

The Role of Psychological Well-being in All-Cause Mortality
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ABSTRACT

A plethora of research demonstrates that negative affect and depression are related to mortality in clinical and non-clinical samples. Evidence of an association between positive well-being and mortality is more limited. The present study investigated whether positive and negative well-being independently predicted mortality differentials in a non-Western population based sample of 5,307 older adults (aged 50-103). During the follow-up period of ten years (1996 – 2006), there were 1,684 deaths recorded. Higher life satisfaction significantly predicted lower risk of mortality after controlling for age, sex, education, marital status and health status. Depressive symptoms significantly predicted higher risk of mortality. A significant interaction with age revealed that the protective effect of life satisfaction diminished at the oldest ages. Our results provide support for independent effects of positive and negative well-being on mortality in older adults.

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BACKGROUND

Negative affect and depression have been linked to mortality in both clinical (Barth, Schumacher, & Herrmann-Lingen, 2004; Faller & Schmidt, 2004; Goodwin, Zhang, & Ostir, 2004) and non-clinical samples (Anda et al., 1993; Blazer & Hybels, 2004; Bruce, Leaf, Rozal, Florio, & Hoff, 1994; Fredman et al., 1989; Ganguli, Dodge, & Mulsant, 2002; Glassman & Shapiro, 1998; May et al., 2002; Penninx et al., 1999; Penninx et al., 2001; Wilson, Bienias, Mendes de Leon, C.F., Evans, & Bennett, 2003). Fewer studies have examined the protective role of positive well-being in the risk of mortality (Fredrickson, 2001; National Research Council, 2001; Pressman & Cohen, 2005; Salovey, Rothman, Detweiler, & Steward, 2000). Research incorporating measures of both positive and negative well-being as independent predictors of mortality is even more limited despite evidence suggesting that positive affect is not the absence of negative affect, and has distinct physiological and neurobiological correlates (Cacioppo & Gardner, 1999; Cacioppo, Gardner & Berntson, 1999; Hamer, 1996; Ryff et al., 2006).

OBJECTIVES: To test whether aspects of psychological well-being—life satisfaction and depressive symptoms—are independent predictors of mortality in a non-Western sample of older adults.

DATA AND METHODS

The data come from a nationally-representative sample of older adults in Taiwan who participated in the Survey of Health and Living Status of the Near Elderly and Elderly. The elderly cohort comprises 4,049 respondents who were first interviewed in 1989; in 1996, a cohort of 2,462 near elderly respondents was added. Follow-up interviews were conducted with both cohorts in 1999 ($n = 4,439$; 90% of survivors) and 2003 ($n = 3,779$; 92% of survivors). Survival status (as of April 20, 2006) and date of death was verified by linking the survey data to the Household Registration file constructed by the Taiwanese Ministry of Interior. The analysis sample comprises 5,307 survivors at the time of the 1996 survey, 1,684 of whom died by April 20, 2006 (1,018 men and 666 women). Decedents were observed an average of 4.7 years (range 0.01 - 9.9) prior to their death, whereas those who survived to 2006 were followed for an average of 9.2 years (range 2.2 - 10.0).

We used a piecewise exponential proportional hazards model to predict mortality during 1996-2006. Three separate models were estimated in order to examine the effects of the positive and negative well-being variables individually and then simultaneously. Life satisfaction represented positive well-being, and negative well-being was captured by the CES-D. Both life satisfaction and the CES-D were time-varying covariates. Life Satisfaction was measured using eight items adapted from Neugarten's Life Satisfaction Scale (Neugarten, Havighurst & Tobin, 1961) and modified for use with Taiwanese respondents (0 = Low life satisfaction and 8 = High life satisfaction). Depressive symptoms were measured using 10 items from the Center for Epidemiological Studies Depression Scale (CES-D) with a possible range of 0 to 30). Control variables included fixed covariates (sex and educational attainment as of 1996) as well as time-varying measures of age, marital status, self-assessed health, chronic conditions, cognitive impairment, functional limitations, and smoking status. For each year of age, we evaluated whether death occurred and the length of exposure. For other time-varying covariates, the values

at a given observation year (1996, 1999, 2003) were used to predict mortality between that wave and the next wave. Persons who were lost-to-follow-up (LFU) or missing data for a given survey did not contribute exposure for the period between waves in which they did not have valid data.

We also explored interactions between the psychological well-being variables and measures of age, sex and prior health status. Interaction terms that were statistically significant ($p < .05$) were retained in the final model.

RESULTS

The relative risk (RR) ratios are presented in Table 2. After adjusting for sociodemographic and health risk factors, we found that life satisfaction and depressive symptoms had significant effects. Depressive symptoms were related to higher risk of mortality, whereas higher levels of life satisfaction predicted lower risk of mortality, but only at younger ages; a significant interaction with age suggests that life satisfaction has little effect on the risk of mortality at the oldest ages. For example, a one point increase in life satisfaction was associated with a 14% reduction in the risk of mortality for a person aged 50 ($RR = .674 * 1.005^{50} = 0.86$), but had no effect for someone aged 80 ($RR = 1.00$).

CONCLUSION

Our results provide support for independent effects of positive and negative well-being on mortality in older adults.

TABLES

Table 1. Sociodemographic Characteristics and Health Status of the Study Population

	1996	1999	2003
Fixed Baseline Characteristics			
Female, %	46.0		
Education, years, mean \pm SD	4.73 \pm 4.56		
Time Varying Covariates			
Age, years, mean \pm SD	65.71 \pm 9.14		
Married, %	71.9	69.3	67.0
Poor Self-assessed Health (1-5), mean \pm SD	2.80 \pm 1.11	2.86 \pm 1.08	2.92 \pm 1.07
Chronic Conditions (0-12), mean \pm SD	1.50 \pm 1.56	1.46 \pm 1.48	2.16 \pm 1.79
Cognitive Impairment (0-11), mean \pm SD	6.65 \pm 2.57	6.82 \pm 2.60	7.44 \pm 2.37
Currently Smoking, %	27.2	24.9	20.4
Functional Limitations (0-8), mean \pm SD	1.10 \pm 1.97	1.48 \pm 2.22	1.77 \pm 2.30
Life Satisfaction (0-8), mean \pm SD	5.05 \pm 2.05	5.17 \pm 2.56	5.30 \pm 2.48
Depressive Symptoms (0-30), mean \pm SD	5.76 \pm 6.07	5.39 \pm 6.09	5.26 \pm 5.79
Number of respondents observed at a given wave	4611	3959	3401

Table 2. Relative Risk Ratios from Piecewise Exponential Hazard Models Relating Life Satisfaction and Depressive Symptoms to Mortality

Predictors [†]	Life Satisfaction		CES-D		Full Model	
	RR	P Value	RR	P Value	RR	P Value
Fixed Baseline Characteristics						
Female	.484	<.001	.482	<.001	.478	<.001
Education	1.006	.444	1.007	0.346	1.005	.483
Time Varying Covariates						
Control Variables						
Age	1.040	<.001	1.080	<.001	1.040	<.001
Married	.868	.036	.873	0.044	.876	.050
Poor Self-assessed Health	1.258	<.001	1.223	<.001	1.235	<.001
Chronic Conditions	1.020	.274	1.020	0.289	1.019	.324
Cognitive Impairment	1.044	.002	1.044	0.002	1.042	.004
Functional Limitations	1.165	<.001	1.156	<.001	1.156	<.001
Currently Smoking	1.176	.028	1.168	0.035	1.178	.027
Psychological Well-Being						
Life Satisfaction	.656	<.001			.674	<.001
Life Satisfaction x Age	1.005	<.001			1.005	<.001
CES-D			1.152	<.001	1.015	.010
CES-D x Age			.998	<.001	---	---

[†] We also included a control for period effects (i.e., a continuous variable indicating the calendar year in which the respondent completed a given age) in all three models; Interaction terms that were statistically significant ($p < .05$) were retained in the final model.

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