

Longevity Increased by Positive Self-Perceptions of Aging

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This research found that older individuals with more positive self-perceptions of aging, measured up to 23 years earlier, lived 7.5 years longer than those with less positive self-perceptions of aging. This advantage remained after age, gender, socioeconomic status, loneliness, and functional health were included as covariates. It was also found that this effect is partially mediated by will to live. The sample consisted of 660 individuals aged 50 and older who participated in a community-based survey, the Ohio Longitudinal Study of Aging and Retirement (OLSAR). By matching the OLSAR to mortality data recently obtained from the National Death Index, the authors were able to conduct survival analyses. The findings suggest that the self-perceptions of stigmatized groups can influence longevity.

There has been a proliferation of studies in the last 6 years showing the effects of race and gender self-stereotypes on behavior and function (e.g., Leyens, Desert, Croizet, & Darcis, 2000; Steele & Aronson, 1995; Stone, Lynch, Sjomeling, & Darley, 1999). Most of these studies have explained their findings by referring to *stereotype threat* (Wheeler & Petty, 2001). Essentially, this theory states that members of stigmatized groups "experience stereotype threat when they are in situations in which other people may view them stereotypically in ways likely to increase performance pressures" (Blasovich, Spencer, Quinn, & Steele, 2001, p. 225). According to the theory, "susceptibility to stereotype threat lies not in the internalization of the stereotype, but in caring about the domains to which it might prove to be a frustration" (Crocker, Major, & Steele, 1998, p. 519).

Self-stereotypes of aging, or older individuals' beliefs about old people as a category, do not appear to fit into the stereotype-threat

framework. The underlying reason is that self-stereotypes of aging seem to develop and operate through internalization. We believe older individuals' internalized age stereotypes contribute to the formation of their self-perceptions of aging, which, in turn, can have a physiological outcome. In this study, we partially address this model by examining whether self-perceptions of aging influence survival.

Unlike race and gender stereotypes, which individuals encounter while developing group self-identities, individuals acquire age stereotypes several decades before becoming old. Thus, younger individuals are likely to automatically accept age stereotypes without questioning their validity (Nelson, 2002; Perdue & Gurtman, 1990). When individuals reach old age and the stereotypes become self-relevant, they have already internalized these stereotypes (Giles, Fox, & Smith, 1993; Levy & Langer, 1994).

Once individuals become older, they may lack the defenses of other groups to ward off the impact of negative stereotypes on self-perceptions. For example, African Americans are potentially able to defend themselves against stereotype threat by disengaging from the academic domain (Steele & Aronson, 1995). This withdrawal is facilitated by the stipulation that stereotype threat arises in specific situations, under specific conditions, when one is engaging in specific tasks (e.g., Steele & Aronson, 1995).

An equivalent disengagement is less likely to be an option for older individuals because the central themes of self-stereotypes of aging are health and function or their absence, which promotes a diffusiveness that transcends domains (Levy, Hausdorff, Hencke, & Wei, 2000). The all-encompassing nature of self-stereotypes of aging may not lend itself to disengagement for older individuals in the same way as, for instance, academic stereotypes do for African

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Americans or employment stereotypes do for women. The diffusiveness of age stereotypes can be seen in a series of laboratory studies demonstrating that the same sets of positive and negative primes, typified by *wise* versus *senile*, can lead to enhancement or decline, respectively, in a wide array of cognitive and behavioral outcomes, including memory performance, handwriting, self-efficacy, mathematical performance, and views of other older people (Levy, 1996; Levy et al., 2000).

The depth and breadth of self-stereotypes of aging may be explained by their focus on cognitive and physical decline, which conveys a sense of the ultimate outcome: death (Becker, 1980; Levy et al., 1999–2000). This outcome does not facilitate compartmentalization into a domain: “The knowledge of the inevitability of death is the underlying sense from which all other fears are ultimately derived” (McCoy, Pyszczynski, Solomon, & Greenberg, 2000, p. 37).

A second self-protective strategy practiced by other stigmatized groups that may be less accessible for older individuals is egalitarian thinking. Controlled personal beliefs are capable of inhibiting the earlier-developed negative stereotypes toward women and African Americans by asserting later-acquired egalitarianism (Devine, 1989; Devine & Monteith, 1999). However, egalitarianism, as promoted by the women’s, civil rights, and political correctness movements, does not exist to the same degree in relation to age stereotypes as it does for gender and race stereotypes (Levy & Banaji, 2002). There is, then, a greater likelihood that younger individuals will accept negative stereotypes about aging as true and that this will continue to occur when the individuals become older and the stereotypes become self-stereotypes. This acceptance diminishes the prospect for defending self-perceptions against negative age stereotypes.

There are two additional indications that aging self-stereotypes are internalized. First, research suggests that self-stereotypes of aging can operate without older individuals’ awareness. This is in contrast to the noninternalization that characterizes stereotype threat and is reflected in its reliance on awareness at critical stages: recognition that a stereotype may be applied to oneself in a particular situation and that one may then act in accordance with it (e.g., Crocker et al., 1998).

The series of laboratory studies that achieved cognitive and physical changes in older participants did so by flashing aging stereotype primes on a screen at a speed that was below the threshold of awareness (see Levy, 1996, for a more detailed description of the procedure). In one of the studies, older individuals who were first exposed to subliminal negative age stereotype primes and then to cognitive challenges showed a significantly heightened cardiovascular response, compared with those exposed to subliminal positive age stereotypes and the same challenges. Yet the two groups of older individuals did not differ in how stressful they rated the challenges to be (Levy et al., 2000). There was, then, unawareness not only of the stereotype primes but also of their physiological impact.

Another study showed that the same subliminal priming of age stereotypes can influence a behavior that is thought to operate largely without awareness: handwriting (Allport & Vernon, 1933; Wolff, 1948). A panel of judges who did not know the age and priming group of the older participants described handwriting samples from the negatively primed group as significantly deteriorated, compared with baseline, whereas those participants who

received positive primes were rated as significantly more accomplished (Levy, 2000).

A further indication that self-stereotypes of aging are internalized is that older individuals tend to hold feelings toward their own group that are as negative as the feelings held about it by those outside their group—the young (Nosek, Banaji, & Greenwald, 2002). Similarly, older individuals are more likely to oppose programs that benefit the aged than are younger individuals (Levy & Shlesinger, 2001; Shlesinger & Kronebusch, 1994). This contrasts with the in-group preference of other stigmatized groups (Levy & Banaji, 2002). For instance, Asians and African Americans, in spite of acknowledging that they are perceived in negative terms, tend to hold as positive views toward their respective groups as Whites do toward their own group (Crocker et al., 1998).

Although the writings of the Symbolic Interactionists are regarded as inconsistent with stereotype-threat theory (Crocker et al., 1998), these writings help to explain the process by which self-stereotypes of aging are internalized and affect self-perceptions of aging. These scholars, including Charles Horton Cooley and George Herbert Mead, conceptualized the self as a product of societal beliefs conveyed through social interaction (Cooley, 1902; Mead, 1934). Such beliefs are likely to include both the positive and the negative age stereotypes that exist in American culture (Brewer, Dull, & Lui, 1981; Hummert, 1999) rather than only the negative stereotypes that are addressed by stereotype threat (e.g., Steele & Aronson, 1995). Studies of older individuals have found a correspondence between self-stereotypes and self-perceptions (Imamoglu, Kueller, Imamoglu, & Kueller, 1993; Levy, 1999).

The preponderance of negative aging stereotypes in society does not guarantee a preponderance of internalized negative aging stereotypes, nor of eventual negative aging self-perceptions. Within the elderly category, subgroups may have different exposures to aging stereotypes. As an example, older Deaf individuals report more positive attitudes toward aging than do older individuals who are not hearing impaired (Levy & Langer, 1994). Older members of the Deaf community tend to participate in intergenerational activities, in which they are given equal or higher status, to a greater extent than do older hearing individuals (Becker, 1980); this type of intergenerational contact may be a source of insulation from mainstream negative stereotypes.

Further, among those who are exposed to the same stereotypes within the same subgroups, there is variability in what is internalized. For instance, older role models can provide young individuals with a countervailing force against negative stereotypes of aging (Palmore, 1998). In addition, personality differences may affect receptivity to stereotypes (Allport, 1954).

Link Between Self-Perception of Aging and Longevity

Most of the research on self-stereotypes and self-perceptions referred to here has been confined to the laboratory, which unavoidably imposes limitations. There is no way of knowing whether the stimuli and paradigms authentically represent how self-stereotypes and self-perceptions operate in the real world and over time. In the present research, we partially address these limitations by examining, in the community, the impact of aging self-perceptions on a long-term outcome: longevity.

The lengthening of the average American life span by 27 years over the last century has provoked considerable research on the

determinants of longevity (e.g., Perls & Silver, 1999; Rogers, Hummer, & Nam, 2000). Much of this research has focused on genes (e.g., Pletcher, Houle, & Curtsinger, 1999; Rogina, Reenan, Nilsen, & Helfand, 2000). Yet as much as 75% of longevity may be due to nongenetic attributes, including psychological and behavioral factors (Vaupel et al., 1998). In addition, most of the research on predictors of survival has focused on negative factors (e.g., disease, injury, and cognitive decline; Stroebe, 2000). Relatively few studies have examined positive factors, such as beneficial beliefs, that might affect survival. The following study examines for the first time whether positive self-perceptions about one's aging influence survival, controlling for functional health and other relevant factors.

We have located only one other study that considered the link between views of aging and survival. In the Berlin Aging Study, researchers examined the association between 17 indicators of psychological functioning and mortality during 7 years in a sample that was 70 years or older (Maier & Smith, 1999). The authors did not expect views of aging to emerge as a significant predictor. Yet, after systematically inspecting the variables, they found that one of the best predictors of mortality was the Attitude Toward Own Aging subscale of the Philadelphia Geriatric Center Morale Scale (PGCMS; Lawton, 1975; Liang & Bollen, 1983), controlling for age, socioeconomic status, life satisfaction, self-rated health, number of illnesses, and cognition. Partially because of the lack of a functional health variable in their analyses, the authors concluded that the negative beliefs about aging are "probably not the cause for an increased mortality risk, but they may reflect potential causes from other domains of functioning" (Maier & Smith, 1999, p. 51). By contrast, our study, which includes functional health as a covariate, is designed to explore the possibility that self-perceptions of aging directly affect survival.

Overview

In the following two studies, we examine whether self-perceptions of aging influence longevity and how this process might occur. We conducted our analyses by matching data from the Ohio Longitudinal Study of Aging and Retirement (OLSAR) with data from the National Death Index (NDI).

The OLSAR serves our research aims because it (a) contains items at baseline that measured self-perceptions of aging; (b) allows us to chart the course of survival over a 22.6-year period; (c) includes individuals, 50 years old or more, who are at the threshold of aging, thus allowing us to explore the reach of aging self-perceptions; and (d) contains survey waves, collected after baseline, that allow us to examine a psychological mechanism by which aging self-perceptions might influence longevity.

Study 1

In the first study, after controlling for relevant factors, we examined the hypothesis that those with more positive aging self-perceptions at baseline will live longer.

Method

Participants

In 1975, Robert Atchley and his colleagues at Miami University recruited participants for the OLSAR in Oxford, Ohio. Because of the small

size of the town (a population of approximately 15,000), the investigators were able to contact virtually all individuals who met the participation criteria of being (a) cognitively intact, (b) age 50 or over by July 1, 1975, and (c) a community resident. The investigators compiled the list of potential participants by starting with the voter registration records and then using a variety of other techniques, including a postcard census of all mailing addresses in the community, a review of welfare rolls, and community informants. The efforts to recruit all eligible individuals in the town maximized the heterogeneity of the sample characteristics as well as the variability in beliefs about aging. The study team identified a total of 1,461 eligible individuals, of whom 1,157 participated.

We added two criteria for inclusion of participants in the analyses. They had to (a) meet the vital-status protocol (included in the *Measures* section, within the description of the survival variable) and (b) provide complete data for the variables analyzed in the study. We excluded 139 participants because they did not meet the vital-status protocol and another 358 participants because they were missing data for at least one of the variables. A total of 660 participants met these additional inclusion criteria.

The final cohort comprised 338 men and 322 women. Their age at baseline ranged from 50 to 94 years ($M = 63.00$ years, $SD = 9.23$). Their mean score on the Health Scale for the Aged (Rosow & Breslau, 1966) was 4.84 (the items for this scale are listed under *Covariates* in the *Measures* section). Scores on the Health Scale for the Aged ranged from 0 to 6, with a higher score reflecting better health. The participants' average socioeconomic status, as measured by the Two-Factor Index of Social Position (Hollingshead, 1965), was 32.49, which indicates that participants tended to be middle class. Scores on this scale ranged from 11, indicating the highest socioeconomic status, to 77, indicating the lowest socioeconomic status.

The final cohort of 660 participants did not differ from the excluded participants in age, socioeconomic status, or functional health. However, the final cohort significantly differed by gender and race. In the total sample of individuals recruited, 42.7% were male, as opposed to 51.2% in the final cohort. Also, in the total sample of individuals recruited, 4.6% were Black or "other," whereas 2.5% described themselves as Black or "other" in the final cohort.

Measures

Independent variable: Self-perceptions of aging. For our self-perceptions of aging measure, we used the Attitudes Toward Own Aging subscale that Liang and Bollen (1983) based on five items from the PGCMS (Lawton, 1975). This subscale consists of the following items: "Things keep getting worse as I get older," "I have as much pep as I did last year," "As you get older, you are less useful," "I am as happy now as I was when I was younger," and "As I get older, things are (better, worse, or the same) as [sic] I thought they would be."

Participants responded to the first four items with a "no," scored as 0, or "yes," scored as 1. The first and third items were reverse scored to make all the items measure a positive aging self-perception. As indicated, participants responded to the fifth item by selecting either "better," "worse," or "the same." To make the fifth item comparable to the other four items, we changed it to a dichotomous variable and combined "the same" responses with "worse" responses (in analyses presented in the *Results* section, we verified that combining "the same" responses with "better" responses did not change the impact of the independent variable on survival). Participants received a total score ranging from 0 to 5, with a higher score indicating a more positive aging self-perception.

Several researchers found that these five items loaded highly on a single factor in different data sets (Liang & Bollen, 1983; Mancini, Shade, & Quinn, 1995; McCulloch, 1991). We conducted a factor analysis to check that the items also loaded on one factor in the OLSAR. Indeed, when we conducted a factor analysis with all the PGCMS items, the five items loaded on a single factor with all factor loadings greater than .40, thus meeting the definition of meaningful loadings (Hatcher, 1994). These five

PGCMS items had not previously been examined as a subscale in the OLSAR.

Outcome: Survival. Our outcome variable is survival. This is the first study to match the OLSAR with mortality data, which we obtained from the NDI.

For the analyses, we used the number of days participants survived after the baseline interview. The survival variable ranged from the baseline survey in 1975 to January 1, 1998, the cut-off date for mortality data available from the NDI. To determine whether and when participants had died, we developed a vital-status protocol on the basis of information provided by the NDI, which included possible matches of deceased individuals on three variables: first and last name; date of birth; and state in which death occurred, as most of the cohort did not move out of Ohio before death. To be considered dead, participants needed to match on all three criteria (264, or 43%, of the participants coded as dead were in this group) or match on two of the three criteria and have confirmation by an obituary and/or an informant (355, or 57%, of the participants coded as dead were in this group). If the OLSAR participants only matched the NDI data by date of birth and state in which death occurred, to be considered dead they also had to match on first name (some of the participants changed their last name with marriage or divorce).

To be considered alive, participants were (a) confirmed to be living through January 1, 1998, by the participants themselves; (b) confirmed to be living through January 1, 1998, by an informant and had no matches provided by the NDI (368, or 92%, of the participants coded as alive were in either this group or the first group); or (c) had one match provided by the NDI but also sent in a survey response after the NDI date of death (31, or 8%, of the participants coded as alive were in this group).

Covariates. The covariates for this study include the following measures assessed at baseline: age; gender; race, as categorized by either White or Black or "other"; and socioeconomic status (Hollingshead, 1965), which takes into account participants' years of education and occupational status.

Baseline functional health was also included as a covariate. It was assessed by Rosow and Breslau's (1966) six-item Health Scale for the Aged. Participants were asked,

Which of the following things are you physically able to do? (Place a check by each of the things you can do): 1. heavy work around the

house (shoveling snow, washing walls, etc.); 2. work at a full time job; 3. ordinary work around the house; 4. walk half a mile; 5. go out to a movie, to church, to a meeting or to visit friends or relatives; 6. walk up and down stairs.

Each check was scored as a 1. Thus, the scores ranged from 0 to 6, with a lower score indicating lower functional health. We analyzed this measure as an ordinal variable. Others have found that the Health Scale for the Aged strongly correlates with observed physical performance measures (Alexander et al., 2000).

In addition, we included two covariates that could be alternative explanations for self-perceptions of aging influencing survival: self-rated health and loneliness. There is considerable evidence that self-rated health influences survival (Idler & Kasl, 1992; Idler, Russell, & Davis, 2000). It has been shown that loneliness predicts survival and tends to correlate with another predictor of survival: depression (for which there was no OLSAR measure; Cacioppo et al., 2000; Danner, Snowdon, & Friesen, 2001; Dill & Anderson, 1999). By adding self-rated health and loneliness as covariates, we tried to make sure that self-perceptions of aging is a new explanatory variable and not just another way to measure more established variables.

We measured self-rated health by the item "Is your health improving, declining or remaining about the same?" Loneliness was measured by the PGCMS item "How much do you feel lonely?" with *not much* scored as 1 and *a lot* scored as 2 (Lawton, 1975).

Statistical Analyses

To examine whether more positive aging self-perceptions at baseline lead to greater longevity after relevant factors are controlled for, we used univariate and multivariate Cox proportional-hazards regression models. The regression models used days since baseline interview as the time scale. The analyses were conducted in stages. First, we conducted two Kaplan-Meier survival curves: one with each value of the self-perception of aging measure examined separately, and one with the participants dichotomized into those below and those equal to or above the self-perception of aging mean of 3.67 (see Figure 1).

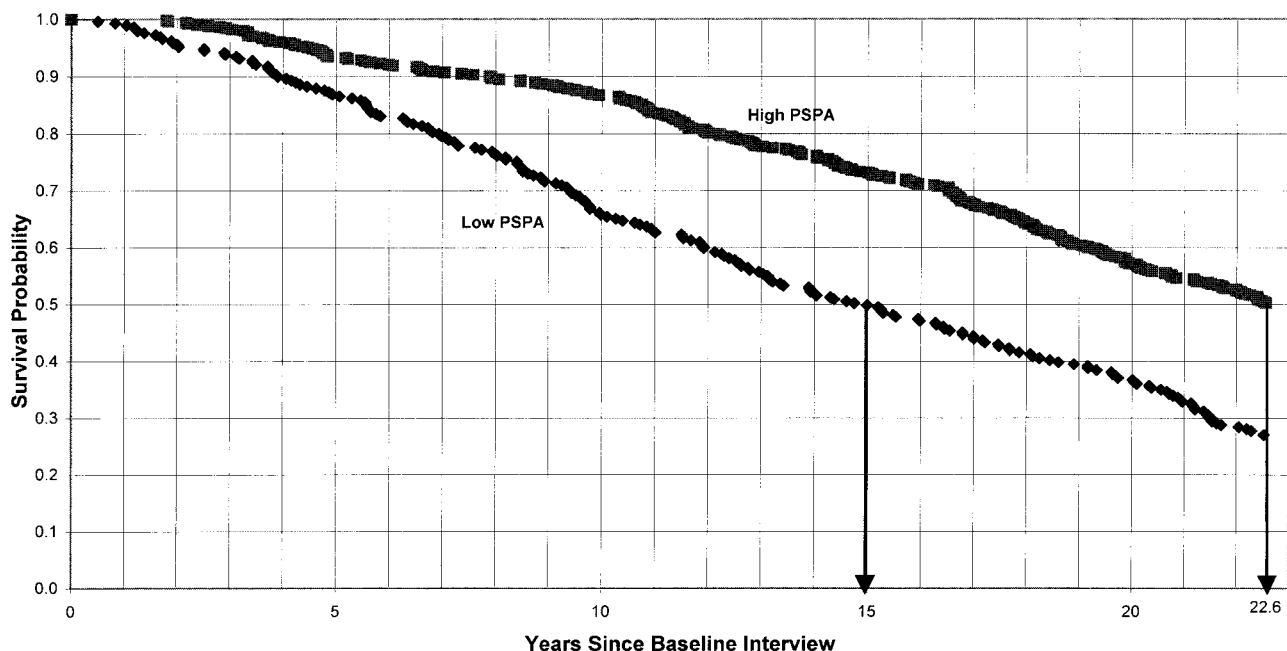


Figure 1. Influence of positive self-perceptions of aging (PSPA) on survival. Arrow indicates median survival.

Next, we conducted several tests of the assumptions for proportional hazards, such as visual inspection of log-log survival curves and inclusion of a Self-Perception of Aging $\times$ Log (Time) interaction term in the model. For all of these tests as well as all additional analyses reported, the self-perceptions of aging measure was analyzed as a continuous variable. These tests indicated that the assumptions for proportional hazards were met by the data.

Then, after analyzing the self-perceptions of aging risk ratio using a univariate Cox proportional-hazards regression model, we added the following potential covariates to our model: age at baseline, race, gender, socioeconomic status, functional health, self-rated health, and loneliness. Using a backward-elimination strategy, we reduced covariates to those significant at .05. Before eliminating nonsignificant covariates, we checked that their removal did not produce a meaningful change (greater than 1%) in the self-perceptions of aging hazard ratio. The final multivariate model therefore contained only those control variables that significantly predicted survival and/or confounded the relationship between self-perceptions and survival (see Table 1). Accordingly, race and self-rated health were eliminated.

Results

The results support the hypothesis of Study 1: Those with more positive aging self-perceptions at baseline live longer, after relevant factors are controlled for.

In the initial analysis, before the covariates were added, those with more positive self-perceptions of aging scores survived significantly longer than did those with more negative self-perceptions of aging scores. When we conducted a Kaplan–Meier survival analysis with self-perceptions of aging as a dichotomous variable, we found that the median survival of those in the more positive self-perceptions of aging group was 7.6 years longer than the median survival of those in the more negative aging self-stereotype group (see Figure 1). That is, the median survival for the more positive self-perceptions group was 22.6 years past baseline, whereas the median survival for those in the more negative self-perceptions group was 15 years. Using the nonparametric log-rank test, we found that the two groups were significantly different ($p < .001$). When we conducted a Cox proportional-hazards regression model with self-perceptions of aging as a continuous variable, each one-point increase in self-perceptions of aging showed a consistent increase in survival.

The influence of sequentially adding covariates to the model on the positive self-perceptions of aging survival risk ratio is presented in Table 1. The final survival model, with all the covariates added, is presented in the extreme right column.

When the self-perceptions of aging score acted as a predictor, the survival risk ratio remained significant after we sequentially adjusted for covariates. The risk ratio of .87 ($p < .001$) suggests that positive self-perceptions of aging reduce the risk of mortality. For each change of one point in the positive self-perception of aging measure, the risk of dying decreased by 13%. When we ran the model with the PGCMS item “As I get older, things are (better, worse, or the same) as [sic] I thought they would be” recalculated so that “the same” was combined with “better” rather than with “worse,” a similar result emerged: The risk ratio of positive self-perceptions on survival became .89 ($p < .004$).

Ordered from greatest to least impact on survival, the variables were in the following sequence: age, self-perceptions of aging, gender, loneliness, functional health, and socioeconomic status. We determined this by multiplying each variable’s coefficient by the mean of the variable and then taking the absolute value.

Visual inspection of the data revealed that the trend of more positive aging self-perceptions leading to greater longevity consistently appeared when we repeated this analysis six times after stratifying by age, gender, socioeconomic status, functional health, and loneliness. That is, we divided the participants into two sets of age groups (less than 60 years old or 60 years old and over, and less than 70 years old or 70 years old and over), two gender groups, two health groups (those below and those equal to or greater than the functional health mean of 4.84), two socioeconomic status groups (those below and those equal to or greater than the socioeconomic status mean of 32.49), and groups of those who reported they felt lonely and those who reported they did not. In all the analyses, those with more positive self-perceptions of aging outlived those with more negative self-perceptions of aging.

We were able to establish that the influence of self-perceptions of aging on survival was a larger effect than the total PGCMS from which the self-perceptions of aging measure’s items were taken. We did this by conducting three additional survival analyses with the PGCMS items. First, we modeled survival as a function of the total PGCMS score, controlling for age, functional health, gender, and socioeconomic status. The hazard ratio was .97 ($p = .06$; 95% confidence interval [CI] = .94–1.00). The same analysis (see Table 1), using the self-perceptions of aging measure, significantly predicted survival ($p < .001$). In addition, the sum of the PGCMS items, excluding the five used for the self-perceptions of aging measure, did not significantly predict survival when we controlled for age, functional health, gender, and socioeconomic status ($p = .38$). Third, we found that self-perceptions of aging still signifi-

Table 1
Relationship Between Positive Self-Perceptions of Aging (PSPA) and Survival

Risk ratio for PSPA alone	Risk ratio for PSPA adjusted for:				
	Age	Age, sex	Age, sex, SES	Age, sex, SES, functional health	Final model: Age, sex, SES, functional health, loneliness
.78 (0.74–0.83) $p < .001$	.90 (0.84–0.95) $p < .001$	.88 (0.83–0.94) $p < .001$	.88 (0.82–0.94) $p < .001$	.90 (0.84–0.97) $p < .006$	.87 (0.80–0.94) $p < .001$

Note. Confidence intervals appear in parentheses. SES = socioeconomic status.

cantly predicted survival (hazards ratio = .88, $p = .008$; 95% CI = .81–.97) after we controlled for the sum of the PGCMS items, excluding the five used for the self-perceptions of aging measure, as well as age, functional health, gender, and socioeconomic status.

Discussion

The findings from Study 1 suggest that self-perceptions of aging have an impact on survival—when age, functional health, gender, and socioeconomic status are controlled for—that is greater than the impact of some other variables that have been previously linked to survival, including gender, socioeconomic status, functional health, and loneliness. A primary question that arises from these findings is, By what mechanism do self-perceptions influence survival? In the following study, we explore whether will to live acts as an intervening variable.

Study 2

Our finding in Study 1, that a social-psychological variable directly influences survival, raises the question of whether an additional psychological mechanism might act as a mediator. On the basis of our prior research and the research of others, we predicted that if self-perceptions of aging affect survival, the underlying mechanism would be, in part, through will to live (Idler & Kasl, 1992; Levy et al., 1999–2000; Phillips & Smith, 1990; Sinard, 2001). We define will to live as a judgment that the perceived benefits of one's life outweigh the perceived hardships.

One of the reasons we predicted will to live may act as a mediator between self-perceptions of aging and survival is that among the views of aging that are internalized from a young age are beliefs about the inverse relationship between the value and the length of older persons' lives. These beliefs are reinforced throughout a lifetime, particularly in old age. A parody of one way these messages may be transmitted to older individuals can be found in a cartoon depicting a doctor telling an older patient, "It appears that you'll definitely outlive your usefulness" (Cullum, 2001).

In a previous study, we found that views of aging can affect older individuals' reported will to live. When we subliminally exposed older individuals to negative stereotypes of aging, they were significantly more likely to reject life-prolonging medical treatment in hypothetical scenarios, whereas those in the positive stereotype group were significantly more likely to accept life-prolonging medical treatments (Levy et al., 1999–2000). As predicted, this effect did not appear in the young, for whom the age stereotypes and the outcome of will to live were not as relevant. This age stereotype effect occurred regardless of the financial or familial burden associated with the hypothetical medical treatments (Levy et al., 1999–2000). These findings suggest that the positive stereotypes of aging primes tilted the will-to-live balance toward the perceived benefits of life, whereas the negative stereotypes tilted the balance toward the perceived hardships of life. Although we did not measure self-perceptions of aging in the previous study, the connection between age stereotypes and will to live suggested to us that will to live might act as mediator between aging self-perceptions and survival.

A number of studies have generated a pattern of findings that suggest that will to live affects survival. Although the investigators of these studies did not directly measure will to live, this concept is often implied. One set of studies has demonstrated that the timing of deaths is affected by holidays. Chinese American women are more likely to die during the week after the Harvest Moon Festival, a holiday in which they play a prominent role, rather than during the week before it (Phillips & Smith, 1990). Jewish men are more likely to die immediately after than right before Passover, an 8-day holiday in which they traditionally have greater psychological and ritual involvement than do Jewish women, for whom no such mortality effect emerged (Idler & Kasl, 1992; Phillips & King, 1988). Among Christians, both men and women are more likely to die in the month following Christmas and Easter than in the month before these holidays (Idler & Kasl, 1992).

The relationship between significant holidays and survival is not limited to specific ethnic or religious groups. For example, one study found a sharp increase of deaths in the month after the much-anticipated January 1, 2000 (Sinard, 2001). The author concluded that because "a likely contributing factor was desire of patients to live into the next century . . . these data suggest a role for the patient's state of mind in postponing his or her own outcome" (Sinard, 2001, p. 1707).

These studies suggest that the anticipation of holidays and the holidays themselves provide a perceived benefit that is transient insofar as it ends when the holidays do; at that point, the perceived hardships of life become more salient than the perceived benefits. The outcome appears to reflect a shift from will to live to what might be called will to die. Will to die occurs when the perceived hardships of one's life outweigh the perceived benefits. A study of over 1.5 million Finnish married persons, aged 35 to 84, found that mortality is higher than normal in the first 6 months after the death of a spouse (Martickainen & Valkonen, 1996). The authors attributed the finding to "an overall weakening of a persons' ability to resist and cope with disease" (p. 1092).

The capacity to cope with a newly imposed perceived hardship is perhaps due to the reservoir of preexisting perceived benefits that carry over to the new challenge. A related phenomenon was conceptualized by Ryff and Singer (1998) as the life of purpose, or fulfilled life, that helps individuals cope with trauma.

We were able to examine whether will to live partially mediates the relationship between self-perceptions of aging and survival because the OLSAR included follow-up survey waves containing variables that we believe measure our hypothetical mediator, will to live.

Method

Although the analyses share with Study 1 the predictor variable (self-perceptions of aging, measured at baseline) and the outcome variable (survival), we added our predicted mediator, will to live.

Our will-to-live measure was developed from three items appearing in a 14-item semantic differential measure that was included in the 1977 wave of follow-up data collection. The questions were prefaced with the following statement: "Below is a list of adjectives that can be used to describe a person's life. For each line, check the one box that best describes what you think about your life in retirement." The responses consisted of paired words on opposite ends of a 7-point scale. The three semantic differential items we selected included the following pairs of adjectives: *empty*–*full*, *hopeless*–*hopeful*, and *worthless*–*worthy*. These adjectives seemed to most

closely correspond to our earlier-stated definitions of will to die and will to live, respectively. That is, when the perceived hardships of one's life outweigh the perceived benefits, we expect an outlook that is empty, hopeless, and worthless, whereas when the perceived benefits of one's life outweigh the perceived hardships, we expect an outlook that is full, hopeful, and worthy. These items loaded on a single factor, with loadings greater than .86.

Results

As predicted by Study 2's hypothesis, we found that will to live partially mediated the relationship between positive self-perceptions of aging and survival. The will-to-live variable fulfilled the three criteria for a partial mediator (see Figure 2; Kenny, Kashy, & Bolger, 1998). Complying with the first criterion, we found that the initial variable, self-perceptions of aging, predicted the outcome of survival, $\beta = .2464$, $SE = .0291$, $p < .001$. (This is consistent with findings from Study 1.) Complying with the second criterion, we found the initial variable, self-perceptions of aging, correlated with the presumed mediator, will to live. That is, when we regressed will to live on self-perceptions of aging, this was significant ($\beta = .6458$, $SE = .0937$, $p < .001$). According to the third criterion, we found that the presumed mediator, will to live, affected the outcome, survival, even when we controlled for the direct path between the initial variable, self-perceptions of aging, and the outcome, survival ($\beta = .0555$, $SE = .0266$, $p < .04$). Even though the beta weight associated with the direct path from self-perceptions of aging to survival was reduced with the inclusion of the presumed mediator, will to live, in the model, self-perceptions of aging still predicted survival in this final equation ($\beta = .2058$, $SE = .0533$, $p < .001$). Thus, it appears that will to live acts as a partial mediator and does not completely mediate the relationship between baseline self-perceptions of aging and survival. In further support that will to live acts as a partial mediator, according to Baron and Kenny's (1986) modification of the Sobel test, we found that the Z score associated with will to live as a mediator was significant ($Z = 1.97$, $p < .03$).

To increase our confidence that will to live partially mediates the relationship between self-perceptions of aging and survival, we conducted an additional analysis with an alternative relationship between the variables. We examined whether it is possible that self-perceptions of aging mediate the relationship between will to live and survival. To check this, we repeated the mediational analysis, but with will to live (in 1975) as the predictor and

self-perceptions of aging (in 1977) as the mediator. We found that self-perceptions of aging did not fit the definition of a mediator (Kenny et al., 1998). Although the first criterion was fulfilled (will to live measured in 1975 significantly predicted survival) and the second criterion was fulfilled (will to live measured in 1975 significantly predicted self-perceptions of aging in 1977), the third criterion was not met. That is, self-perceptions of aging measured in 1977 did not significantly predict survival when we controlled for the 1975 will to live.

Discussion

As predicted, we found that will to live partially mediated the relationship between self-perceptions of aging and survival, whereas self-perceptions of aging did not mediate the relationship between will to live and survival.

Our findings from Study 2 suggest that positive self-perceptions of aging lengthened survival both directly and indirectly. Even with the indirect path added, the direct path between self-perceptions of aging and survival remained fairly strong. This indicates that although will to live is part of the process by which self-perceptions of aging influence survival, other mediators are probably involved. Another likely means is cardiovascular response to stress, which earlier research has shown can be adversely affected when elderly participants are exposed to negative stereotypes of aging (Levy et al., 2000).

The semantic differential questions of the OLSAR, on which we based our will-to-live measure, were framed in terms of retirement. This raises the possibility that the participants were considering the will-to-live items specifically in terms of retirement rather than in terms of a broader perspective. The importance of retirement as a rite of passage was suggested by Neugarten (1996), who described the continuum of views toward it: At one end, "many people describe retirement as a period characterized by monotony, boredom and decline, a period marking time until death"; at the other end, life in retirement provides "time to develop new interests and with opportunities to extend not only one's lifetime but also what can be called one's personal biography" (p. 223). To examine the role played by retirement in response to the will-to-live measure, we compared responses of those who reported they were employed, housewives, or retired. No differences emerged between the responses of these groups, suggesting that this measure acts as more than a proxy for retirement. In short, however salient retirement may be, will to live appears to reflect thoughts that go beyond the participants' job status.

General Discussion

This study found that positive self-perceptions of aging measured up to 23 years earlier contributed to individuals living longer. The advantage remained after we controlled for age, gender, socioeconomic status, loneliness, and functional health. Self-perceptions of aging had a greater impact on survival than did gender, socioeconomic status, loneliness, and functional health in this cohort. The robustness of our finding is further suggested by our demonstration that those in the more positive self-perception of aging group demonstrated better survival among men as well as women, those with better as well as worse functional health, those less than 60 years as well as 60 years and over, those less than 70

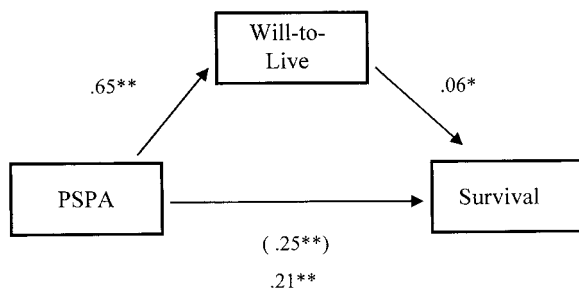


Figure 2. Will to live as a partial mediator between positive self-perceptions of aging (PSPA) and survival. The number in parentheses indicates the direct effect of PSPA on survival prior to inclusion of the mediator in the regression equation. * $p < .05$. ** $p < .001$.

years as well as 70 years and over, those with lower as well as higher socioeconomic status, and those who reported experiencing loneliness as well as those who did not.

The increased life span of 7.5 years in our study is considerable, especially when we compare our findings with those of other longevity studies. The effect of more positive self-perceptions of aging on survival is greater than the physiological measures of low systolic blood pressure and cholesterol, each of which is associated with a longer life span of 4 years or less (Friedman et al., 1995). The survival advantage of more positive self-perceptions of aging is also greater than the independent contribution of lower body mass index, no history of smoking, and a tendency to exercise; each of these factors has been found to contribute between 1 and 3 years of added life (Fraser & Shavlik, 2001).

Our self-perceptions of aging measure provided a partial inventory of the participants' definition of their old age. Because we assume that these definitions tend to evolve, in part, from the age stereotypes internalized in childhood and beyond, they are unlikely to be consciously evaluated (Levy & Banaji, 2002). Nevertheless, self-perceptions of aging are likely to generate feelings of benefit or hardship that we suggest are evaluated within the mediating phase that constitutes the will to live. Hence, we found that the more positive the self-perceptions of aging were, the greater was the will to live, and this partially mediated the relationship between self-perceptions of aging and survival.

Even though there are, as noted in the introduction, important differences between the old and other targeted groups, our findings demonstrate that the old cannot be considered in monolithic terms. As an example, although the old may lack certain defenses against internalizing negative stereotypes of aging, our data show that a considerable number of individuals are able to successfully cope with these stereotypes.

Additionally, although the theory of stereotype threat excludes internalization and therefore sets it apart from self-stereotypes of aging, this does not preclude the possibility that racism is internalized by its targets. Indeed, studies using a scale designed to measure the internalized racism of African Americans have found an association between this variable and a number of psychological and behavioral outcomes (Taylor, Henderson, & Jackson, 1991; Williams & Williams-Morris, 2000). Also, an association has been found among African Americans between accepting the validity of racist stereotypes and chronic health problems (Williams & Chung, in press). For many chronic illnesses, African Americans have a higher mortality rate than do Whites (Rogers et al., 2000).

It is, therefore, possible to propose that a fundamental commonality may arise from the impact of stigmatization. Although further exploration is needed, our study suggests that the process shared by stigmatized groups may be found in the effect of self-stereotypes on self-perceptions. To the extent that the process is shared, there is a greater likelihood that the outcome will be as well. Accordingly, our study carries two messages. The discouraging one is that negative self-perceptions can diminish life expectancy; the encouraging one is that positive self-perceptions can prolong life expectancy.

There is clearly a need to ameliorate the discouraging message. One approach would emphasize positive stereotypes of aging among the young by such means as promoting positive intergenerational activities. Another approach would deemphasize negative

stereotypes of aging by, for instance, encouraging older individuals to monitor the correspondence between the ways they are targeted by others and the ways they target themselves. An incentive for engaging in this process of self-awareness might follow from a recognition that stigmatization can carry with it the ultimate penalty.

However, both these approaches are piecemeal measures. If a previously unidentified virus was found to diminish life expectancy by over 7 years, considerable effort would probably be devoted to identifying the cause and implementing a remedy. In the present case, one of the likely causes is known: societally sanctioned denigration of the aged. A comprehensive remedy requires that the denigrating views and actions directed at elderly targets undergo delegitimization by the same society that has been generating them.

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