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Elders' Attitudes toward Extending the Healthy Life Span

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Abstract

Elders' Attitudes toward Extending the Healthy Life Span

Despite continuing debate between anti-aging researchers seeking major life span extension and concerned gerontologists and bioethicists, elders' views have received little research attention. Study aimed to relate elders' attitudes toward strong life span extension to psychosocial and background factors. Participants were 109 American elders (65% women) aged 60-99 ($M = 77.08$, $SD = 9.05$). Measures included attitudes toward living long and living forever, Desired Age, Death Acceptance, Goal Seeking, Internality, and background variables (age, gender, marital status, education, religion, health). Attitudes were more positive toward an extended life span than living forever ($p < .01$). In regression analyses, more positive attitudes were related to greater Desired Age, less Death Acceptance, greater Goal Seeking, and greater Internality, and to lower age and non-Christian religious affiliation. Qualitative analyses explored goals for various periods of additional life. Elders' positive attitudes toward extended life need consideration by experts debating this issue.

Keywords: life extension, death acceptance, internality, goal seeking, older adults.

Elders' Attitudes toward Extending the Healthy Life Span

The idea of a fountain of youth that would allow an individual to live in good health indefinitely has fascinated people since ancient times. Medical advances in recent years have been accompanied by rising life expectancies as well as increasing numbers of centenarians (aged 100-109) and supercentenarians (aged 110 and over), with some of the latter group approaching what is presently considered to be the maximum life span of around 120 years. Some researchers (e.g., Miller, 2002) have estimated that life expectancies may be expected to achieve modest incremental increases in the years to come, moving closer to the maximum life span without changing the latter.

However, scientists working on anti-aging projects have announced some promising findings in a number of research areas. Life spans of fruit flies have been doubled through genetic manipulation; other interventions such as caloric restrictions; hormone therapy, dietary supplements, and the like have also produced impressive gains in life spans of laboratory animals (e.g., AgePage, 2004; Olshansky, Perry, Miller, & Butler, 2006). Although such methods have not yet been extended to humans, a position paper endorsed by a large body of scientists indicates that researchers are optimistic that at least some modest extensions of the maximum life span will be achieved in the years ahead (Olshansky, Hayflick, & Carnes, 2002). Other anti-aging researchers believe that understanding of the basic processes underlying aging of body cells can lead to greater extension of the maximum life span (Mykytyn, 2008; Vincent, Tulle, & Bond, 2008), with possible life spans extending to age 150 and beyond, or even to the attainment of life without death (de Grey & Rae, 2007). This has led to the distinguishing of two types of life span extension, weak and strong (Lucke & Hall, 2006; Moody, 2001/2002). In the weak type, scientific advances result in an increase in average life expectancy without increasing the

maximum life span, whereas in the strong type both life expectancy and maximum life span increase.

Not surprisingly, the idea of significant life span extension, especially strong life extension, has led to many cautions and objections from various gerontologists, bioethicists, and other experts who are concerned with consequences for the individual and society if anti-aging researchers succeed (e.g., Annas, 2008; Kass, 2009, Lebacqz, 2008; Mehlman, 2008; Sprott, 2008). These concerns include overpopulation, legal issues, social justice (possible creation of an underclass without extended life), religious concerns, economic issues relative to the allocation of social resources, regulation of technologies, implications for reproduction and the continued vitality of the species, basic changes in human nature, unexpected negative side effects of interventions on the individual, complexities of social networks, and basic questions as to what should be the purpose, goals, and values of life. Arguments on both sides are ongoing and far from settled.

However, despite the continuing arguments by experts and those in authority, there have been few attempts to study the views and preferences of the average person in the community regarding an increased life span even though such views would be important for acceptance of any policy (Lucke, Ryan, & Hall, 2006). Public interest and acceptance of either weak or strong life extension (i.e., whether it is considered beneficial and morally acceptable) would be essential for support of research attempting to attain these goals.

One existing study used a large national German sample aged 20 to 90 (Lang, Baltes, & Wagner (2007); participants were asked how long they desired to live. The average desired lifetime was approximately age 85, with few age differences, a figure somewhat higher than average life expectancy but well within the current maximum life span (fitting the definition of

weak life span extension). Moreover, participants indicated that their views were little influenced by reports of recent research on aging.

From another perspective, an interview study (Arber, Vandrevala, Daly, & Hampson, 2008) of 69 elders aged 65 to 93 in Southeastern England probed their views regarding use of life-prolonging medical technologies in the last stage of life. Overall, some 48% indicated that they would favor life-prolonging treatments. However, there was a large gender difference, with 73% of the men in favor compared to only 25% of the women. Women were more concerned about quality of life and various social issues. This study illustrates the weakest sort of life extension, where the last portion of the aging process would be slowed (Binstock, 2004) to gain just a little more out of life, rather than actually halting aging or even rejuvenating the individual.

In an early study probing public opinion (Lucke, et al., 2006), 31 Australians over age 50 were asked whether they would be willing to take advantage of new technologies to extend the life span and whether they felt such technologies would be successful. (No particular amount of life span extension was specified.) Participants were more interested in an extended life span if it included good health and quality of life.

Very little research thus far has probed the views of community members regarding the strong form of life extension, and none in the United States. A computer search of five different databases yielded only a few studies, all carried out by researchers in Australia.

Recent work (Underwood, Bartlett, Partridge, Lucke, & Hall, 2009) explored views of adult community members in Australia regarding strong life extension, with samples selected to maximize diversity of opinions. Individual interviews were carried out with 57 men and women (25 Christians, 20 with no religion, and 12 with other religions). In addition, 8 focus groups were conducted with a total of 72 people, again sampling to yield highly diverse groups (two groups

aged 50 and over, 2 groups under age 50, and groups of evangelical Christians, Baptists, transhumanists, and a group advocating medical technologies to eliminate aging). Participants were asked, "If you could extend your life beyond what you would otherwise expect, would you consider it? Why or why not? Ideally, how long would you like to live (Underwood, et al., 2009, p. 497)?" Although the data were essentially qualitative, approximately 38% of the individual participants, and about half of the focus groups were not interested in using life-extending technologies. These less interested participants were Christians and those in the two older focus groups. Their remarks indicated that they were satisfied with the current life span and had no interest in extending it; they believed in a Christian afterlife and felt that extending life would be "playing God." Many had health problems that might reduce their enthusiasm for life span extension. However, the remaining 62% individual participants and approximately half of the focus groups were interested in strong life extension, along with a good quality of life. Some considered living to 200 or 500 years, or indefinitely.

In an additional Australian study (Partridge, Lucke, Bartlett, & Hall, 2009), a telephone survey probed views of a representative sample of 605 Queensland adults from 18 to 96 years of age ($M = 43$ years) concerning five life span extension questions. Of the respondents, 64% saw some personal benefits from an extended life (e.g., more time with family, able to do more), whereas 80% saw personal negatives (e.g., a prolonged state of poor health, financial costs). Only 49% saw benefits for society as a whole (e.g., increasing collective knowledge, retaining important people), while 78% saw social negatives (e.g., overpopulation, burden on social resources), and 80% had ethical concerns (e.g., life extension is unnatural, negative social impact). Although the sample was varied in terms of age, marital status, education, and religious affiliation, the authors did not attempt to relate these background factors to participants' life

extension views. Overall, a greater proportion of participants felt that life extension would have negative consequences for themselves or society than felt it would be of benefit.

The latter two studies (Partridge, et al., 2009; Underwood, et al., 2009) are important in that they demonstrate the existence of some community support for strong life extension well beyond the present life span. However, they did not specifically investigate views regarding the strongest possible type of life extension, living indefinitely or living forever. This needs to be assessed in the light of de Grey's claims (de Grey & Rae, 2007) that such an extension would be possible in the near future.

Problem of the present study. Previous research on views of the public regarding life span extension has not probed views of the American public, has not specifically examined views of older adults, has not attempted a quantitative measurement of attitudes toward life span extension, has only partially suggested how attitudes might vary with contextual and demographic variables, and has not explored how psychosocial variables may be related to those attitudes. In regard to the latter, it would be important to identify and understand the personality characteristics of those individuals who would want to live an extended life.

The primary aim of the present exploratory study was to determine the relationship of American older adults' attitudes toward strong life span extension to psychosocial and contextual or demographic variables. A secondary aim was to examine differences in the kinds of goals older individuals might pursue if they were to live for various periods of additional life.

Looking first at the four psychosocial variables included in the study (desired age, internality, death acceptance, and goal seeking), such variables have not been investigated thus far in relation to life extension attitudes, but some inferences regarding their importance can be drawn from existing research. Health concerns were of major importance to those considering

life span extension (Arber, et al., 2008; Underwood, et al., 2009), thus it is expected that feeling

in control of one's health outcomes (an internal health locus of control) would be related to a

more positive attitude toward life extension. Greater death acceptance has been found among the

very old (Johnson & Barer, 1997) presumably because these elders expected limited additional

life; also religious teachings regarding an afterlife would foster an acceptance of death. One

could infer that those with less death acceptance would be more favorable to life extension. One

would also expect that people with goal seeking characteristics would favor life extension.

Participants in the Australian study (Underwood, et al., 2009) felt that they still had a lot to see,

do, learn, and accomplish in an extended life. The existence of various benefits for society

associated with life extension (Partridge, et al., 2009) also suggests that those more favorable to

life extension might be goal-seeking people who actively desire to explore new goals and

challenges in life. (The latter goals are strong motives to accumulate more knowledge, skills and

wisdom itself, which would be needed, if only to avoid boredom in an extended life.) Finally, it

is expected that those with a greater desire to live longer within the present maximum life span

would also be more likely to have more favorable attitudes toward living an extended life. In

sum, **t**he present exploratory study is an attempt to determine how the degree of older adults'

attitudes regarding strong life span extension is related to a set of certain psychosocial

characteristics: their rejection (lack of acceptance) of death regardless of any religious teachings,

their confidence in their own abilities to control or maintain good health, their ability to seek and

pursue new goals in an extended life, and a basic desire to continue living. These psychosocial

characteristics indicate a coherent link between a positive attitude toward life extension and an

actual reality of possibly attaining it.

Going on to consider what background and contextual factors might be related to attitudes toward life span extension, the present study included six such variables: gender, age, marital status, educational level, health, and religion. Based on the findings of the limited research in this area, it would be expected that women (Arber, et al., 2008), those who are older (Underwood, et al., 2009), those who are Christians (Underwood, et al., 2009), those in poorer health (Underwood, et al., 2009), those who are less well educated (Partridge, et al., 2009; Underwood, et al., 2009) would hold less favorable attitudes toward strong life span extension. Previous research has not investigated the relationship of differences in marital status on life extension attitudes, however, it is interesting that married women supported their spouses' desires for life extension even when they themselves did not desire extended life (Arber, et al., 2008).

A secondary aim of the study was to identify what elders' goals might be if they lived for extended periods of life (i.e., well beyond the present maximum human life span of 120 years), either forever or for an arbitrary150 years, regardless of their attitudes toward strong life span extension, and to compare these goals with those for only shorter periods of additional life (10 years or 6 months). It would be expected that the types of goals would be related to the period of additional life under consideration. Socioemotional selectivity theory (Carstensen, Isaacowitz, & Charles, 1999) proposes that when individuals have a long life expectancy their goals are to seek and obtain more knowledge and skills to adapt more effectively to the environment; on the other hand when life expectancy is short individuals' goals shift to seeking gratifying emotional experiences with a select group of close friends and family. One would expect similar differences in goals when an extended life span is involved compared to a short time period.. In

sum, it was hypothesized that the type of goals that individuals hold for additional life will depend on the period of remaining life considered.

Although the research of Partridge and colleagues (Partridge, et al., 2009) suggested some possible goals of an extended life, further study is needed to determine more specifically what some of these goals and challenges might be, especially in relation to differing conceptions of an extended life span.

Method

Sample

Study participants were 109 older adults (39 men, 70 women) aged 60-99 (M = 77.08, SD = 9.05). All were volunteers, 50 recruited from a senior citizen center and 59 from an independent living residence for seniors in a small Midwestern American city. They were all American born of European ancestry. Even though the study was carried out in a city where a major research university was located including international students and faculty, this study sampled an older generation from a very stable community in the American heartland. Overall, the participants were a healthy and physically active group.

Measures

Background and contextual variables. Items at the beginning of the interview-questionnaire elicited participants' age, gender, marital status (married, widowed), educational level, health, religious affiliation, and religious denomination (if affiliated). Education was coded on a scale ranging from 1 (*0-6 years*) to 7 (*post-graduate degree*).

Health was rated on a six-point scale ranging from 1 (*very poor*) to 6 (*excellent*). This frequently used global self-rating of health has been shown to have good concurrent validity in regard to other measures of health, such as physicians' judgments, chronic conditions, activity

limitations, and 7-year survival rates (e.g., Ferraro & Feller, 1996; Siegler, Bosworth, & Poon, 2003).

Participants' religious affiliation was assessed by asking if they were a member of a church or other place of worship, and if so, which denomination. Religious affiliation was a major indicator of organizational religiosity, one of three interrelated religiosity factors (Krause, 1993).

Desired age. Participants were asked, "If you could choose and you knew you could maintain good health, how many more years would you like to live?" The Desired Age was obtained by adding the number of additional years desired to the participant's chronological age. The test-retest reliability of Desired Age over a 6-month period was .80.

In addition, participants were asked the open-ended question, "What are your reasons for desiring to live as long as you do?"

Internal locus of control. The 6-item Internality subscale from the Multidimensional Health Locus of Control Scale (Wallston & Wallston, 1981) was used to assess the extent to which the individual feels in control of health outcomes. Given the importance of good health for longevity, this content-specific measure was selected rather than a more general internality scale. A sample item is: "If I take care of myself, I can stay healthy." A 6-point response scale was used, ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). The Internality score was the sum of the item scores, with a high score indicating greater internal locus of control in relation to health. Wallston and Wallston reported an internal consistency reliability of .67 and a four-month test-retest reliability of .66 as well as evidence for the validity of the measure. Internal consistency reliability for participants of this study was .76.

Death Acceptance. The 8-item Death Acceptance scale from Reker's (1992) Life Attitude Profile - Revised was used to measure the absence of any fear and anxiety about death and the acceptance of death as a natural aspect of life. The scale was designed to be neutral, i.e., free of any religious conceptions of death and the afterlife. A sample item is: "Since death is a natural aspect of life, there is no sense worrying about it." The 7-point response scale ranged from 1 (*strongly disagree*) to 7 (*strongly agree*). The total score is the sum of the item scores, with a high score indicating greater acceptance of death. Reker reported an internal consistency reliability of .81 for older adults, and a 6-week test-retest reliability of .84, as well as considerable evidence for validity. Internal consistency reliability for the participants of this study was .83.

Goal Seeking. The 8-item Goal Seeking scale from Reker's (1992) Life Attitude Profile - Revised was used to assess the respondent's desire to search for new and different goals and challenges in life. A sample item is: "A new challenge in life would appeal to me now." The 7-point response scale ranged from 1 (*strongly disagree*) to 7 (*strongly agree*). The total score is the sum of the item scores, with a high score indicating greater goal seeking. Reker reported an internal consistency reliability of .77 for older adults, and a 6-week test-retest reliability of .80, as well as considerable evidence for validity. Internal consistency reliability for the participants of this study was .89.

Attitudes toward life extension. To assess participants' attitudes toward different amounts of strong life span extension, a 16-item measure consisting of two subscales, Livelong and Forever, was developed (Cicirelli, 2008) for the present study. These subscales assess two qualitatively different concepts. The Livelong measure refers to an extended but finite maximum life span, whereas the Forever measure refers to an indefinitely long life span without death from

natural causes. (Both refer to a strong life span extension beyond the current maximum human life span in contrast to a weak life span extension. The latter refers to increases in life span from current life expectancy up to the current maximum life span.) A 5-point response scale was used for each of the 16 items, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), with each subscale score consisting of the mean of its item scores.

Livelong. The Livelong subscale, consisting of 5 items, assessed participants' attitude toward living with an extended (though finite) maximum life span. Table 1 presents the items with item means and standard deviations for the study participants. The Livelong score was the respondent's mean score for the 5 items, with a high score indicating a more positive attitude toward an extended maximum life span. Internal consistency reliability was .87; test-retest reliability over a 6-month period was .58.

Forever. The Forever subscale, consisting of 11 items, assessed participants' attitude toward living indefinitely long or forever. The items, item means, and standard deviations are also shown in Table 1. The Forever score was the respondent's mean score for the 11 items, with a high score indicating a more positive attitude toward living forever. Internal consistency reliability was .93, test-retest reliability was .61.

Face and content validities (Anastasi & Urbina, 1997; Robinson, Shaver, & Wrightsman, 1991) of the two subscales are assumed, based on the item content. Some evidence for known groups and convergent validities of the two subscales was obtained in a previous study (Cicirelli, 2008). As hypothesized, church members scored significantly lower on the two subscales than did those who had no church affiliation. Also, those who held stronger humanistic beliefs viewed life extension more favorably than those who did not.

Goals for-extended life. To probe participants' ideas about what they might do with an indefinitely extended life compared to a more limited time left to live, a technique first used to probe elders' meanings of death under different life spans (Cicirelli, 2002) was employed. Participants were asked the following open-ended questions:

1. If you can imagine that science has made it possible for everyone to live forever and also maintain good health, what would you want to do with your life?

2. Assuming that science has yet to eliminate death, but could extend your life to 150 years and still maintain your good health, what would you want to accomplish in that time period?

3. Assuming that science has only progressed to the point that one can predict exactly how much longer you have to live, and you can expect to live 10 more years in good health, what would you want to do with your life? What would you want to accomplish?

4. If you had only 6 more months to live, what would you want to accomplish under those conditions?

The information provided by this technique helped to identify what participants' goals for an extended life span might be, as well as provide information for comparing the types of goals for an extended versus a shorter life.

Procedures

All methods for the study were approved by the Purdue University Institutional Review Board. After the study was explained to them, participants signed an informed consent form and were interviewed individually by the experimenter in a quiet room at their facility.

A semi-structured interview questionnaire was used, with demographic and background information gathered first, followed by the Desired Age questions, the Internality scale, the Death

Acceptance and Goal Seeking subscales of the Life Attitude Profile, and the Forever and

Livelong life extension attitude subscales, with the open-ended questions about goals for an

extended life administered last. It was felt that this ordering of items in the interview avoided the

possibility that attitudes regarding life extension would influence participants' responses to other

measures.

Results

Characteristics of Study Participants

Of the 109 older adults in the study, 58 were married and 51 were widowed. They were

well educated; 54 were college graduates or had advanced degrees and 55 had lesser levels of

education ($M = 5.44$, $SD = 1.48$). Despite the fact that the sample was recruited from participants

at a senior center and from an independent living residence for seniors, the great majority were

quire healthy; with 16% rating their health as excellent, 28% as very good, 38% as good, 17% as

not so good, and only 1% as poor (none considered themselves in very poor health) ($M = 4.39$,

$SD = 1.03$). They were active and participated in many social and community activities.

Although 27 participants had no religious affiliation, 82 participants were affiliated with a

variety of religious institutions. When classified into major religious types (Roof & McKinney,

1987), 27% were affiliated with traditional Protestant religions, 20% were affiliated with

fundamentalist or evangelical Protestant religions, 12% were Catholics, 16% were Unitarians

(from a secular humanist congregation), and 25% had no religious affiliation. A variable named

Religion was constructed for analysis purposes, with the two Protestant groups and the Catholics

combined into a category labeled "Christian" (n = 64) and the Unitarians and those with no

religious affiliation combined into a category labeled "non-Christian" (n = 45).

In preliminary comparisons of the two sites at which data were collected, participants did

not differ in terms of gender, marital status, health, or Religion, but interviewees at the

independent living residence were slightly older and better educated than interviewees at the

senior citizen center. Because there was a great overlap in the characteristics of participants at

the two sites, and because site was not related to life extension attitudes in preliminary analyses,

it was not considered further.

Means and standard deviations of quantitative study variables are presented in Table 2.

Comparison of Longlife and Forever Attitudes

A repeated measures ANOVA was used to compare participants' scores on the two

measures of attitudes toward life extension. Although the majority of participants had

unfavorable attitudes toward any form of life extension, scores on Longlife ($M = 2.51$, $SD = 0.93$)

were significantly more positive than Forever scores ($M = 2.25$, $SD = 0.83$), $F(1,99) = 20.51$, $p <$

.01. (The covariates gender, age, and education had no significant effects.)

Regression Analyses: Variables Related to Life Extension Attitudes

Hierarchical regression analyses were carried out with each of the life extension attitude

measures as dependent variables in turn. In Model 1, the six exogenous background variables

were included in the analysis: gender, marital status, chronological age, health, Religion, and

educational level. In Model 2, the four endogenous psychosocial variables were added: Desired

Age, Internality, Death Acceptance, and Goal Seeking. Although the number of variables

included in the analysis relative to the sample size was greater than desired, all six background

variables were included for exploratory purposes. (Estimating the power of a significant F-test

for a medium-size multiple regression effect according to Cohen, 1988, power would be .72 with

10 variables in the analysis and an N of 109, but would improve to .85 with only 6 variables

included.) In Model 3, a trimmed variable set consisting of those background variables that were

significant predictors in Model 2 plus the four endogenous psychosocial variables were entered.

Summaries of the analyses for Longlife are presented in Table 3 and those for Forever are

presented in Table 4.

      Longlife. In the first stage of the hierarchical regression analysis (Model 1) with Longlife

as the dependent variable (see Table 3), none of the six background variables were found to be

significant predictors. When the psychosocial variables (Desired Age, Internality, Death

Acceptance, and Goal Seeking) were added in the second stage (Model 2), two of the background

variables (age and Religion) were significant predictors after adjustment for shared variance with

the psychosocial variables. Standardized regression coefficients for significant predictors ($p <$

.05) were: age ($\beta = -.37$), Religion ($\beta = -.18$), Desired Age ($\beta = .55$), Internality ($\beta = .22$), Death

Acceptance ($\beta = -.20$), and Goal Seeking ($\beta = .20$). The latter four variables explained an

additional 35% of the variance in Longlife beyond Model 1 for a total R^2 of .46. Thus, those

with more favorable attitudes to living an extended life were younger, were non-Christian in

religious orientation, and had a greater Desired Age, greater Internality, less Death Acceptance,

and more Goal Seeking. It is interesting that although chronological age and Desired Age were

positively correlated ($r = .57$), they had different relationships to the attitude toward living an

extended life span, with older people holding less favorable attitudes than those who were

younger, but those with a greater Desired Age holding more favorable attitudes than those who

desired to live less long. (Preliminary diagnostic tests indicated that collinearity of chronological

age and Desired Age was not a problem in the analysis.)

When the trimmed set of variables (chronological age, Religion, and the four psychosocial variables) were entered into the regression equation (Model 3), all were again significant predictors of Longlife, with an R^2 of .44.

Forever. A similar analysis was carried out, this time with Forever as the dependent variable (see Table 4). In the first stage of the analysis (Model 1), none of the six background variables was a significant predictor. However, when the psychosocial variables were added in the second stage (Model 2), chronological age (β = -41), Religion (β = -.22), Desired Age (β = .65), Internality (β = .26), and Death Acceptance (β = -.25) were all significant predictors, with the latter three variables explaining an additional 42% of the variance in Forever for a total R^2 of .50. Goal seeking was not significantly related. According to Model 2, those with more favorable attitudes to living forever were younger, were non-Christian, had a greater Desired Age, greater Internality, and less Death Acceptance.

When the trimmed set of variables (chronological age, Religion, and the four psychosocial variables) were entered into the regression equation (Model 3), chronological age, Desired Age, Internality, and Death Acceptance were significant predictors of Forever, with an R^2 of .46, but Religion was no longer significantly related.

Attitudes toward Life Span Extension and Reasons for Desired Age

In an earlier part of the interview before attitudes toward life span extension were assessed, participants were asked how long they desired to live as well as the reasons for their choice. These reasons were classified into two categories: positive reasons for desiring to live to the age they specified, and negative reasons for desiring to live no longer than the age they specified. Positive reasons included such things as wanting to see how the world turns out, wanting time to make a difference in the world, wanting to see new things, continued interest in

life, wanting to enjoy family, wanting to learn new things, feeling it would be too hard to leave

life, and so on. Negative reasons included such things as feeling in poor health, having no

friends left, feeling unable to understand modern world, not wanting to live in a nursing home,

feeling unlikely to accomplish anything more in life, feeling that the body is not designed to hold

up longer, and so on.

Based on participants' scores on the Forever measure, two extreme groups were

identified. A High group ($n = 20$) consisted of those with Forever scores greater than 3.00,

indicating some degree of positive attitude toward living forever. A Low group ($n = 48$)

consisted of those with Forever scores of 2.00 or less, indicating an attitude that was quite

negative toward living forever. Of the reasons advanced for their desired age by the High group,

100% were positive, whereas only 65% of the reasons given by the Low group were positive,

$\chi^2(1) = 11.98$, $p < .01$.

Similarly defined High ($n = 27$) and Low ($n = 39$) groups were constructed based on the

Longlife score. In this case, 97% of the reasons advanced by the High group were positive,

whereas only 62% of the reasons given by the Low group were positive, $\chi^2(1) = 15.88$, $p < .01$.

Thus, it appears that those participants who hold the most negative attitudes toward life

extension also advanced more negative reasons for not wanting to live longer within a normal life

span.

Goals for Extended Life

In the latter portion of the interview, participants were instructed to imagine that they

could live for varying periods of time in good health (forever, 150 years, 10 years, 6 months) and

then asked what they would want to do with their lives in that period of time. Although some

participants expressed disbelief that anyone could live forever, when prompted to "just imagine

what it would be like," all tried to think of what they would do in that period of time. The great

majority were able to express some goals for an extended life, for example: "If I could live

forever, I would want to see more of the world, learn new things, and volunteer to help others."

"If I could live forever, I would return to teaching, get more education, and read every book that

was ever written." "If I could live forever, I would travel, square dance, and watch my

grandchildren grow up." "If I could live forever, I'd become a missionary and bring God to some

foreign country." "If I had only six months to live, I would get my house in order and get ready

to meet my maker." "If I had only six months to live, I would try to get my vacation." "If I had

only six months to live, I would focus on my relationships with my wife and friends." "

However, there were some responses like: "I don't know; just go on living." "Take it day by

day." "Keep on at my factory job." "Do what I've been doing." "Take things as they come."

Better educated participants were more articulate in expressing their goals for an

extended life span, especially regarding achievement-related goals related for themselves and

society. E.g,, "If I could live forever, I would spend more time in third world countries trying to

improve their lives." "If I could like forever, I would like to continue learning and use my

learning to better the world." In contrast, goals of those with less education were less well

defined, e.g.: "If I could live forever, I would like to help others." " I would travel some and do

some volunteer work."

Participants' responses to the open-ended questions asking what they would want to

accomplish in the four time periods were subjected to content-analysis using the constant

comparative technique (Strauss & Corbin, 1990). (Up to three responses were coded for each

participant, with the mean number of responses per participant ranging from 1.57 to 1.98 over the

four conditions.) This process yielded 39 response categories for living forever, 35 response

categories for living to age 150, 36 response categories for living 10 more years, and 26 response

categories for living only 6 months more. Many of these categories were the same across the

four conditions, but some were unique to a particular period of extended life. These response

categories were classified further on the basis of content into eight second-order categories or

types of goals. These were:

1. Live day to day. E.g., just go on living, continue as I am now.

2. Personal achievement, self-improvement. E.g., pursue a new career, study, learn, and

achieve, explore new fields, get better at everything, become rich and famous.

3. Achievement for society. E.g., solve some of world's problems, help change the

world, do medical research, improve the environment.

4. Relationships with others. E.g., spend time with family and friends, meet new people,

establish enduring relationships.

5. Helping others, directly or through organizations. E.g., help others, help grandchildren

achieve goals, mentor youth, make others happy, raise money for charities.

6. Personal pleasure. E.g., play, enjoy life, enjoy hobbies, travel, have a good time, be

happy.

7. Prepare for death. E.g., get life in order, settle financial affairs, leave family in good

shape, write family history, give away possessions, repair relationships, get right with God.

8. Desire extended life. E.g., find ways to extend life, get another life, find a way to live

longer.

The frequency of participants' responses in each of the above eight categories of goals,

expressed as a percentage of all responses to that condition, is shown in Table 4 for each of the

four conditions (living forever, living to age 150, living another 10 years, and living another 6

months). Looking first at the condition of living forever, the most frequently expressed goals

were for personal achievement (26%) and helping others (25%); these were also the more

frequently expressed goals (24% and 23%, respectively) for the condition of living to age 150.

Under the condition of 10 more years to live, personal achievement was still the most frequently

expressed goal (21%), followed closely by relationships with others (20%), personal pleasure

(20%), and helping others (19%). Finally, under the condition of only 6 more months to live,

preparing for death was the most frequently expressed goal (39%), followed by relationships with

others (29%) and personal pleasure (17%).

Looking at responses for types of goals across the four time conditions, personal

achievement , achievement for society, and helping others were more frequent under the two

conditions of extended life (forever and 150 years) but dropped off in frequency as remaining life

became shorter. On the other hand, relationships with others appeared to become more important

as remaining life became shorter. Preparing for death became a concern only when remaining

life was limited to 6 months. Goals of personal pleasure and of continuing to live day by day

were more or less steady across the four time conditions.

The question of whether participants' goals differed for the groups High and Low on

attitudes toward extended life (Forever and Longlife) was investigated, but no significant

differences were found. Apparently participants were able to imagine what they would want to

do under the various life span conditions regardless of their attitudes toward life extension.

Also, although some qualitative differences in the goals expressed by participants who

had more or less education were noted in examples given earlier, attempts to relate these trends

to the types of goals were not statistically significant. Similarly, attempts to relate Religion to

types of goals were not significant.

Discussion

The major purpose of the study was to assess older adults' attitudes towards life extension and determine the relationship of those attitudes to personality and various background (demographic and contextual) factors. The study did not consider the participants' views regarding implications of life extension for the society and culture, the environment, or ethical and moral issues. As important as the latter topics are, this study was more concerned with getting a better understanding of older adults' basic views and the personality factors underlying those views.

It is noteworthy that, even in a sample older than those previously studied, about a fifth of the participants held attitudes that were positive to some degree toward living forever, and about a fourth of the sample held attitudes that were positive to some degree toward living beyond the present maximum life span of approximately 120 years. This is a somewhat smaller proportion of elders than the 62% of the Australian sample reported by Underwood and colleagues (Underwood et al., 2009) as being favorable to strong life extension. However, those researchers went to considerable lengths to recruit participants of all ages for their qualitative study as well as participants from groups that they anticipated would be favorable to life extension.

The most important finding of the study was that the psychosocial factors identified in older adults (greater Desired Age, less Death Acceptance, greater Internality, and greater Goal Seeking) were related to more positive attitudes toward life extension. These characteristics presented a picture of an individual who wanted to live longer, who did not accept the idea of death, who felt in control of maintaining good health, and who was actively seeking new goals in life, e.g., breaking away from routines to try new and different things, to find adventure and conquer new worlds, to meet new challenges. The psychological characteristics of Goal Seeking

assessed for study participants bore some similarity to qualitative comments of a few Australians

(Underwood, et al., 2009) viewing life extension as "an opportunity to try new things and to learn

and see more (p. 498)." However, the present study used a quantitative measure of Goal Seeking

in regression analyses to show a more precise relationship to life extension attitudes.

The above psychological portrait of a person favoring life extension is supported by the

types of goals participants expressed if they were to live forever or for 150 years. These included

both achievement goals that emphasized obtaining more formal and informal education to

accumulate knowledge and making use of such knowledge to help solve some of the world's

problems and altruistic goals that emphasized helping others throughout the world, especially in

third world countries. Taking the motivation to reach such goals into consideration along with

the psychosocial characteristics already identified provides a more coherent view of the

personality of the person interested in life extension. That is, someone who desired to live a

greatly extended life would be motivated by worthwhile goals, would reject the idea of death

(even if it violated religious convictions), and would have confidence in being able to

maintaining health over a long period. With such a view of a person who desires an extended

life, one could envision a "time traveler" who is more rational and serious than one simply

desiring to live longer based on impulse or a "lark." Obviously, such a view needs to be

confirmed in further studies which also include other personality characteristics hypothesized to

qualify a person to better represent the human race in such an important endeavor.

The mean Desired Age of 93 reported by the elders participating in this study was

somewhat greater than the mean of 85 found for German respondents over the entire adult age

range (Lang et al., 2007). One might think that the wider age range of the German sample was

responsible for the difference in findings of the two studies, but Lang and colleagues reported

that desired age was unrelated to chronological age. However, in both cases, the desired age was

well within the current maximum life span. Another possibility is that responses to the Desired

Age question in the present study might have been influenced by ideas about strong life

extension, but Desired Age was elicited in an early part of the interview, long before the scales

assessing attitudes toward life extension were administered. What is interesting is that those

participants who later expressed more positive attitudes toward life extension not only had a

greater Desired Age than participants who held more negative attitudes to life extension, but also

gave reasons for desiring to live longer (within the current maximum life span) that included

such positive reasons for living as desiring to see, learn, and accomplish things. That is, they

held active and interested attitudes toward life.

It was somewhat surprising not to find gender differences in life extension attitudes,

given the previous finding (Arber, et al., 2008) that men were more in favor of weak life

extension than were women. Yet, similar to the present study, no gender differences were noted

by Underwood and colleagues (Underwood, et al., 2009). It may be that men and women do not

differ when considering strong life extension under conditions assuming good health, whereas

the Arber study examined decisions to keep people alive in the final stages of life through the use

of such medical technologies as ventilators and tube feeding. Arber's explanation was that

women were more concerned with being a burden on others whereas men were more concerned

with their own desires to live as long as possible. Such concerns might not be activated under

conditions of continued good health associated with strong life extension in this study. Yet, the

question of gender differences should be investigated more fully in future research.

The finding that those affiliated with a Christian religion had more negative attitudes

toward extended life than non-Christians was expected in view of previous findings (Underwood,

et al., 2009) that belief in an afterlife was incompatible with extending the life span and that one

would be "playing God" to attempt to do so. Yet some of the Australian Christian participants

saw no conflict between life extension and their religion. Taking a closer look at the five types

of religious denominations included in the present study, even though group sizes were too small

to provide more than suggestive evidence, the more liberal traditional Protestants (Episcopalians,

Methodists, etc.) were found to hold Longlife attitudes that differed little from the Unitarian or

those who had no affiliation, but were more positive than either fundamentalist or evangelical

Protestants or Catholics. In the case of the Forever attitude, for which Religion was not a

significant predictor, only the group with no affiliation had more positive attitudes than the

Catholics. Further studies need to probe actual differences in beliefs, especially beliefs about the

afterlife, not merely church affiliations.

In the portion of the interview in which participants were asked what they wanted to do

with their lives relative to four possible life spans (live forever, live to age 150, live 10 more

years, and live only 6 months more), participants were quite able to imagine what it would be

like to live for various periods of time and set goals accordingly, regardless of their attitudes

toward life extension. What is exceedingly interesting is that goals related to achieving

something to benefit society in general, goals related to helping others, and even goals of

personal achievement were more frequent when longer life spans were considered, dropping off

when shorter times left to live were involved. Such goals were also among the social and

personal benefits of extended life listed by Australian respondents (Partridge, et al., 2009).

Conversely, goals related to personal relationships with family and friends were more frequent

when shorter times left to live were involved, a finding consonant with socioemotional selectivity

theory (Carstensen, et al., 1999). The sharp increase in goals related to preparing for death

relative to the condition of having only six months to live may be construed as also supporting

increased concern with personal relationships as death approaches, inasmuch as many of the

death preparation goals involved family relationships.

The study presented here was exploratory in nature and its limitations are readily

recognized. These include a small, non-random sample of participants in the later stages of their

life span. Although most considered themselves in good health, their attitudes toward life

extension may have been colored by their own expectations for a more limited life span.

Certainly, their own health conditions were among the reasons given by those whose desired age

was shorter. Also, because the sample involved participants from a senior citizen center and an

independent living residence, it is possible that the social context of being in a setting where

deaths of members are more frequent events than found in a wider community setting influenced

participants' attitudes toward life extension. Still, whether the direction of such influence would

result in more positive or more negative attitudes toward life extension is unclear. A further

possibility is that older adults who volunteered to participate in the study would differ in attitudes

toward life extension from those who did not volunteer. Such questions would need to be

examined in future work with a larger sample from a general population of older adults. It would

also be of value to compare different age groups as well as those living in a variety of contexts.

A further limitation is the new measure of attitudes toward life extension with limited

support for their reliability and validity. Additional instrument development would be important

for continued work in this area. Also, attitudes regarding some of the ideas voiced by those

opposed to life span extension would be important to investigate in a general population.

Overall, one can conclude that elders are very cautious about life without death or a

greatly extended life span, but are more positive about increasing longevity in order to complete

their goals in life. In this regard, the views of elders in this study would seem to fit in with those

of the scientists' position paper presented by Olshansky, Hayflick, and Carnes (2002), which is

most supportive of efforts to increase average life span within the present maximum life span,

and cautiously optimistic regarding efforts to go beyond that. As scientific work aimed at

extending the life span continues, the existence of a segment of the broader community that

views such efforts positively will need to be taken into account by those leaders of the field who

continue to debate its desirability.

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Table 1

Attitudes Toward Life Extension Scale Items, Item Means, and Standard Deviations for the Livelong and Forever Subscales (N = 109)

Item	M	SD
Longlife		
1. More scientists should be doing research to extend the life span.	2.85	1.19
2. I hope that eventually all body parts can be replaced as needed.	2.83	1.36
3. I try all kinds of health recommendations to extend my life past 100.	2.44	1.24
4. I will do everything in my power to fight dying.	2.31	1.20
5. A desirable life span would be 150.	2.05	1.08
Subscale item mean	2.51	0.93
Forever		
1. Nobody really wants to die.	2.88	1.30
2. More scientists should be doing research to eliminate death.	2.41	1.11
3. I hope that someday death can be conquered.	2.31	1.35
4. I would prefer to never die.	2.28	1.43
5. To live forever would be the best possible life.	2.27	1.24
6. I would like to live forever.	2.22	1.37
7. To live forever would be a great blessing.	2.15	1.30
8. I believe that science will eventually eliminate death.	2.11	1.12
9. Death is like any disease and should be conquered.	2.09	1.14
10, Evolution will eventually eliminate death.	1.98	0.98
11. Death has no place in a modern society.	1.97	1.02
Subscale item mean	2.25	0.88

Table 2

Means and Standard Deviations of 109 Participants on Study Variables

Variable	Mean	Standard Deviation
Chronological Age	77.08	9.05
Educational Level	5.44	1.48
Health	4.39	1.03
Desired Age	93.09	8.88
Internality	25.14	4.90
Death Acceptance	41.77	8.82
Goal Seeking	33.17	9.59

Table 3

Summary of Multiple Regression Analyses Predicting the Life Extension Attitude Longlife, with

Standardized Regression Coefficients (N = 109)

Variable	Model 1	Model 2	Model 3
Gender	-.16	-.07	
Married	.01	.02	
Age	-.16	-.37**	-.34**
Health	-.01	-.12	
Religion	.15	-.18*	-.21**
Education	.15	.12	
Desired Age		.55**	.57**
Internality		.22*	,20*
Death Acceptance		-.20*	-.22**
Goal Seeking		.20**	.18*
R^2	.11	.46	.44
F	1.83	3.59**	11.72**
ΔR^2		.35	
ΔF		13.49**	17.40**

* $p < .05$. ** $p < .01$.

Table 4

Summary of Multiple Regression Analyses Predicting the Life Extension Attitude Forever, with Standardized Regression Coefficients (N = 109)

Variable	Model 1	Model 2	Model 3
Gender	-.13	-.02	
Married	-.05	-.05	
Age	-.15	-.41**	-.42**
Health	.01	-.10	
Religion	-.18	-.22*	-.12
Education	-.11	-.16	
Desired Age		.65**	.54**
Internality		.26**	.25**
Death Acceptance		-.25**	-.30**
Goal Seeking		.12	.14
R^2	.08	.50	.46
F	1.26	8.28**	12.48**
ΔR^2		.42	
ΔF		17.40**	

* $p < .05$. ** $p < .01$.

Table 5

Percentage of Participants' Responses in 8 Categories of Goals for Remaining Life for Situations of Living Forever, Living to 150, Living Another 10 Years, and Living Another 6 Months

	Percentage of Participant Responses			
Type of Goal	Live Forever	Live to 150	Live 10 Years	Live 6 Months
Live day to day	7	11	12	8
Personal achievement	26	24	21	6
Achievement for society	16	17	3	0
Helping others	25	23	19	6
Relationships with others	11	12	20	29
Personal pleasure	15	12	20	17
Prepare for death	0	0	2	34
Desire extended life	0	1	1	1