Long-term effects of control beliefs on morbidity and mortality

Heiner Maier, Paige E. Goodwin, and Sherry L. Willis

The Pennsylvania State University
Department of Human Development and Family Studies
S-110 Henderson Building
University Park, PA 16802

Expanded text of poster presented at the Gerontological Society of America's 45th Annual Scientific Meeting, November 20, 1993 in New Orleans, LA.

The research reported in this poster was supported by Grant AG08082 from the National Institute on Aging to S.L. Willis

Running Head: Effects of Control Beliefs

Abstract

Prior research has demonstrated the importance of control beliefs for health outcomes. However, little research has examined which specific beliefs are adaptive or maladaptive. This study examined the effects of transcontextual and context-specific control beliefs on morbidity and mortality. Control beliefs were assessed on 512 older adults (mean age: 72.7 years) at their year of entry (1979 or 1986) into the ADEPT study. In 1992, data on participants' current health and mortality status were collected. Proportional hazards regression models indicated that chance and powerful others control beliefs were associated with subsequent mortality. Chance control beliefs were associated with subsequent morbidity. Results indicate that external beliefs increase the risk for both mortality and morbidity.

Long-term effects of control beliefs on morbidity and mortality

Control beliefs are individuals' expectancies pertaining to the connection between personal characteristics and/or actions and experienced outcomes. Control beliefs are seen as particularly relevant to aging and development in late adulthood. The process of aging itself, accompanied by negative life events and losses, has been described as leading to a perceived loss of control (Avorn, 1983). To the extend that this perceived control deficit generalizes over time and across situations, the resulting deficit may affect a broad range of behaviors (Abramson, Seligman, & Teasdale, 1978). Beginning in the mid-1970s, researchers in gerontology examined the role of control beliefs in relation to health-related outcomes. Since then, various experimental field studies have shown that interventions designed to increase perceptions of control had short-term positive outcomes on psychological and physiological health (Rodin, Timko, & Harris, 1985).

The purpose of the present study was threefold. First, we attempted to replicate and extend findings from correlational studies using a longitudinal design. We hypothesized that perceptions of control and mastery would be positively related to health, and negatively related to morbidity and mortality.

Various models of control have been proposed. A multi-dimensional perspective on control beliefs assumes that multiple sources of control such as self, other people, and chance may affect outcomes (Levenson, 1974). Beliefs refering to these sources are not

ordered on a single continuum, but rather are independent from each other. For example, individuals may believe that both the self and other people control a particular outcome. In addition, sources of control may operate in either a generalized way or within specific domains of behavior (Lefcourt, 1976). Our knowledge about the differential predictive power of these beliefs with regard to morbidity and mortality is limited. The second goal of this study was to identify key beliefs that are adaptive or maladaptive. We hypothesized that a belief in chance or fate will be related to morbidity rather than to health, because an individual holding this belief is less likely to engage in health-protective behaviors such as diet adherence or exercise. We also hypothesized that internal and achievement-related beliefs are predominant in discriminating between morbidity and mortality, since an individual with a sense of mastery and desire for accomplishment might be more likely to mobilize reserves when he or she faces serious illness or death.

Individual differences in perceived health and demographic characteristics are related to morbidity and mortality. Respondents reporting a better health status are less likely to die even after controlling for objective health status (Wolinski & Johnson, 1992). Older people and males have a higher risk of dying; and higher age, lower education, and being divorced/single are found to be risk factors for morbidity (Kaplan, 1992). The third goal of this study was to examine whether a relationship between control beliefs and morbidity and mortality holds after taking into account perceived health status and demographic variables

Method

Sample

Participants in this study were part of a larger ongoing study of adult cognitive development, the Adult Development and Enrichment Project. Subjects were 512 community-dwelling older adults, 423 females and 89 males who entered the study either in 1979 or in 1986. Their age range at date of entry was 59 to 93 years (M=72.7, SD=6.6), and their educational level ranged from 3 to 22 years (M=11.6, SD=2.9). Participants rated their health as good (M=2.1, SD=0.9) on a six-point Likert scale (1=very good, 6=very poor).

Measures

Five categories of measures were relevant to this study. Personal measures, transcontextual control belief measures and context-specific control belief measures were assessed at date of entry into the study. Mortality and morbidity were assessed through follow-up studies in 1986, 1989, 1991 and 1993.

Personal measures. A Personal Data questionnaire was used to assess gender, age, educational level and marital status (1=married, 2=widowed, 3=single or divorced). This questionnaire also included self-evaluations of health, hearing, and vision. For all self-perceptions of health status, lower values indicate better evaluations of health status.

Transcontextual control belief measures. Levenson's (1974) Locus of Control measure assesses generalized control beliefs and has three scales. The Internal scale measures the extent to which individuals feel in control over their life circumstances. The Powerful Others scale assesses the extent to which life circumstances are felt to

be controlled by others. The Chance scale measures the extent to which life circumstances are attributed to chance or fate. For all scales, a higher score indicates a stronger belief.

Context-specific control belief measures. The Personality-in-Intellectual-Aging Contexts (PIC) Inventory (Lachman, 1983) assesses domain-specific control beliefs. This instrument has six scales. Three PIC locus of control scales (Internal, Powerful Others, Chance) assess attributions regarding control of intellectual competence. The PIC Internal scale examines whether the individual claims responsibility for modifications and/or maintenance of intellectual functioning. The PIC Powerful Others scale examines whether the individual has a tendency towards dependency and reliance on other people for accomplishing intellectual tasks due to the belief that others are better able to carry out such tasks. The PIC Chance scale indicates an orientation towards the belief that there is nothing that can be purposefully done to preserve or modify intelligence in later life. An Achievement scale examines the perceived importance of intellectual competence. An Anxiety scale assesses affective reactions to intellectually demanding tasks. Finally, an Attitude scale examines one's perceptions of intellectual abilities relative to the past. For all scales, a higher score indicates a stronger belief.

Mortality assessment. Participants (or their relatives) were recontacted in 1992/1993 to examine their current health status. They were classified into two categories. A total of 412 individuals were still alive. A total of 100 individuals were classified as "dead" and the year of death was obtained based on reports from their family

or as indicated in Social Security Administration records (United States Social Security Administration, 1990).

Morbidity assessment. Morbidity was assessed for survivors only. For the purpose of the present analyses, data are reported for individuals who at entry in the study reported their health as being "good" or "very good" (N=300). Change in participants' health status was examined through a follow-up questionnaire administered in 1986, 1989, 1991, and 1993. Participants were classified into two categories. The 165 individuals who in the follow-ups reported their health as being "good" or "very good" were classified as "healthy". The 135 individuals who in the follow-ups reported their health as below average or who reported living in a care facility were classified as "not healthy". Year of morbidity ("not healthy") was obtained based on the year participants reported this change in health status.

Results

Proportional hazards regressions (Cox & Oakes, 1984) were performed for the two outcome variables mortality and morbidity. In proportional hazards regression models, survival time until an event (e.g., death, morbidity) occurs is the dependent variable. For both outcomes, the regression model was built following a three step procedure. In a first step, control beliefs assessed by the PIC and the Levenson scales were entered into the model. In a second step, significant predictors ($p<.05$) from step 1 were retained and health perceptions were added. In a third step, significant predictors from steps 1 and 2 were retained and personal variables (gender, age, education, and marital status) were added. Within each step, a

forward selection strategy was employed to avoid the problem that odds ratios were obscured due to multicollinearity among predictor variables. Values presented below are odds ratios (OR) and 95 % confidence intervals (CI).

Predictors of mortality. Table 1 presents odds ratios obtained from the proportional hazards modeling of the effects of control beliefs on mortality.

Insert Table 1 about here

Model 1 indicates that a high PIC Chance control belief was a risk factor for death (OR=1.036, CI=1.016-1.056, p<.001). Model 2 shows that this relationship holds after health variables were added. In addition to a high PIC Chance control belief, perceived health status was related to mortality. Individuals who perceived themselves being in poor health were more likely to die (OR=1.309, CI=1.074-1.595, p<.01). After demographic variables were added (Model 3), the association between PIC Chance control beliefs was no longer statistically significant (OR=1.018, CI=0.997-1.039, p=.09). Advanced age (OR=1.068, CI=1.036-1.101, p<.001), being male (OR=0.505, CI=0.318-0.803, p<.01), and being widowed, divorced or single (OR=1.497, CI=1.070-2.094, p<.05) were risk factors for death. As in model 2, individuals who perceived themselves being in poor health were more likely to die (OR=1.450, CI=1.175-1.1789, p<.001). Figure 1 displays the effects of PIC Chance control beliefs on survival time after controlling for perceived health, age, gender, and marital status.

Insert Figure 1 about here

Predictors of mortality were also examined for the subsample of individuals that reported themselves as being in below average health at date of entry into the study (N=150). This series of models indicates which predictors discriminate between morbidity and mortality. Odds ratios obtained from the proportional hazards modeling of the effects of control beliefs on mortality for this subsample are presented in Table 2.

Insert Table 2 about here

Model 1 indicates that high PIC Powerful Others control beliefs were a risk factor for death (OR=1.033, CI=1.004-1.063, p<.05). Addition of perceived health variables did not alter this association (Model 2). Notice that perceived health is not included as a predictor variable in the model here because it was used as a selection criterion for the subsample. After demographic variables were added (Model 3), the association between a high PIC Powerful Other belief and mortality remained (OR=1.033, CI=1.002-1.064, p<.05). Additionally, advanced age increased the risk to die (OR=1.047, CI=1.002-1.093, p<.05). Figure 2 displays the effects of PIC Powerful Others beliefs on survival time after controlling for age.

Insert Figure 2 about here

Predictors of morbidity. Table 3 presents odds ratios obtained from the proportional hazards modeling of the effects of control beliefs on morbidity.

Insert Table 3 about here

Model 1 indicates that a high PIC Chance control belief was a risk factor for morbidity (OR=1.024, CI=1.007-1.041, p<.01). The addition of health variables did not alter this association (Model 2). Perceived health is not included as a predictor variable into the model here because it was used as a selection criterion for the subsample that reported good health at date of entry into the study. After demographic variables were added (Model 3), the association between a high PIC Chance belief and morbidity still remained (OR=1.020, CI=1.002-1.037, p<.05). Additionally, advanced age increased the risk of morbidity (OR=1.031, CI=1.002-1.061, p<.05). Figure 3 displays the effects of PIC Chance control beliefs on time spent in good health.

Insert Figure 3 about here

Discussion

Three outcomes were examined in this study: Mortality for the total sample, mortality for individuals with below average health ratings, and morbidity for individuals who perceived their health as good at study entry. Risk factors associated with mortality for the total

sample were advanced age, being male, and being widowed, divorced, or single. There was a stong relationship between perceived health and mortality, with individuals who perceived their health as poor being more likely to die. A belief in chance or fate increased the risk of dying. This relationship weakened when health and demographic factors were taken into account. For individuals with below average health rating, a risk factors associated with mortality was the belief that other people were better at performing cognitive tasks. This latter relationship remained after age was controlled for. For individuals who perceived their health as good at study entry, risk factors associated with morbidity were advanced age and a belief in chance or fate.

Longitudinal evidence presented here supports prior reserach that suggested the importance of beliefs for health outcomes. However, it appears that maladaptive beliefs are external beliefs, whereas internal beliefs play a less dominant role than hypothesized. Modifying the dysfunctional beliefs identified in this study may be a promising preventive strategy in interventions designed to maintain health in older adults.

It has been argued that accommodative, more external coping strategies are associated with life satisfaction and the absence of depressive tendencies (Brandtstaedter & Renner, 1990). The present study has shown that external beliefs were related to both mortality and morbidity, but high externality was always related to negative outcomes and not to postive outcomes (e.g., living longer, living longer in good health). When one faces illness or needs to depend on others, the presence of external beliefs may be adaptive with regard to life

satisfaction, even if the ultimate outcome is death. Future research should more closely examine the interrelationship among life satisfaction, external beliefs, and health outcomes.

Context-specific control beliefs were better predictors for both mortality and morbidity than transcontextual control beliefs. This is surprising, because the PIC does not assess beliefs related to health and mortality but rather beliefs related to the domain of cognitive aging. One possible explanation for this finding is that health beliefs might share more variance with beliefs pertaining to cognitive aging than with transcontextual beliefs. Another expanation is that the PIC Inventory is an instrument that explicitly was constructed in a developmental context. Beyond control beliefs, this instrument assesses beliefs about development and changes that have occured and that are expected to occur (e.g., "It's inevitable that my intellectual functioning will decline as I get older"). In contrast, the Levenson Locus of control scales assess the extent to which individuals feel that they can control their life circumstances *now* (e.g., "When I make plans, I am almost certain to make them work"). It may well be that the development-related component of beliefs that is covered by the PIC Inventory is an important factor with regard to mortality and morbidity.

References

Abramson, L.Y., Seligman, M.E.P., & Teasdale, J.D. (1978). Learned helplessness in humans: Critique and reformulation. Journal of Abnormal Psychology, 87, 49-74.

Avorn, J. (1983). Biomedical and social determinants of cognitive impairment in the elderly. Journal of the American Geriatrics Society, 31, 137-143.

Brandtstaeder, J., & Renner, G. (1990). Tenacious goal pursuit and flexible goal adjustment: Explication and age-related analysis of assimilative and accomodative strategies of coping. Psychology and Aging, 5, 58-67.

Cox, D.R., & Oakes, D. (1984). Analysis of survival data. London: Chapman and Hall.

Kaplan, G.A. (1992). Health and aging in the Alameda county study. In K.W. Schaie, D. Blazer, & J.S. House (Eds.), Aging, health behaviors, and health outcomes, (pp. 69-88). Hillsdale, NJ: Lawrence Erlbaum Associates.

Lachman, M.E. (1983). Perceptions of intellectual aging: Antecedents or consequence of intellectual functioning? Developmental Psychology, 19, 482-498.

Lefcourt, H.M. (1976). Locus of control: Current trends in theory and research. New York: Wiley.

Levenson, H. (1974). Activism and powerful others: Distinctions within the concept of internal-external control. Journal of Personality Assessment, 38, 377-383.

Rodin, J., Timko, C., & Harris, S. (1985). The construct of control: Biological and psychological correlates. In M.P. Lawton & G.L. Maddox (Eds.), Annual review of gerontology and geriatrics, (Vol. 5, pp. 3-55). New York: Springer.

United States Social Security Administration (1990). Social Security Death Index. Baltimore, MD: United States Social Security Administration.

Wolinski, F.D., & Johnson, R.J. (1992). Perceived health status and mortality among older men and women. Journals of Gerontology: Social Sciences, 47, S304-S312.

Table 1: Odds Ratios obtained from the Proportional Hazards Modeling of the Effects of Control Beliefs on Mortality (N=512)

	Model 1 Control Beliefs entered	Model 2 Health Variables entered	Model 3 Demographic Variables entered
Control Beliefs			
PIC Internal			
PIC Powerful			
PIC Chance	1.036***	1.033**	1.018[1]
PIC Achievement			
PIC Anxiety			
PIC Attitudes			
Levinson Internal			
Levinson Powerful			
Levinson Chance			
Health Variables			
Perceived Health		1.309**	1.450***
Perceived Hearing			
Perceived Eyesight			
Demographic Variables			
Age			1.068***
Education			
Gender			0.505**
Marital Status			1.497*
Model Chisquare, df	13, 1***	19, 2***	52, 5***

Note: * $p < .05$: ** $p < .01$; *** $p < .001$.

[1] $p = .09$

Table 2: Odds Ratios obtained from the Proportional Hazards Modeling of the Effects of Control Beliefs on Mortality for Individuals who at Entry into the Study reported their Health as being "Moderately Good" or Worse (N=150)

	Model 1 Control Beliefs entered	Model 2 Health Variables entered	Model 3 Demographic Variables entered
Control Beliefs			
PIC Internal			
PIC Powerful	1.033*	1.033*	1.033*
PIC Chance			
PIC Achievement			
PIC Anxiety			
PIC Attitudes			
Levinson Internal			
Levinson Powerful			
Levinson Chance			
Health Variables			
Perceived Hearing			
Perceived Eyesight			
Demographic Variables			
Age			1.047*
Education			
Gender			
Marital Status			
Model Chisquare, df	5, 1*	5, 1*	9, 2*

Note: * $p < .05$.

Table 3: Odds Ratios obtained from the Proportional Hazards Modeling of the Effects of Control Beliefs on Morbidity for Individuals who at Entry into the Study reported their Health as being "Good" or "Very Good"(N=300)

	Model 1 Control Beliefs entered	Model 2 Health Variables entered	Model 3 Demographic Variables entered
Control Beliefs			
PIC Internal			
PIC Powerful			
PIC Chance	1.024**	1.024**	1.020*
PIC Achievement			
PIC Anxiety			
PIC Attitudes			
Levinson Internal			
Levinson Powerful			
Levinson Chance			
Health Variables			
Perceived Hearing			
Perceived Eyesight			
Demographic Variables			
Age			1.031*
Education			
Gender			
Marital Status			
Model Chisquare, df	8, 1**	8, 1**	12, 2**

Note: * $p < .05$; ** $p < .01$

Figure 1: Outcome Alive versus Dead
Survival curves for PIC Chance Control Beliefs
Controlling for Health, Age, Gender, and Marital Status
Curves for Mean Value (solid line), 1 STDV above (...),
and 1 STDV below (– – –) the mean

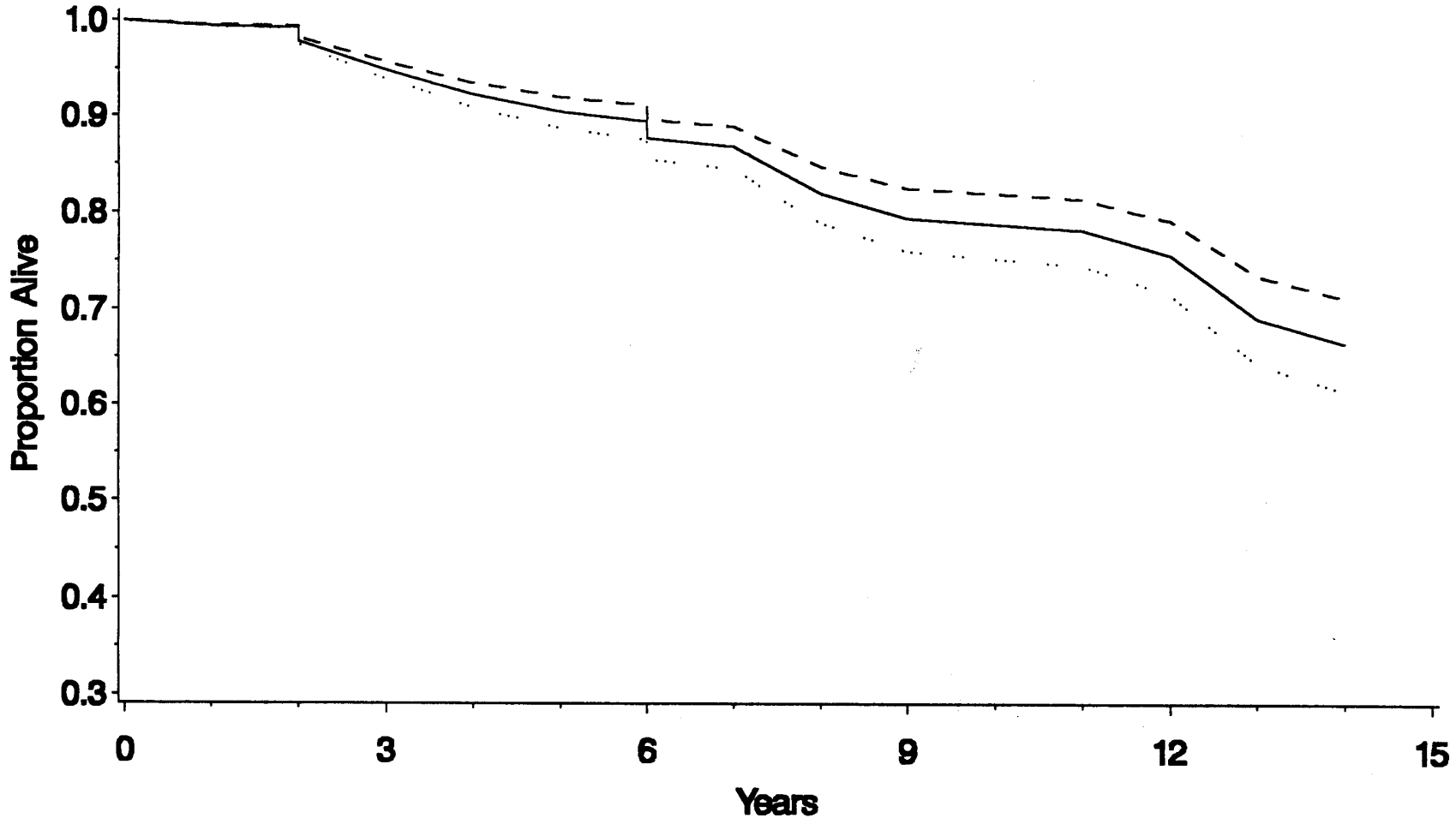

Figure 2: Outcome Alive vs Dead for Below Average Health
Survival curves for PIC Powerful Others Control Beliefs
Controlling for Age
Curves for Mean Value (solid line), 1 STDV above (...),
and 1 STDV below (– – –) the mean

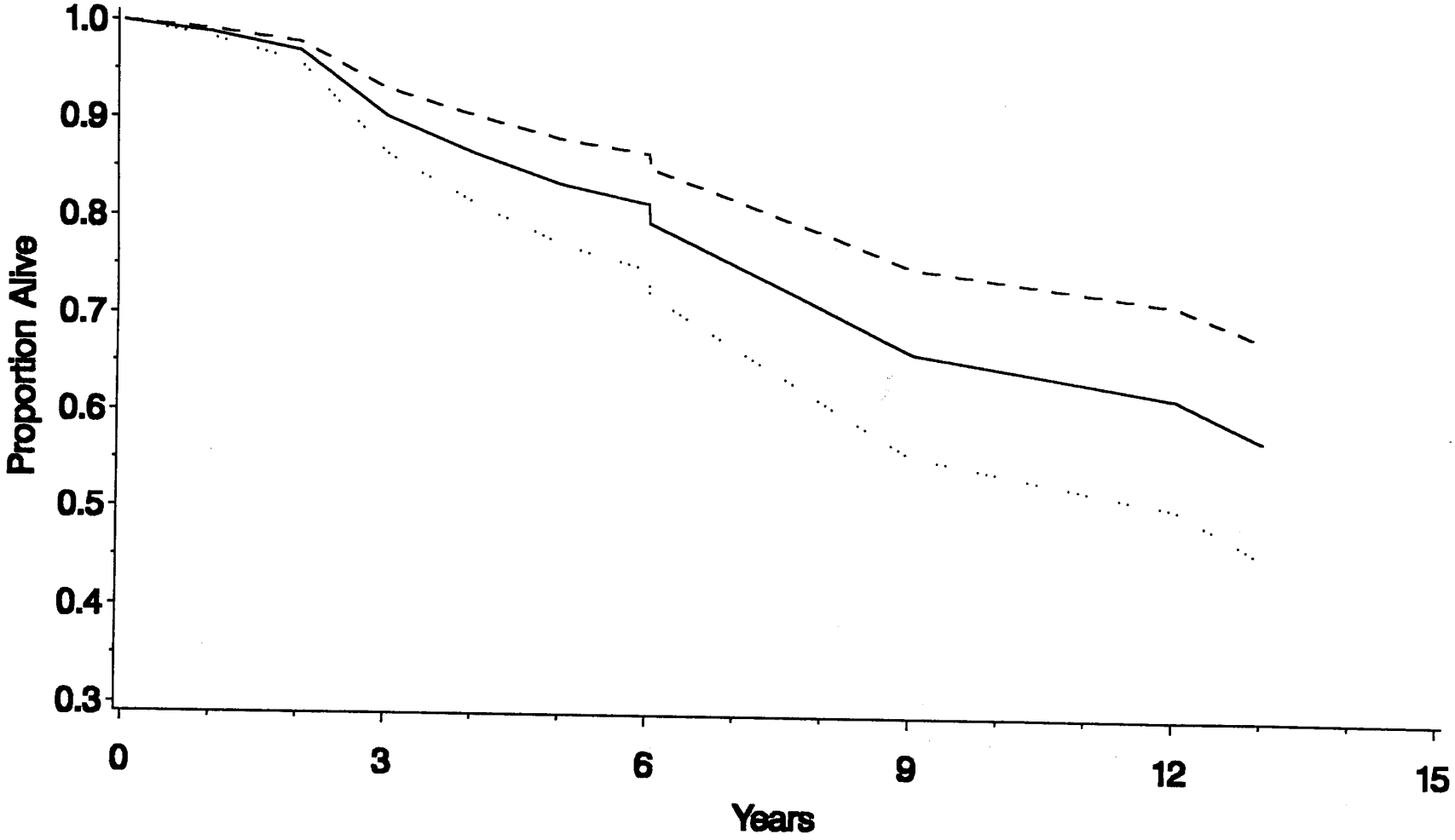

Figure 3: Outcome Healthy vs Not Healthy for Healthy Individuals
Survival curves for PIC Chance Control Beliefs
Controlling for Age
Curves for Mean Value (solid line), 1 STDV above (...),
and 1 STDV below (– – –) the mean