 Illinois adults and the other is a 1990 survey of 2,030 U.S. adults. Both samples were drawn using random-digit dialing methods (Waksberg, 1978). Both find high mean levels of perceived control in the age range 18 through 50, followed by successive steps down in the sense of control in progressively older age groups. Figure 1 illustrates the relationship in the 1990 survey of U.S. adults. In both surveys a one-way analysis of variance shows that the negative linear trend and the deviation from linearity are statistically significant.

The association between age and the sense of control can be described well by a cubic function given in Equation 1 (Mirowsky, 1995). Adding terms representing other powers of age to the model does not significantly improve its fit. The slope of the function is zero at age 18, but it becomes increasingly negative at progressively older ages. Figure 1 shows the cubic curve (fit to individual-level data) superimposed on the crude means in the 1990 U.S. sample.

\[
\hat{C} = b_0 + b_1(\text{Age-18})^2 + \sum_{i=2}^{k} X_i \tag{1}
\]

\[
b_1 < 0 \tag{2}
\]

Somewhat less than half of the total association between age and the sense of control can be attributed to age-group differences in education and physical impairment, but more than half of the total association remains unexplained. Mirowsky (1995) attempted to explain the association by adjusting for various \(X_i\) that might affect the sense of control and be affected by age (or cohort). When no \(X_i\) are adjusted, Equation 1 describes the total association between age and the sense of control. If the size (absolute value) of \(b_1\) diminishes with adjustment for \(X_i\), then age-group differences in \(X_i\) apparently account for the diminished part of the total association. Mirowsky found that adjusting for education explains about 24 percent of the total association. Adjusting for education and impairment together explains about 41 percent. Additional adjustment for income, malaise, subjective health, and the frequency of aches and pains did not diminish \(b_1\) much.

A survey of clinic patients used methods similar to Mirowsky’s and found similar results. Wolinsky and Stump (1996) interviewed patients at a large urban teaching hospital. The patients were at risk of acute deterioration either because they were older than 74 or because they were older than 50 and showed evidence of a serious medical problem such as coronary artery disease. Wolinsky and Stump regressed Mirowsky and Ross’s (1991) sense-of-control index on age, progressively adjusting for correlates that might explain the association. Wolinsky and Stump found a significant negative association that was reduced substantially (34.4%) by adjustment for education. The association was not reduced by adjustment for the following blocks of variables: (a) gender, race, and marital status; (b) SF-36 scales of physical function, mental health, and perceived health; and (c) religiosity, belief in an afterlife, and Catholicism.

Although broadly similar, the community and clinical studies differ in one important result. The community research found that differences between age groups in the average level of impairment account for a substantial fraction of their differences in the average sense of control. The clinical study found no similar effect of physical functioning. Why? Perhaps it is that the clinical sample implicitly screened out individuals with little or no impairment. In regard to subjective life expectancy, one convergent result seems more relevant than the divergent one: Community and clinical results both show a substantial unexplained association between age and the sense of control.

![Figure 1. The sense of control in 10-year age groups in a 1990 sample of 2,030 U.S. residents (Mirowsky, 1995).](image-url)
The Horizon Hypothesis

In its minimum form, the horizon hypothesis states that adjustment for subjective life expectancy accounts for part of the remaining unexplained association:

$$|b_{i, \text{imp}, \text{subj.life.exp.}}| \leq |b_{i, \text{imp}}|$$ (3)

In its strongest form the horizon hypothesis states that adjustment for subjective life expectancy accounts for the remaining association between age and the sense of control that is not attributable to education and impairment:

$$b_{i, \text{ed}, \text{imp}, \text{subj.life.exp.}} = 0$$ (4)

Possible Confounders

Precursors of both subjective life expectancy and the sense of control can create spurious association between them. Indeed, it seems highly likely that some part of their total association will be spurious. Education and subsequent socioeconomic status decrease the predicted rate of morbidity and mortality (e.g., House et al., 1994; Johnson and Wolinsky, 1993; Rogot, Sorlie, and Johnson, 1992; Ross and Wu, 1995, 1996) and increase the predicted sense of control (e.g., Kohn and Slomczynski, 1990; Mirowsky, 1995; Pearl et al., 1981; Wheaton, 1980). The historical trend toward higher levels of education means that older Americans have lower levels than others. That might contribute to a negative correlation between subjective life expectancy and the sense of control. Physical impairment and chronic disease predict lower rates of survival, and tend to undermine the sense of control (Baltes, Wahl, and Schmid-Furstost, 1990; Turner and Noh, 1983). The rates of impairment, disease, and poor health increase with age. That also might contribute to a negative correlation between subjective life expectancy and the sense of control. A strict test of the horizon hypothesis requires adjustment for education, income, physical function, and health. Otherwise, their effects on the sense of control might be mistaken for those of a longer subjective life expectancy.

METHODS

Sample

The 1995 survey of Aging, Status, and the Sense of Control (ASOC) is a national telephone probability sample of United States households. Respondents were selected using a prescreened random-digit dialing method that increases the proportion of numbers dialed that are in households and decreases standard errors compared to the standard Mitofsky-Waksberg method, while producing a sample with the same demographic profile (Lund and Wright, 1994; Waksberg, 1978). The ASOC survey has two subsamples, designed to produce an 80 percent oversample of persons aged 60 or older. Strata 1 draws from all households; strata 2 draws only from households with one or more seniors. In strata 1 the adult (18 or older) with the most recent birthday was selected as respondent. In strata 2 the senior (60 or older) with the most recent birthday was selected. The survey was limited to English-speaking adults. Up to 10 call-backs were made to select and contact a respondent, and up to 10 to complete the interview once contact was made. Interviews were completed with 71.6 percent of the persons selected: 73.0 percent and 67.3 percent, respectively, for strata 1 and 2. Fifty-eight percent of the sample is under age 60 (N = 1,496) and 42 percent of the sample is 60 years and older (N = 1,097), for a total sample of 2,593.

Variables

Sense of control. — The ASOC survey measures the sense of control using a 2x2 index designed for large community surveys comparing individuals across the full range of adult ages (Mirowsky and Ross, 1991, 1996). It is the same index used in two earlier community surveys and one clinic survey of age and the sense of control that were summarized in the introduction (Mirowsky, 1995; Wolinsky and Stump, 1996). The 2x2 index balances statements claiming control against an equal number denying it and statements about good outcomes against an equal number about bad outcomes (Mirowsky and Ross, 1991, 1996). The measure is similar in concept and content to the personal control component of Rotter's (1966) locus-of-control scale and to Pearl et al.'s (1981) mastery scale. The 2x2 index eliminates bias from the tendency to agree with all statements regardless of content and from defensive claiming of responsibility for successes but not for problems (Mirowsky and Ross, 1991, 1996). The index has four subscales, each composed of two statements: Responsibility for success claims "I am responsible for my own successes," and "I can do just about anything I really set my mind to"; Responsibility for failure claims "My misfortunes are the result of mistakes I have made," and "I am responsible for my failures"; Denying control over success claims "The really good things that happen to me are mostly luck," and "There's no sense planning a lot — if something good is going to happen it will"; Denying control over problems claims "Most of my problems are due to bad breaks," and "I have little control over the bad things that happen to me." Response categories are: strongly disagree, disagree, agree, and strongly agree, coded -2, -1, 1, and 2, respectively, for statements claiming responsibility and coded 2, 1, -1, and -2 for those denying responsibility. The index averages the responses to the 8 items.

Subjective longevity and life expectancy. — The ASOC survey asks, "To what age do you expect to live?" I calculated subjective life expectancy by subtracting current age from the subjective estimate of longevity. Of the 2,592 respondents in the sample, 78.6 percent estimated subjective longevity (2,037); that is, 82.1 percent of strata 1 and 66.8 percent of strata 2, or 88.0 percent of respondents younger than age 60 and 65.8 percent of respondents age 60 or older. Those who estimated personal longevity tend to be younger, more educated, and have a stronger sense of control. Among the variables in this study, age and education have the largest impact on the probability of reporting subjective longevity. Figure 2 illustrates their effects. (Adjustments for sample self-selection will be addressed in the Results section.)

The possible confounders that might create a spurious
The association between subjective life expectancy and the sense of control can be classified as ascribed status, socioeconomic status, and health or life-course status.

**Ascribed status.** — Female is a dummy variable that equals 1 for females and 0 for males. Minority is a dummy variable that equals 1 for persons who identify themselves as Black or African American, Native American, Asian or Pacific Islander, or Hispanic, and equals 0 for others (white “Anglos”).

**Socioeconomic status.** — Education is coded in years. Respondents were asked to report their highest grade or degree of formal education. Income is coded in tens-of-thousands of dollars ($10k). Respondents were asked to report total household income before taxes from all sources.

**Health or life-course status.** — Preliminary analyses indicated that four measures of health and life-course status have significant net effects on the sense of control. Widowed is a dummy variable that equals 1 for those who report having lost a spouse and not remarried, and 0 otherwise. Unable to work is a dummy variable that equals 1 for those who are unable to work because of a disability, and 0 otherwise. Impairment is an index that averages responses to seven questions asking the respondents to state the amount of difficulty they have with going up and down stairs, kneeling or stooping, lifting or carrying objects less than 10 pounds (such as a bag of groceries), using hands or fingers, seeing (even with glasses), hearing, and walking (McDowell and Newell, 1987; Nagi, 1976). Those who say they have no difficulty with an item are coded 0, those who say they have some difficulty are coded 1, and those who say they have a great deal of difficulty are coded 2. Fitness is an index that averages the response to two questions: “On how many days in the past week have you had lots of energy? . . . felt physically fit?” Answers are coded in days per week.

Several other health measures were evaluated and did not have significant direct effects on the sense of control adjusting for impairment, fitness, and subjective life expectancy. They include a count of medical conditions — “Have you ever been diagnosed or told by a doctor that you have . . . ?” — that include heart disease, high blood pressure, lung diseases such as emphysema or lung cancer, breast cancer, any other types of cancer, diabetes, arthritis or rheumatism, osteoporosis (brittle bones), and ulcers, ulcerative colitis or other digestive problems, a count of doctor visits in the past year, a count of prescription medications, recent hospitalization for a serious problem, an index of aches and pains, and self-reported health. These measures do not appear in the regression analyses that follow because they cannot account for the association between subjective life expectancy and the sense of control.

**RESULTS**

**Age and Subjective Life Expectancy.**

As in previous surveys, the mean sense of control in the ASOC sample remains high over the 18-year-old to 50-year-old range and then drops progressively in successively older age groups. Figure 3 shows the crude means and their 95 percent confidence ranges in 5-year age categories. A one-way analysis of variance finds that both the negative trend and the deviation from linearity are statistically significant at \( p < .001 \). Thus, the ASOC provides the second replication in a national U.S. sample of the pattern found originally in an Illinois sample.

Not surprisingly, subjective life expectancy decreases with age. Figure 4 shows the mean and its 95 percent confidence range in 5-year age groups. It also shows the actuarial life expectancy based on 1993 mortality rates (the most recent available) matched by race and sex to the composition of the ASOC subsample in each age range. The mean subjective estimate is slightly but consistently higher than the actuarial estimate for two main reasons. First, the people who participate in surveys are a little healthier on average than the population as a whole, because a household survey does not include persons who are in nursing homes or hospitals, or who are homeless. Second, the people who report a subjective longevity estimate are healthier on average than others of the same age who do not. For example, the mean physical impairment is significantly lower among those who report an expected longevity than among those who do not (\( M = .229 \) and .319, respectively, adjusting for age, \( F = 27.069, df = 1 \) and 2,574, \( p < .001 \)). On the whole, though, the mean subjective estimate of life expectancy corresponds reasonably well to the actuarial one. As age increases, the number of years people expect to have remaining decreases, asymptotically toward zero.

**Testing the Horizon Hypothesis**

Regression analyses confirm the hypothesis that subjective life expectancy accounts for that part of the association between age and the sense of control that is not attributable to education and impairment. Table 1 shows the sense of
control regressed on the cubic function of age and adjusted progressively for education, impairment, and subjective life expectancy. Row 1 gives the coefficient that represents the effect of age on the sense of control.

The first three steps in Table 1 replicate the results of the two previous surveys described in the introduction. Step 1 gives the coefficient that represents the total association between age and the sense of control. That coefficient is negative and statistically significant at $p < .001$. Step 2 gives the coefficient adjusted for education. As shown in rows 7 and 8, that adjustment reduces the total association by 16.6 percent, or 1.396 standard errors of the coefficient’s estimate. Adding the adjustment for impairment reduces the total association by another 41.1 percent, or 3.456 standard errors. Although diminished 57 percent by the two adjustments, the coefficient shown in step 3 of row 1 remains significantly different from 0 at $p < .001$.

The results in step 4 of Table 1 prove consistent with the horizon hypothesis in its strictest form. The additional adjustment for subjective life expectancy in step 4 reduces the coefficient by another 35.4 percent of the total association, or 2.966 standard errors. Together, the three adjustments account for 93.1 percent or the total association and render the coefficient in row 1 statistically insignificant ($p = .332$ for a one-tailed test).

**Ruling out multicollinearity.** — Multicollinearity does not account for the fact that age’s effect becomes insignifi-
significant when subjective life expectancy is adjusted. Subjective life expectancy correlates \(-.697\) with the cube of years since age 18. Thus, the two variables have 48.6 percent of their variance in common. While this inflates the standard errors of their coefficients somewhat, the inflation is far too small to account for the insignificance of the age-cubed term in step 4 of Table 1. The age-cubed term’s variance inflation factor (VIF) is only 2.039, which implies a tolerance of 49 percent, well above the 10 percent generally considered necessary. To pass a one-tailed test at the .05 level, the \(t\)-value in row 1, step 4 of Table 1 would have to be 3.8 times larger than it is. Thus, the tolerance would have to be less than 26 percent (100/3.8) for multicollinearity to be a viable explanation of the insignificant effect.

**Ruling out sample-selection bias.** — Self-selection into the sample does not account for the fact that age’s effect becomes insignificant when subjective life expectancy is adjusted. The possibility of sample-selection bias exists whenever the probability of being in the sample correlates with both the independent and the dependent variable in question. In the present case, older persons and those with a lower sense of control are less likely than others to report subjective longevity. Their absence from the analyzed sample attenuates the measured association between age and the sense of control — a classic floor effect of truncation from below (e.g., Winship, 1992). However, that problem vanishes with adjustment for the proximate cause of selection out of the sample. In the present case, subjective life expectancy apparently acts as the proximate cause of reporting an expected personal longevity. I adjusted the regression in step 4 of Table 1 for the hazard of not reporting subjective longevity. For individuals who reported subjective longevity, the hazard measures the likelihood that they might not have done so. I calculated the hazard by estimating a probit regression of whether or not someone reported longevity on the independent variables described in the measurement section, eliminating those with insignificant effects. Adjusting for the hazard of nonresponse inflates the standard error of education somewhat, reducing its \(t\)-value from 10.956 to 6.637, but otherwise leaves the regression coefficients in step 4 and their standard errors much the same. The coefficients for rows 1 through 4 respectively become \(-.015, .044, -.311, \text{ and } .027\). The coefficient of the hazard of nonresponse is not significant in any version of the regression model that adjusts for subjective life expectancy. Thus, the hazard of nonresponse does not bias the results of any model that includes subjective life expectancy as an independent variable.

**Ruling out spurious association.** — The apparent effect of subjective life expectancy on the sense of control cannot be attributed to related aspects of social and physical status. Table 2 shows the regression of sense of control on subjective life expectancy, adding adjustments for variables that correlate with both. Age group differences in education, income, widowhood, inability to work, impairment, and physical fitness account for about half of the total association between subjective life expectancy and the sense of control. However the adjustments leave about half of the total association unexplained. The coefficient in step 4 remains greater than 0 and statistically significant at \(p <

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Table 2. Progressive Multiple Regressions With the Sense of Control Dependent, Showing That Its Association With Subjective Life Expectancy Remains Significant With Adjustment for Ascribed Status, Socioeconomic Status, and Health and Life-Course Status

<table>
<thead>
<tr>
<th></th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(b_i)</td>
<td>(\beta_i)</td>
<td>(b_i)</td>
<td>(\beta_i)</td>
</tr>
<tr>
<td>Subjective life expectancy +10</td>
<td>(0.057)</td>
<td>(0.205^{***})</td>
<td>(0.059)</td>
<td>(0.213^{***})</td>
</tr>
<tr>
<td>Minority</td>
<td>(-0.86)</td>
<td>(-0.060^{***})</td>
<td>(-0.81)</td>
<td>(-0.057^{**})</td>
</tr>
<tr>
<td>Female</td>
<td>(-0.097)</td>
<td>(-0.094^{***})</td>
<td>(-0.072)</td>
<td>(-0.070^{***})</td>
</tr>
<tr>
<td>Education</td>
<td>(0.049)</td>
<td>(0.246^{***})</td>
<td>(0.042)</td>
<td>(0.210^{***})</td>
</tr>
<tr>
<td>Income ($10k)</td>
<td>(0.007)</td>
<td>(0.071^{**})</td>
<td>(0.005)</td>
<td>(0.047^{*})</td>
</tr>
<tr>
<td>Widowed</td>
<td>(-0.094)</td>
<td>(-0.058^{*})</td>
<td>(-0.094)</td>
<td>(-0.058^{*})</td>
</tr>
<tr>
<td>Unable to work</td>
<td>(-0.228)</td>
<td>(-0.076^{**})</td>
<td>(-0.228)</td>
<td>(-0.076^{**})</td>
</tr>
<tr>
<td>Impairment</td>
<td>(-0.187)</td>
<td>(-0.112^{***})</td>
<td>(-0.187)</td>
<td>(-0.112^{***})</td>
</tr>
<tr>
<td>Fitness</td>
<td>(0.021)</td>
<td>(0.093^{***})</td>
<td>(0.021)</td>
<td>(0.093^{***})</td>
</tr>
<tr>
<td>Intercept</td>
<td>(0.513)</td>
<td>(0.573)</td>
<td>(-0.102)</td>
<td>(0.126)</td>
</tr>
<tr>
<td>(R^2)</td>
<td>(0.042)</td>
<td>(0.055)</td>
<td>(0.126)</td>
<td>(0.170)</td>
</tr>
</tbody>
</table>

*Note: Unstandardized \((b_i)\) and standardized \((\beta_i)\) coefficients with \(t\)-values in parentheses.

*Source: 1995 U.S. ASOC Data, \(N = 2,037\).

\(\ast p < .05; \ast\ast p < .01; \ast\ast\ast p < .001\) (2-tailed \(t\)-test).
Subjective life expectancy is one of several factors related to age that affect the sense of control. However, its association with the sense of control cannot be attributed entirely to its association with lower education, lower income, widowhood, greater physical impairment, and lower physical fitness. Adjustment for those factors leaves a statistically significant association between subjective life expectancy and the sense of control.

**DISCUSSION**

The results consistently support the horizon hypothesis that greater subjective life expectancy increases the sense of control. As in previous surveys, the average sense of control decreases in older age groups. Much of that negative association reflects the lower education and higher impairment of older age groups. However, a large fraction of the association remains after adjustment for education and impairment. Subjective life expectancy has a significant positive relationship with the sense of control that explains the remainder of age’s association with it. The results suggest that age-based differences in subjective life expectancy account for a third or more of the total association between age and the sense of control.

Although the results support the horizon hypothesis, they do not rule out the possibility that the sense of control increases subjective life expectancy but is not increased by it. The cross-sectional analysis ruled out multicollinearity, sample-selection bias, and spurious association as likely explanations of subjective life expectancy’s apparent role. However, a cross-sectional analysis cannot rule out the possibility that subjective life expectancy is a consequence rather than a cause of perceived control. Much of the research summarized in the introduction indicates that a sense of control improves functioning, health, and well-being, particularly among older persons. Indeed, the likely mutual reinforcement of health and perceived control generates much of the interest in the relationship between age and the sense of control. A reciprocal effect would not in itself invalidate the cross-sectional findings. Suppose that lower subjective life expectancy decreases the sense of control, which further decreases subjective life expectancy. It would still be the case that differences between age groups in subjective life expectancy produce much of their differences in the sense of control. The real threat to the horizon hypothesis does not come from the likelihood of a reciprocal effect. It comes from the logical possibility that all of the association results from the effect of perceived control on subjective life expectancy. However unlikely that may seem, it remains a possibility that must be addressed in future panel studies.

The association between old age and a low sense of control over one’s own life may seem like a grim and unyielding fact. People understand that their own futures get shorter as they get older, and that fact into account when judging control over personal outcomes. Science will not eliminate the negative association between age and life expectancy any time soon, if ever. The same may be said for the association between age and impairment. There are good reasons to think it would be beneficial to increase the sense of control that older Americans feel over their own lives. What reason can be found in its relationship to subjective life expectancy, impairment, and education to think that improvements are possible? The answer to this question provides a guide for future research.

The first possibility is that successive generations may enjoy progressively higher age-specific levels of education, lower age-specific impairment, and longer age-specific life expectancy. If so, the result would be a progressive delay in the age at which the average sense of control drops to a specific level or by a specific amount. In many ways the better educated of today are like the average persons of tomorrow, who can expect to live longer and be less impaired at any given age than the current average. Education’s effects and trends suggest a higher sense of control among the old of the future than among those of the present.

Will rising levels of education flatten the slope of the curve illustrated in Figure 1, or merely raise it by an amount that is constant across age groups? Higher education reduces the strength of the cross-sectional association between age and impairment, and reduces the rate at which levels of impairment rise as people age (Ross and Wu, 1996). Perhaps education also moderates the association between age and subjective life expectancy, flattening the slope and reducing the rate at which it declines with age. In addition, education also might moderate the direct effects of impairment and subjective life expectancy on the sense of control, to the extent that it helps people manage and overcome their limitations. Interactions such as these would suggest more rapid improvements in old-age sense of control than would unconditional (linear) effects. If education slows the rise of impairment, slows the decline of subjective life expectancy, and simultaneously reduces the effects of impairment and a short life expectancy on the sense of control, then the slope of the cross-sectional curve may flatten considerably in the coming decades.

Rising levels of education provide hope for those who will be old in the future. What hope is there for those who are old now? There are good reasons to suspect that impairment, subjective life expectancy, and the sense of control form a deviation-amplifying feedback system. This might seem another grim fact about old age, but if true it also contains a seed of hope. Feedback systems can work in both directions, amplifying improvements as well. Greater subjective life expectancy may increase the sense of control, which then slows the rise of impairment, which in turn slows the decline in the sense of control, and so on.

What factors increase an individual’s subjective life expectancy relative to the actuarial estimate? Some factors may be aspects of personal history that can be changed for future generations but not for those who have already lived out their lives, such as education, parity, age at first birth, employment history, lifetime poverty, and so on. Other factors may represent current circumstances that might be improved through individual or collective action, such as exercise, diet, subjective fitness and health, emotional well-being, social activity, economic security, health care security, and so on. Still other factors may include attitudes or inspirations that might be labeled optimism. Some people may take an uncommonly and perhaps irrationally hopeful
view. Will a hopeful deviation from the normal or scientifically likely expectation increase the sense of control too? Is there a benefit from optimism? If so, is there also a limit to the benefit?

On the whole, the relatively low sense of personal control reported by older Americans seems based on a reasonable assessment of real circumstances. The key to improving the sense of control that older Americans feel over their own lives lies in improving their circumstances and effectiveness. In the long run this apparently requires raising levels of education and longer preservation of physical function. In the short run the best strategy may lie in keeping shocks to subjective life expectancy and the sense of control from creating intractable consequences that further undermine morale. An event such as an injury, a medical or economic crisis, or the death of a loved one may temporarily undermine subjective life expectancy and the sense of control. Reassurance, support, therapy, and resources may help individuals to manage the crisis effectively in a manner that rebuilds the sense of control over personal outcomes. It may be inevitable that the oldest Americans feel less in control of their own lives than younger Americans feel. It is not inevitable that older Americans feel as little in control of their own lives in the future as they do now.

Acknowledgments

The survey of Aging, Status, and the Sense of Control (ASOC) and the analysis reported in this article were supported by a grant from the National Institute on Aging's Behavioral and Social Research Program (1 RO1 AG-12393) to John Mirowsky, principal investigator, and Catherine E. Ross, co-principal investigator. The data were collected by the Survey Research Laboratory of the University of Illinois. This analysis also was supported in part by the College of Social and Behavioral Sciences and the Department of Sociology at The Ohio State University, Columbus.

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Received August 6, 1996
Accepted December 19, 1996

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