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Psychological Adjustment Variables as Predictors of Mortality Among Nursing Home Residents

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Mortality over a 4-year period was examined in relation to self-esteem, depression, life satisfaction, and meaning in life in a nonclinical sample of 129 intermediate-care nursing home residents. Survival was associated with the psychological adjustment variables, and the effect persisted after statistically controlling for age, sex, and physical health. Self-evaluations (self-esteem and depression) were stronger predictors of mortality than were general life evaluations (life satisfaction and meaning in life). Comparisons with previous studies suggest conditions under which psychological variables are likely to be associated with mortality.

Psychological adjustment variables such as life satisfaction, self-esteem, and depression have been the outcome or dependent variables in thousands of gerontological investigations. Although psychological adjustment is undoubtedly an important end, little is known about how psychological adjustment may itself contribute to the ultimate end—physical death. The issue is particularly relevant to older people. Deteriorating health; the loss of family, friends, familiar activities, and environments; and the sense of being a burden may cause older people to vacillate in their will to live. In this context, positive thoughts and feelings about oneself and life in general may serve to reduce such vacillation and thereby decrease vulnerability to stress and disease. This may be especially true for nursing home residents given the dramatic changes in their living environment and their physical frailty.

The effects of psychological factors on mortality may be relatively direct if they influence immune system functioning (S. Cohen & Herbert, 1996; Maier, Watkins, & Fleshner, 1994) or indirect if they influence the performance of health-related behaviors such as exercise, diet, and medication compliance (Adler & Matthews, 1994). In younger and middle-aged populations, associations have frequently been reported between psychological variables such as depression, distress, neuroticism, dispositional optimism, and self-esteem and physical health variables such as immunocompetence, physical symptoms, cardiovascular disease, risk for cancer, and recovery from illness (Adler & Matthews, 1994; Herbert & Cohen, 1993). These associations may be stronger and may have more serious consequences in older populations.

Most of the relevant gerontological studies have focused on mortality differences between community samples and individuals with serious forms of psychopathology (Langley, 1995). However, there have been some indications that variations in psychological variables in nonclinical samples also may be associated with mortality. Work satisfaction in men and past enjoyment of intercourse in women are independent predictors of longevity (Palmore, 1982). The quantity and sometimes the quality of one's relationships have been associated with mortality in both cross-sectional and prospective studies controlling for health status (House, Londis, & Umberson, 1988; Sabin, 1993). Manipulations of perceived control have been found to influence happiness, activity, and mortality in nursing home residents (Rodin & Langer, 1977). Activity level is associated with mortality in nursing home residents when physical health, cognitive functioning, and other variables are statistically controlled (Stones, Dornan, & Kozma, 1989). There also has been research on terminal decline and drop, which is the hypothesis that marked functional changes are associated not with age but with impending death. However, most investigations have focused on intellectual performance and physical health, and the much smaller set of findings for psychological adjustment variables are considered unclear. The relevant reports were typically from wider studies on aging in which adjustment variables were not the primary focus, and the findings for the adjustment measures that were administered (rigidity–flexibility, psychological energy) are mixed (see Berg, 1996, for a review). What is thus missing in the literature is an assessment of the predictability of mortality in nonclinical populations from the psychological adjustment variables that have been so commonly used as dependent variables in nonmortality gerontological research.

Method

Participants and Procedure

The interview data for this study were those described and analyzed in a previous report focusing on different issues (O'Connor & Vallerand, 1994). As described in the earlier report, a list of the intermediate-care nursing homes in the Montreal area was obtained from the provincial government and 11 homes were randomly selected. Inquiries about conducting research were made to the nursing home administrators, and 3 refused. Three additional homes were randomly selected from the list (with no further refusals). The homes varied in the number of residents

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(range = 39–247, M = 126, SD = 64.5), in the number of bedrooms (range = 26–247, M = 114, SD = 69.7), in the number of floors in the building (range = 1–9, M = 3.6, SD = 2.2), and in the staff-to-resident ratio (range = 1:7.7–1:14.5, M = 1:11.1, SD = 1.85).

The head nurse in each home examined the list of residents and withdrew the names of individuals who, in her judgment, did not have the cognitive skills to answer our questions or whose physical condition made them unable to participate (approximately 15% of the residents were eliminated for this reason). Our findings thus applied to nursing home residents who had sufficient cognitive skills to participate in a research interview. We then randomly selected names from the list of potential participants to sample about 10% of eligible residents in each nursing home. The acceptance rate among these residents was approximately 80%. In other words, there was a total of 1,381 residents in the 11 nursing homes. The head nurses judged that approximately 207 residents were unable to participate, leaving a potential sample of 1,174, from which we obtained a nonstratified random sample of approximately 10% of the eligible residents from each home. There were 111 women and 18 men (aged 65–96 years, M = 80.5). Participants had been residents of the homes for an average of 3.8 years. Ninety-two were widowed, 18 were married, 14 were single, and 5 were separated or divorced. The frequencies for highest completed level of education were 82 elementary school, 33 high school, and 5 college or university (with 9 missing values). Responses to an optional question about annual income revealed a mean of $10,000 (Canadian).

Residents were first informed by the staff that they might be contacted to participate in a study, and a short time later the residents who agreed to participate were administered the measures interview style by a trained research assistant. Follow-up information on mortality and dates of death or departure were obtained from the nursing home records 4 years after the initial interviews. In that period, 69 people had died and 5 had gone to other residences. The data were collected in the early to mid-1990s.

Measures

Satisfaction with life. The Satisfaction With Life Scale (Diener, Emmons, Larsen, & Griffin, 1985) consists of five statements that assess the cognitive or judgmental component of global life satisfaction (a sample item is "I am satisfied with my life"). This measure has favorable psychometric properties, with high internal consistency (Cronbach's α = .81 for our data) and temporal reliability (.82 over a 2-month period). Scores are correlated with other measures of subjective well-being (e.g., the Affect Balance Scale, the Well-Being scale from the Differential Personality Questionnaire, and Symptom Checklist scores) and with interviewer assessments of life satisfaction among older respondents. Self-reports on this scale also correlate highly with peer reports and clinical ratings (Diener et al., 1985; Pavot, Diener, Colvin, & Sandvik, 1991). Scores are not associated with age, sex, educational level, or social desirability.

Self-esteem. Participants completed 5 of the 10 items from Rosenberg's (1979) Self-Esteem Scale, which assesses general self-worth and self-acceptance: "I feel that I am a person of worth, at least on an equal plane with others," "I feel that I have a number of good qualities," "I am able to do things as well as most [elderly] people," "I take a positive attitude to myself," and "On the whole, I am satisfied with myself." This popular scale is unidimensional, internally consistent (α = .76 for our data), has high test–retest reliability, and is correlated with self-esteem–related constructs (e.g., confidence, popularity, anxiety, and depression). Scores are not significantly associated with age, marital status, gender, work experience, grade point average, scholastic aptitude, or birth order (Blascovich & Tomaka, 1991). The degree of similarity between our abbreviated version of this measure and the full version was examined in data collected for another study (Conklin & O'Connor, 1995). Women (n = 812, mean age = 35 years) recruited from the waiting rooms of physicians' offices completed the Self-Esteem Scale, and the correlation between their scores on the abbreviated version and the full version was .96.

Depression. Participants completed three items from the Beck Depression Inventory (BDI) having to do with feeling like a failure, feeling disappointed in oneself, and having suicidal thoughts (α = .67 for our data) that are known to be homogeneous and valid (Kane & Kane, 1981, p. 117). Nursing home residents sometimes become fatigued by the Full Scale BDI, and these three items were selected and tested for use with long-term-care populations by Sherwood, Morris, Mor, and Gutkin (1977). The degree of similarity between this abbreviated version of the BDI and the full version was examined in data collected for another study (see Dyce, 1996, which is the first report from a larger data set). BDI responses were culled from the files of 570 hospital outpatients (387 women and 183 men, mean age = 34), and the correlation between their scores on the abbreviated version and the full version was .80.

Meaning in life. Participants completed four questions adapted from Reker, Peacock, and Wong (1987) tapping meaning in life: "I believe that I can find meaning in life if I try to," "I am seeking a meaning or purpose in life," "I believe that it is possible for life to be meaningful for me in the future," and "I believe my life has meaning now" (α = .87 for our data).

Participants indicated the degree of accuracy of all of these items (except those from the BDI) on 7-point Likert scales ranging from 1 (*not at all accurate*) to 7 (*extremely accurate*), and mean scores were computed. Composite psychological adjustment scores were computed by first reversing the scores on the BDI, converting the scores on depression, meaning in life, satisfaction with life, and self-esteem into standard scores and computing the mean of these four standard scores for each participant (α = .74).

Physical health. Participants provided a rating of their current health on a 7-point scale (see Idler & Benyamini, 1997, for information on the validity of single-item, self-report ratings of health). The head nurse in each home rated the general health of participants on a 9-point scale ranging from 1 (*very poor*) to 9 (*very good*); reported the number of days each participant had been bedridden in the past month, the number of times they had to see a physician in the past month, and how many different kinds of pills they took each day; and provided a general 9-point rating of how strong the pills were.

Analytical Procedures

There were missing values for 2.3% of the variable scores. To determine whether the missing values were random or systematic, we created dummy code variables, with the codes based on the presence or absence of missing values. None of the dummy codes were significant predictors of mortality or other variables in the study, and the effect sizes were negligible, indicating that data were missing randomly. The grand means were imputed in the places of missing values, which is a conservative strategy because it reduces variation around means and attentuates effect sizes (J. Cohen & Cohen, 1983). The results with and without missing values were identical.

There were significant degrees of skewness and kurtosis for some of the variables (e.g., depression, number of days in bed, number of physician visits), but the effects remained unchanged after square root and logarithmic transformations were performed to produce normal distributions. Results for untransformed variables are reported because this has been the common practice in previous gerontological investigations using these measures.

Survival analysis provides estimates of the relationships between the amount of time before an event (e.g., death) and predictor variables. It is a strongly recommended technique (Singer & Willett, 1991) that was used in our study because it could incorporate the important and relevant data from the participants who did not die over the course of the study as well as the data from the 5 residents who dropped out (moved away) before the final data collection. The relationship between psychological adjustment and mortality was examined using the Cox proportional hazards survival analytical technique (Parmar & Machin, 1995), which is a regression analog that permits the use of continuous predictors and provides estimates of relationships while statistically controlling for the effects of other variables (e.g., physical health). The analyses were conducted using the SAS PHREG software procedure. One participant was dropped from the analyses because the individual had moved away before the first event (death) in the data set.

Results

The means, standard deviations, and Pearson product–moment correlations between the variables are reported in Table 1. The four psychological adjustment variables displayed consistent, moderate intercorrelations. The intercorrelations between the health variables were more variable, but they were in the expected directions. There also were significant correlations between the adjustment variables and the physical health variables (particularly self-ratings of health and number of doctor visits).

Cox regressions were then conducted (a) for each individual variable and for the composite psychological adjustment scores predicting mortality; (b) for each of the psychological adjustment variables while statistically controlling for age, sex, and the physical health variables; and (c) for all of the individual variables (excluding the composite variable) entered simultaneously. The results of these analyses are reported in Table 2. The beta coefficients are analogous to raw beta weights in multiple regression. Hazard ratios from survival analysis provide indications of effect size and are typically reported for group comparisons. However, because all of our variables were continuously scored, the interpretation of hazard coefficients for continuous variables was not obvious or straightforward. We therefore computed a hazard ratio for each predictor on the basis of a comparison of two scores, the score at 1 *SD* below the mean and the score at 1 *SD* above the mean using the formula provided by Parmar and Machin (1995, p. 124). Hazard ratios of 1.0 indicate no effect. A ratio of 4.0 in our case would mean that individuals scoring 1 *SD* above the mean have 4 times the hazard of dying than individuals scoring 1 *SD* below the mean. A ratio of 0.25 would mean that individuals scoring one standard deviation above the mean have one fourth the hazard of dying than individuals scoring 1 *SD* below the mean. To facilitate interpretation of the findings, we also translated the effect for each predictor into its (more familiar) correlation coefficient equivalent. Specifically, the test statistic for Cox regressions is the Wald chi-square, which is equal to $(\beta/SE)^2$, and the square roots of these coefficients are z values from the familiar standard normal distribution. The z values were converted into correlation coefficients using the formula, $r = z/\text{square root}(N)$, provided by Rosenthal and Rosnow (1991, p. 297; see also Rosnow & Rosenthal, 1988). Negative signs for betas and correlations indicate lower mortality rates for higher levels of the predictors. In Table 2 we also report the 95% confidence intervals (two-tailed) for these effect sizes. Two-tailed significance levels are reported unless otherwise noted, and the correlation coefficient equivalents are reported in the text because of their familiarity to most readers.

There were significant bivariate effects for depression (r =

Table 1
Means, Standard Deviations, and Pearson Correlations

Variable	Correlation 1	2	3	4	5	6	7	8	9	10	11	12	*M*	*SD*
1. Depression	—												0.29	0.53
2. Self-esteem	−.51***	—											5.56	1.11
3. Meaning in life	−.33***	.45***	—										4.35	1.76
4. Satisfaction with life	−.36***	.46***	.39***	—									4.96	1.37
5. Psychological adjustment	−.75***	.80***	.71***	.73***	—								−0.01	0.76
6. Health: Self-ratings*	−.21*	.32***	.30***	.35***	.40***	—							4.15	1.51
7. Health: Nurse ratings*	−.12	.10	.18*	.01	.16	.25**	—						5.95	1.63
8. Health: Doctor visits	.20*	−.31***	−.20*	−.16	−.29***	−.22*	−.29***	—					2.33	3.36
9. Health: Days in bed	.23**	−.08	−.10	.01	−.15	.00	−.29***	.39***	—				0.46	1.40
10. Health: No. of daily pills	.04	−.04	−.09	.10	−.02	−.24**	−.10	.23**	.13	—			5.16	3.13
11. Health: Strength of pills	−.19*	.04	.01	.07	.11	−.21*	−.09	.17	−.02	−.49***	—		4.85	1.58
12. Age	−.18*	−.03	−.07	.04	.03	.03	.05	−.09	.07	−.10	−.13	—	80.50	7.16

Note. $N = 128$. Depression means are on a scale of 0–3; self-esteem, meaning in life, and satisfaction with life means are on a scale of 1–8; and self- and nurse rating of health and strength of pills ratings are on a scale of 1–9, with higher means indicating better health and stronger pills.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 2
Cox Regression Statistics

Variable	β	*SE*	Hazard ratio	*r*	95% CI for *r* Low	95% CI for *r* High
Bivariate effects						
Depression	.64***	.19	1.97	.29	.12	.47
Self-esteem	−.37***	.11	0.44	−.30	−.47	−.13
Meaning in life	−.15*	.07	0.58	−.21	−.38	−.04
Satisfaction with life	−.13	.09	0.70	−.14	−.31	.04
Psychological adjustment	−.49***	.15	0.48	−.30	−.47	−.12
Health: Self-ratings[a]	−.12	.08	0.69	−.13	−.31	.04
Health: Nurse ratings[a]	−.10	.07	0.72	−.13	−.30	.05
Health: Doctor visits	.03	.04	1.20	.06	−.11	.24
Health: Days in bed	−.01	.09	0.96	−.01	−.19	.16
Health: No. of daily pills	.06	.04	1.42	.13	−.04	.30
Health: Strength of pills	−.03	.08	0.90	−.04	−.21	.13
Age	.03	.02	1.51	.14	−.03	.32
Sex	−.46	.32	0.72	−.13	−.30	.05
Controlling for age, sex, and physical health						
Depression	.92***	.25	2.76	.34	.17	.51
Self-esteem	−.36**	.13	0.44	−.25	−.43	−.08
Meaning in life	−.13	.07	0.64	−.15	−.33	.02
Satisfaction with life	−.08	.10	0.79	−.08	−.25	.10
Psychological adjustment	−.61**	.19	0.40	−.28	−.45	−.10
Simultaneous entry						
Depression	.81**	.28	2.35	.25	.08	.43
Self-esteem	−.18	.14	0.67	−.11	−.28	.06
Meaning in life	−.09	.09	0.73	−.09	−.27	.08
Satisfaction with life	.08	.11	1.24	.06	−.11	.24
Health: Self-ratings[a]	.12	.10	1.43	.10	−.07	.27
Health:Nurse ratings[a]	−.12	.08	0.68	−.13	−.31	.04
Health: Doctor visits	−.01	.05	0.92	−.03	−.23	.15
Health: Days in bed	−.07	.10	0.82	−.06	−.23	.11
Health: No. of daily pills	.06	.05	1.46	.12	−.05	.29
Health: Strength of pills	−.02	.09	0.94	−.02	−.19	.15
Age	.05**	.02	2.10	.22	.05	.40
Sex[b]	−.47	.36	0.72	−.11	−.28	.06

Note. $N = 128$. Hazard ratios closer to 1 indicate weaker effects. Negative β and r values indicate lower mortality rates for higher levels of the predictors. CI = confidence interval.
[a] Higher ratings indicate better health. [b] The coding for sex was 1 for women and 2 for men.
* $p < .05$. ** $p < .01$. *** $p < .001$.

.29, $p < .001$), self-esteem ($r = -.30$, $p < .001$), and meaning in life ($r = -.21$, $p < .05$). The bivariate correlation values for satisfaction with life ($r = -.14$), self-rated health ($r = -.13$), nurse-rated health ($r = -.13$), number of daily drugs ($r = .13$), and age ($r = .14$) were all in the expected direction (e.g., greater mortality occurring with poor health and increasing age), but fell just short of the value of .15 required for significance at the .05 level (one-tailed). Furthermore, the effects for depression and self-esteem remained significant after statistically controlling for age, sex, and the physical health variables (*r*s = .34 and −.25, *p*s < .001 and .05, respectively), whereas the effect for meaning in life was no longer significant ($r = -.14$). When all of the predictors were simultaneously entered, significant effects emerged for depression ($r = .25$, $p < .01$) and age ($r = .22$, $p < .05$), and the effect for self-esteem was attenuated ($r = -.11$). Self-esteem and depression were moderately correlated ($r = -.51$), and it was apparently the variance in self-esteem that was shared with depression that was associated with mortality.

The bivariate effect for the prediction of mortality from global psychological adjustment scores was −.30 ($p < .001$), and the effect remained significant after statistically controlling age, sex, and the physical health variables ($r = -.28$, $p < .01$). The relationship between global psychological adjustment scores and mortality is shown in Figure 1. The survivorship curves, adjusted for the effects of age, sex, and the physical health variables, indicate the proportions of nursing home residents surviving across the 4-year time period and are plotted for three levels of the predictors: the mean, 1 *SD* below the mean, and 1 *SD* above the mean. (Survivorship probabilities were computed by substituting these three values into the Cox equations.) Higher scores on psychological adjustment were associated with lower mortality. After 4 years, the survivorship for residents scoring 1 *SD* below the mean on psychological adjustment was 27%, in contrast to a survivorship of 55% for those scoring 1 *SD* above the mean. The survivorship curves also indicate that associations between psychological adjustment and mortality are most evident after 2 years and are less obvious before then.

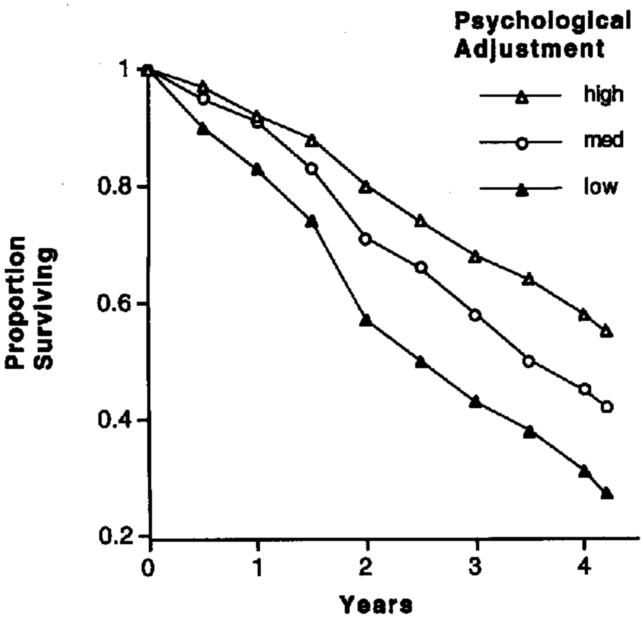

Figure 1. Survivorship curves for three levels of psychological adjustment: the mean ("med"), 1 *SD* below the mean ("low"), and 1 *SD* above the mean ("high"). $N = 128$.

Other analyses indicated no interactions for sex and no main effects or interactions for education or income (for which only partial data were available). There also were no effects for the other variables (e.g., motivational styles) that were measured and discussed by O'Connor and Vallerand (1994). The Cox regression procedure assumes that the effect of each predictor is multiplicative and constant (proportional) over time, and inspections of log plots revealed no violations of this assumption (Parmar & Machin, 1995, p. 139).

Discussion

Naturally occurring variation in psychological adjustment predicted mortality in nonclinical samples of nursing home residents, and the effects persisted after statistically controlling for age, sex, and physical health. There were moderate and statistically significant associations between psychological adjustment scores and physical health scores, but the relationships between adjustment and mortality were only slightly attenuated after controlling for physical health variables. The psychological adjustment variables that have so frequently served as outcome variables in gerontological investigations are thus themselves important predictors of the ultimate human outcome.

Although our findings are encouraging, several features of our sample and method should be considered. Our participants were primarily female, and all were nursing home residents who were judged by the head nurses to be physically and intellectually fit to participate in a research interview. It is unknown whether the findings also apply to more impaired nursing home residents or to independently living older adults. The "fit" criteria used by the head nurses to include and exclude residents were subjective, and it is possible that some participants suffered from unnoticed, mild degrees of cognitive impairment. This unmeasured variable could provide an alternative explanation of the findings, and so we searched the literature to assess the plausibility of this explanation (i.e., to determine whether cognitive impairment is associated with both psychological adjustment variables and mortality).

Cognitive changes are associated with mortality in nonclinical populations (Small & Backman, 1997), but associations between cognitive changes and well-being variables have rarely been reported for healthy samples. The available findings are mixed (Rabbit, Donlan, Watson, McInnes, & Bent, 1995), although longitudinal studies have shown declines in cognitive performance but no declines in life satisfaction or psychological adjustment across time (e.g., Palmore & Cleveland, 1976). More generally, research on normal aging has revealed some forms of cognitive decline, but the declines are not accompanied by functional impairment (Corey-Bloom et al., 1996), and there is stability in life satisfaction (Mannell & Dupuis, 1996), self-esteem (Giarrusso & Bengston, 1996), and psychological well-being (Ryff, 1996). This suggests that cognitive changes in later life are not associated with psychological adjustment variables. In nursing home samples, measures of cognitive functioning and measures of well-being load on separate factors and are uncorrelated (Pruchno, Kleban, & Resch, 1988). Cognitive functioning scores also are not associated with mortality among nursing home residents who are cognitively and physically capable of cooperating with an extensive questionnaire battery (Stones et al., 1989). There has been much more research on these variables in older psychiatric populations, with evidence that both depression and dementia are associated with increased mortality (Langley, 1995; Van Dijk, Van de Sande, Dippel, & Habbema, 1992). However, depression, anxiety, and life satisfaction are not associated with cognitive status in these populations (Hyer, Gouveia, Harrison, Warsaw, & Coutsourdis, 1987). Cognitive decline is associated with depression in the early stages of dementia, but the depressive symptoms decrease over time (Blazer, 1998, p. 45), and the mean time before death is 8.5 years after the onset of symptoms (Jost & Grossberg, 1995). The fact that people with depression and dementia tend to be in the early stages of the disease and relatively far from death makes it unlikely that our findings are attributable to unmeasured cognitive decline associated with dementia because we more or less found the reverse (i.e., that relatively depressed people were more likely to die over 4 years). Furthermore, the selection decisions by the head nurses in our study probably produced a restriction in the range of cognitive status variables, thus reducing their influence in this sample.

In summary, the literature indicates that cognitive status predicts mortality in (a) large community samples in which there is much variation in cognitive status and (b) people with dementia, but not in (c) more homogeneous samples of relatively high-functioning nursing home residents. Cognitive status also is not associated with well-being variables, with the exception of individuals in the early stages of dementia. The lack of measures of cognitive status in our study is a limitation, and although there are a variety of reasons for believing that cognitive decline is not a likely explanation for our findings, the possibility cannot be ruled out. More generally, our original goal was to examine psychological adjustment variables in a sample of nursing home residents that was similar to the samples typically used in such gerontological research (i.e., in research in which respondents complete measures of psychological adjustment). Exclusion criteria must always be used in these investigations, and we are aware of no key differences between our sample and those used in previous work of this kind.

We examined all-causes mortality because information on the causes of death was not available. Our measures of physical health also were based on self- and nurse reports, not on reports from physicians. However, subjective health is more strongly related to well-being and life satisfaction than are objective measures of health (Larsen, 1978). It also is difficult to imagine other relevant aspects of physical health that are related to psychological adjustment and that were not tapped by self-rated health, nurse-rated health, medication use, number of days bedridden, and number of visits by physicians.

The effects for the physical health variables were in the expected directions but did not reach statistical significance when predicting mortality. We therefore sought to compare our physical health effect sizes with those observed in other studies. Many of our health variables have not been measured in previous mortality work (e.g., number of days in bed, number of doctor visits, nurse ratings). However, Idler and Benyamini (1997) published odds ratios for self-rated health and mortality taken from 27 studies of representative community samples. The odds ratios for "healthy" versus "unhealthy" group comparisons typically ranged from 1.5 to 3.0 (meaning that the risk of mortality was 1.5–3.0 times greater in the less healthy group). In our own data, the hazard ratio (which is roughly equivalent to an odds ratio) for self-reported health based on comparisons of scores 1 *SD* above and below the mean was 1.46. (The ratio of 0.69 in Table 2 became 1.46 when the self-ratings were reverse scored to make the high–low comparison equivalent to those reported by Idler & Benyamini, 1997.) The odds ratios for our data varied between 1.29 and 2.01 depending on the criteria that were used to categorize people into healthy and unhealthy groups on the basis of their 7-point scale ratings. Our effect size for self-rated health was thus in the neighborhood of previously reported effect sizes. More generally, the effect sizes for the physical health variables may not have reached statistical significance because of the smaller size of our sample, and the effect sizes may have been attenuated by a restriction in the range of health scores. The representative community samples used in previous work were presumably more heterogeneous in physical health than our institutionalized sample.

Further comparisons of our findings with those from previous studies suggest conditions under which effects for psychological adjustment are likely to be found. For example, Parmelee, Katz, and Lawton (1992) observed a relationship between depression and mortality that disappeared after statistically controlling for physical health and cognitive status. However, their sample included both nursing home residents and older people living in a congregate apartment complex and was thus probably much more heterogeneous in physical health and cognitive status than our own sample. Their focus was on major depression, and they categorized participants into three groups (possible major, minor, and no depression) instead of examining naturally occurring variations in continuums of depression scores. The Parmelee et al. depression variable was categorical and thus disadvantaged in competing with their continuously measured health variables. They also examined mortality across a briefer period (18 months) than in our study (4 years), and the plots in Figure 1 indicate that mental health predictors of mortality become more noticeable and obvious after 2 years. Findings similar to those of Parmelee et al. have been reported by other investigators who used similar methods and community samples (e.g., Thomas, Kelman, Kennedy, Ahn, & Yang, 1992). The overall comparisons of our findings and methods and those of earlier studies suggests that (a) physical health and cognitive status may be more important short-term predictors of mortality than depression in heterogeneous samples of older people and when the measurement of depression is categorical but that (b) continuously measured psychological adjustment variables may be stronger long-term predictors of mortality in relatively homogeneous samples of nursing home residents. The effects of psychological adjustment on mortality may emerge only in samples that are not swamped with variations in physical health and cognitive functioning.

This interpretation is supported by parallel findings for activity level and mortality in older adults. In community samples physical health is a stronger predictor of mortality than activity level (Lee & Markides, 1990), but in institutional samples activity level is a stronger predictor of mortality than physical health (Stones et al., 1989). A comparison of our findings with those of Stones et al. also is informative. They found that activity level was a stronger predictor of mortality than self-reported happiness. We did not measure activity level, but we did find that psychological adjustment variables focusing on self-evaluation (self-esteem and depression) were stronger predictors of mortality than life satisfaction and meaning in life. It would therefore be interesting to determine how self-evaluation variables compete with activity level in further research.

It also is important to identify the mediating pathways to mortality taken by psychological adjustment. The pathway from psychological states to immunocompetence to serious health outcomes is considered controversial and unproved (Adler & Matthews, 1994; S. Cohen & Herbert, 1996; Herbert & Cohen, 1993; Maier et al., 1994). The effect of psychological adjustment on mortality may instead be mediated by the effects of psychological adjustment on health-related behavior and activity levels. Stones et al. (1989) found that happiness was itself a predictor of activity level and that the effects of self-evaluations on activity levels may be even stronger. Feeling good about oneself may lead to better self-care and to longevity-promoting activity levels in individuals who might otherwise give up and waste away.

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