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Are Life Satisfaction and Optimism Protective of Health Among Older Adults?

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Abstract

This study examined associations among life satisfaction, optimism and mobility restrictions in a population based sample of 3,363 older persons from the Survey of Health and Living Status of the Near Elderly and Elderly in Taiwan. Zero-inflated Poisson regression was used to determine if life satisfaction and optimism were independently related to the number of mobility restrictions that developed during an approximately 8-year period. We adjusted for sociodemographic characteristics, health status and depressive symptoms at baseline. Life satisfaction and optimism were both associated with the development of fewer mobility restrictions during follow-up, but only for those participants who had zero mobility restrictions at baseline. The results suggest a protective relationship between aspects of psychological well-being and physical decline in later life.

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Introduction

Researchers are increasingly attentive to the role that positive mental health plays in physical health outcomes. Positive mental well-being is not the absence of negative well-being, and has distinct physiological and neurobiological correlates (Hamer, 1996; Ryff et al., 2006; Tomarken, Davidson & Henriques, 1990; Tomarken, Davidson, Wheeler & Doss, 1992; Wheeler, Davidson & Tomarken, 1993). Thus, the causes and consequences of positive well-being cannot necessarily be inferred from research on negative well-being (Ryff et al., 2006).

The term positive mental well-being is often used to reflect the experience of frequent positive affect, which refers to both stable and trait-like feelings such as happiness, joy, excitement, enthusiasm and contentment (Pressman & Cohen, 2005); infrequent negative affect; self-esteem; mastery; life satisfaction and optimism. Positive affect is recognized as a protective factor against poor health, independent of negative affect, in young and older populations (Fredrickson & Levenson, 1998; Fredrickson, 2001; Ostir, Markides, Black, & Goodwin, 2000; Ostir, Markides, Peek, & Goodwin, 2001; Ostir et al., 2002; Ostir, Berges, Markides, & Ottenbacher, 2006; Scheier & Carver, 1992). For example, Ostir et al. (2000; 2004) found that older adults with high positive affect were half as likely as adults with low positive affect to have died or to have acquired restrictions in mobility or functional status two and seven years later in the presence of controls for baseline functional physical status, lifestyle indicators (e.g., smoking, drinking), and baseline negative affect scores. Ostir, Markides, Peek and Goodwin (2001) discovered that positive affect at baseline was associated with lower incidence of stroke over a 6-year follow-up, especially for men, in the presence of adjustments for sociodemographic variables, health and baseline negative affect.

Other aspects of positive well-being, including appraisals of life satisfaction and optimism, have also been shown to be related to health in western populations (Koivumaa-Honkanen et al., 2000; Koivumaa-Honkanen, Honkanen, Koskenvuo, Viinamaki, & Kaprio, 2002; Koivumaa-Honkanen et al., 2004; Scheier & Carver, 1992; Scheier et al., 1989; Scheier et al., 1999). Life satisfaction typically refers to quality of life judgments that are based on individuals' own criteria for success and happiness (Pavot, Diener, Colvin, & Sandvik, 1991; Shin & Johnson, 1978). Life satisfaction measures vary in their composition, but generally, they tap trait levels of affect as well as cognitive assessments of the extent to which a person's life matches his or her expectations (Okun & Stock, 1987). Characteristic items ask respondents to reflect on how their lives compare to their ideals, whether or not they find their lives interesting, how satisfied they are with their lives, and whether or not they would change anything about their lives.

Numerous researchers have demonstrated that health impacts life satisfaction ratings (e.g., Diener, Suh, Lucas, & Smith, 1999; Mroczek & Spiro, 2005), but the protective role that life satisfaction may play in health and survival has only recently been examined. Koivumaa-Honkanen et al. (2000) found that life dissatisfaction was a predictor of fatal injury during a 20-year follow-up (Koivumaa-Honkanen et al., 2002). Life satisfaction scores also predicted work disability in an 11-year follow-up (Koivumaa-Honkanen et al., 2004). Koivumaa-Honkanen et al. (2002) found that life satisfaction exerted a significant effect on all cause mortality in the presence of controls for baseline health in a 15-year prospective cohort study of Finnish adults. In their study, life satisfaction predicted male disease mortality and injury mortality (even after eliminating suicides) but did not predict mortality in women. Thus, several studies have

demonstrated that positive affect and life satisfaction are related to disability and survival over time.

Evidence suggests that optimism, an affective judgment about the future, also contributes to better physical health. In a study of perioperative physiologic reactions to coronary artery bypass surgery, optimists were significantly less likely than their counterparts to experience myocardial infarction during surgery (Scheier et al., 1989). Optimists also recovered more quickly during post-surgery: they were faster to accomplish mobility tasks (e.g., sitting in bed, walking around the room), were rated by staff as demonstrating a better recovery 6-8 days and 6-months after surgery, and showed better physical health status up to 5 years later (Scheier & Carver, 1992; Scheier et al., 1989). In a study of women with abnormal Pap smears, the level of severity of atypical neoplastic growth of the cervix was assessed during a follow-up visit. Optimistic attitudes assessed at baseline were significantly related to less severe abnormality (Antoni & Goodkin, 1988). In a different study of healthy, middle-aged women, optimistic women were less likely to develop intima media thickness (IMT), an early indicator of atherosclerosis, at 10 and 13 years of follow-up (Matthews, Raikkonen, Sutton-Tyrrell, & Kuller, 2004). Giltay, Geleijnse, Zitman, Hoekstra, and Schouten (2004) found that optimism predicted lower all-cause and cardiovascular mortality for men and women. These studies suggest that optimism may be beneficial for both clinical and non-clinical populations.

A strong theoretical framework for why positive mental well-being is related to health has not yet been developed, but there are several lines of research demonstrating the pathways through which optimism and life satisfaction may be beneficial to health. People who are optimistic tend to use active, problem-focused coping and are more accepting of stressful life events, while pessimists are more likely to use escapism and denial (Scheier & Carver, 1992).

Similarly, people who appraise their life satisfaction positively may have better coping abilities. For example, life satisfaction may reveal how well one has adapted or learned to cope with one's health status and environment (Folkman, 1997; Fredrickson, 2001). Higher life satisfaction can also be an indication of how easily an individual disengages from unattainable goals and re-engages in new, more attainable goals (Rasmussen, Wrosch, Scheier & Carver, 2006). This strategy would be vital to coping with health conditions, such as restricted mobility or chronic disease, which may render valued life goals impossible.

Fredrickson (2001) and Salovey, Rothman, Detweiler & Steward (2000) have independently suggested that positive emotions and cognitive styles contribute to the building of resources that promote resilience. Positive feelings can broaden individuals' coping abilities by facilitating the gain of social, intellectual, and physical resources (Fredrickson, 2001). For example, positive affect increases engagement in social networks and activities, which have been shown to be negatively associated with illness and mortality (Pressman & Cohen, 2005). Positive affect is associated with confidence in and adherence to health practices (Bardwell, Berry, Ancoli-Israel, & Dimsdale, 1999; Cohen, Doyle, Turner, Alper, & Skoner, 2003; Luoto, Prattala, Uutela, & Puska, 1998; Ryff, Singer, & Dienberg Love, 2004; Salovey, Rothman, Detweiler, & Steward, 2000; Scheier & Carver, 1992), particularly focusing on and planning for future health outcomes (Salovey et al., 2000).

Another theory for why frequent positive experiences may be favorable for health is based on research demonstrating that positive emotions are linked to physiologic reactions. Positive affect is associated with physiological functioning, including autonomic nervous system activation, hypothalamic-pituitary-adrenal (HPA) axis activation, changes in cardiovascular response and immune function (see Pressman & Cohen, 2005 for a review). Still, it is unclear

how subtle changes in these systems might contribute to wellness over time. On the other end of the spectrum, negative emotions and chronic stress may exacerbate illness through neuroimmune and neuroendocrine deficiencies that increase vulnerability to disease (Heim, Ehlert & Hellhammer, 2000; McEwen & Stellar, 1993; Segerstrom & Miller, 2004). Positive emotions can "undo" the immediate effects of negative emotions by reducing psychophysiological reactivity and enhancing coping when individuals are confronted with negative events (Fredrickson & Levenson, 1998; Pressman & Cohen, 2005; Shapiro, Jamner, Goldstein, & Delfino, 2001; Tugade, Fredrickson, & Barrett, 2004). In sum, frequent positive experiences may create more favorable physiological profiles.

Few of the studies described above have used population based samples, and none, to our knowledge, has been based on a non-western population. In this study, we used data from the Survey of Health and Living Status of the Near Elderly and Elderly in Taiwan to test whether life satisfaction and optimism protected older adults from increased mobility restrictions, an indicator of health and physical functioning, over an approximately 8-year period. We included both life satisfaction and optimism in our statistical analyses, because it is unclear from existing research how much these constructs overlap in their prediction of health. We adjusted for health status and social connectedness at baseline, both of which are related to the development of mobility restrictions. We also included baseline depressive symptoms in order to examine the benefits of life satisfaction and optimism independent of negative affect. Few studies of the relationship between positive mental well-being and health include controls for baseline negative affect (Pressman & Cohen, 2005). Given the evidence from previous prospective studies on life satisfaction, optimism and health (Koivumaa-Honkanen et al., 2000; Koivumaa-Honkanen et al., 2002; Koivumaa-Honkanen et al., 2004; Ostir et al., 2000; Ostir et al., 2001; Ostir, Ottenbacher,

& Markides, 2004; Ostir et al., 2006), and the distinctiveness of these well-being constructs (Scheier & Carver, 1992), we anticipated that life satisfaction and optimism would independently contribute to the number of mobility restrictions in our sample.

Method

Participants

The sample included participants from the longitudinal Survey of Health and Living Status of the Near Elderly and Elderly in Taiwan. The first wave of data collection began in 1989 with a nationally representative sample of 4,049 persons aged 60 and older and an additional national sample of 2,642 near-elderly persons aged 50 to 66 in 1996. Respondents have been interviewed at approximate three-year intervals since the initial interview date. The current study relied primarily on data from the 1996 and 2003 interviews, which involved a follow-up period of 7.8 years. Of the 3,778 completed interviews in 1996 and 2003, 3,363 respondents (89%) had data on all of the variables included in our model. Approximately 321 of the 415 missing cases (77%) were due to the use of proxy respondents, who were not asked any subjective questions (e.g., self-assessed health or depressive symptoms).

Measures

Mobility Restrictions included the number of mobility activities for which the respondent had any difficulty (potential range was 0 to 8). These activities include standing for 15 minutes, squatting, reaching over one's head, grasping with fingers, lifting/carrying 11-12 kilograms, running 20-30 meters, walking 200-300 meters, and climbing 2-3 flights of stairs. A variable denoting mobility restrictions in 1996 was included as a baseline health control.

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) (Cronbach's alpha = .79).

Optimism was measured using the question, "Do you expect that in the future happy things will occur?" (1 = Yes; 0 = No).

Sociodemographic controls included age, respondent's sex (1 = Female; 0 = Male), marital status (1 = Spouse or companion; 0 = Neither), and years of schooling completed (from the 1989 interview for the elderly sample and from the 1996 interview for near elderly). We also included two variables measuring social connectedness and involvement that are known to be related to health outcomes and positive well-being, specifically (1) the total number of reported ties with children, close relatives, and close friends with which the respondent has monthly contact, and (2) the number of social activities in which the respondent participates (potential range of 0 to 11).

Baseline health controls included depressive symptoms (10 items from the Center for Epidemiological Studies Depression Scale (CES-D) with a possible range of 0 to 30) (Cronbach's alpha = .82) and cognitive impairment (the number of cognitive tasks that the respondent answered incorrectly out of a possible 11). Cognitive impairment was based on items from the modified Rey Auditory Verbal Learning Test (Lezak, 1983) and a modification of the Digits Backward Test (Wechsler, 1981). We also included one question that asks respondents to rate their overall health in one of five categories (1 = Excellent; 5 = Poor), which we refer to as self-assessed health ("Regarding your current state of health, do you feel it is excellent, good, average, not so good, or poor?"). Finally, we included smoking status (1 = Yes; 0 = No) and the number of chronic conditions the participant reported among the following conditions: high blood pressure, diabetes, heart disease, cancer, respiratory ailments, arthritis, ulcers, liver or gall bladder disease, cataracts, kidney disease, gout, or spinal injury (potential range of 0 to 12).

Statistical Analysis

The data were analyzed using a form of Poisson regression because the outcome variable, mobility restrictions, was a count variable. Specifically, we used zero-inflated Poisson regression in order to correct for the large number of participants who reported no mobility restrictions at baseline and follow-up (70% in 1996 and 45% in 2003) (Goldman, Turra, Glei, Lin, & Weinstein, 2006; Long & Freese, 2006). The model uses two equations: one is a logit model that predicts membership in a latent class that is at risk of experiencing mobility limitations (the "inflate" equation); and the other is a Poisson model that predicts the number of mobility limitations for those at risk. Although the inflate equation is typically modeled by predicting those *not* at risk (Cheung, 2002), we have chosen to model the complementary outcome to facilitate comparisons with the Poisson equation. In our models, variables that increase the probability of being at risk generally increase the expected number of limitations for those at risk, so the coefficients in the two equations tend to have the same signs.

The outcome variable was the number of mobility restrictions, which was assessed during the 2003 interview. The predictors of interest were life satisfaction and optimism assessed in 1996. We included control variables that are related to health outcomes and positive mental well-being, including age, sex, education, baseline health status, marital status, number of social ties and number of social activities. Previous prospective studies found that positive emotional well-being influenced health outcomes in samples that were healthy at baseline (Koivumaa-Honkanen et al., 2000; Koivumaa-Honkanen et al., 2002; Ostir et al., 2000; Ostir et al., 2004). In order to investigate whether or not the results would be the same regardless of health status at baseline, we included an interaction term between life satisfaction and whether or not the respondent had mobility restrictions at the baseline interview in 1996. For similar reasons, we

included an interaction term between optimism and whether or not the respondent had zero mobility restrictions in 1996. To facilitate interpretation of the regression coefficients for life satisfaction and optimism, we estimated two zero-inflated regression models: model (a) includes only the main effects of the covariates and model (b) adds the two interaction terms described above to model (a). The data were analyzed using Stata 9.0 (StataCorp, 2005).

Results

The sociodemographic characteristics and health status of the study population are shown in Table 1. Respondents reported an average life satisfaction score of 5.2 (*SD* = 2.0) out of 8 and 79.3% of the sample reported an optimistic view of the future. As expected with an older sample, the average number of mobility restrictions increased from 0.8 to 2.0 over the follow-up period.

Table 2 presents the coefficients and standard errors for the zero-inflated Poisson models. In model (a), the significant social, demographic and health covariates have signs in the expected direction. For example, in the inflate part of the model, being older, female, having lower education, and having worse health status at baseline were significantly associated with being a member of the latent class at risk of mobility limitations; in the Poisson part of the model these same covariates were significantly associated with a larger number of mobility limitations. Life satisfaction was not significantly related to being at risk for mobility restrictions, but lower life satisfaction was associated with a higher number of mobility restrictions for those at risk. Optimism was not associated with either being at risk or the number of restrictions. The Poisson part of model (b) reveals that both interaction terms were significant: life satisfaction and optimism were significantly related to number of mobility restrictions, but only for those participants who had zero mobility restrictions at baseline. Among those with no restrictions at

baseline, an increase in life satisfaction from the lower to the upper quartile of the distribution of life satisfaction scores (scores of 4 and 7 respectively) was associated with a 9% decline in the number of mobility restrictions at follow-up. Optimistic respondents with zero mobility restrictions at baseline also experienced 9% fewer mobility restrictions than their non-optimistic counterparts. In addition, being older, female, a smoker, and having lower education significantly predicted a higher number of mobility restrictions at follow-up. Not surprisingly, previous health status, including mobility restrictions, cognitive impairment, and self-assessed health contributed to the number of mobility restrictions in the expected direction at follow-up. Depressive symptoms did not significantly predict number of mobility restrictions with adjustments for life satisfaction and optimism.

[Tables 1 & 2 about here]

Discussion

In our initial model, we found that life satisfaction, but not optimism, was significantly related to the number of mobility restrictions at the end of the approximately 8-year follow-up period. However, the relationships were more nuanced when we introduced interaction terms reflecting functional status at baseline. Both life satisfaction and optimism were predictive of the number of mobility restrictions at follow-up for respondents who had zero mobility restrictions at baseline. The relationships were significant in the presence of controls for mental and physical health status, social involvement, and sociodemographic characteristics.

Our findings are consistent with those from other prospective studies finding associations between positive well-being and disability in healthy samples. For example, Ostir et al.'s (2000) sample included only respondents who could complete a walking task and had no difficulty with activities of daily living at baseline. They found a relationship between positive affect scores

and mobility, functional status, and survival two years later. Similarly, Ostir et al. (2004) found a significant relationship between positive affect and frailty in their sample of non-frail older adults. In Koivumaa-Honkanen et al.'s (2004) study of life satisfaction and work disability, life dissatisfaction predicted psychiatric sources of work disability in the portion of their sample classified as "ill" at baseline, whereas life dissatisfaction predicted both non-psychiatric and psychiatric causes of work disability for those classified as "healthy" at baseline. Koivumaa-Honkanen et al. (2000) included only those who were free of chronic disease at baseline in their study demonstrating a relationship between life dissatisfaction and mortality.

Given the multiple pathways through which positive emotions may affect health, our findings raise the question of why life satisfaction and optimism would be associated with health in the long-term only for those who are relatively healthy at baseline. One possibility is that life satisfaction and optimism are beneficial up to a certain threshold of health, at which point, other, stronger influences come into play. For example, life satisfaction and optimism may improve adherence to medical regimens and behaviors for those with no mobility restrictions (e.g., better sleep, diet, exercise), which would reduce the number of mobility restrictions they develop, whereas the presence of mobility restrictions at baseline may disrupt adherence to health practices. Similarly, if positive emotions improve one's physiological profile over the long-term, it would be difficult for these subtle changes to have much of an impact after other negative physiological events have accumulated to the point of disability or disease. Presumably, positive emotions can only prevent or "undo" so much of the cumulative damage that has already taken place.

There is also some evidence that high positive affect is dysfunctional in populations with chronic illness, because those high in positive affect and optimism may not take their illnesses

seriously (Brown et al., 2000; Derogatis, Abeloff, & Melisaratos, 1979; Devins et al., 1990). Reporting high life satisfaction and optimism in the face of a high number of mobility restrictions may indicate denial or suppression of the seriousness of one's disability. In our sample, there were 35 individuals with four or more mobility restrictions who reported very high life satisfaction (a score of 7 or 8). Of these 35 respondents, 31 said they were optimistic about the future. This suggests that either these are extraordinarily psychologically resilient individuals, or that these particular respondents are using denial as a coping mechanism. A sufficient number of individuals in denial included in our analysis could suppress positive relationships among life satisfaction, optimism and health for respondents with mobility restrictions at baseline.

There are limitations in this study that should be carefully considered. First, we used a single question to measure optimism, which was not validated against the Life Orientation Test (Carver & Scheier, 2003), a reliable measure of dispositional optimism. The use of one question may have limited our ability to measure trait-level optimism. Second, we must consider the possibility that despite our careful inclusion of control variables, the associations we observed may be the result of reverse causation, that is, that respondents' health status influenced their reports of life satisfaction and optimism. Although we reduce this possibility by including baseline health measures, we cannot entirely remove this bias. Finally, it is well-established that affect influences self-reports of health (Diener et al., 1999). Thus, levels of mental well-being may drive respondents to underestimate or overestimate their ability to complete specific mobility tasks, thereby biasing their self-reports of mobility restrictions.

In conclusion, we found that life satisfaction and optimism were determinants of the number of mobility restrictions at an 8-year follow-up for those without mobility restrictions at

baseline, adjusting for sociodemographic factors, baseline health, depressive symptoms and social involvement. Higher life satisfaction and optimism may contribute to better health practices and to better physiological functioning in the longer-term. Life satisfaction and optimism may also indicate the presence of adaptive coping mechanisms. Future research should aim to clarify the multiple pathways through which positive emotions impact health.

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Table 1. *Descriptive Statistics* (*n* = 3,363)

Variable	Mean or percent	SD
Mobility restrictions in 2003 (0 – 8)	2.0	2.5
Covariates Measured at Baseline		
Life Satisfaction (0 – 8)	5.2	2.0
Optimism (1=Yes; 0=No)	79.3%	
Socio-demographic Controls		
Age (54 - 91)	64.1	8.1
Female (1=Yes; 0=No)	48.1%	
Education (years)[a]	4.9	4.6
Marital Status (1=Spouse or companion; 0=Neither)	75.4%	
Social Involvement		
Social activities (0 – 11)	1.6	1.3
Fewer than 8 social ties (1=Yes; 0=No)	10.8%	
Health		
Smoking (1=Yes; 0=No)	26.4%	
# of chronic conditions (0 – 12)	1.4	1.5
Mobility restrictions (0 – 8)	.8	1.6
CES-D (0-30)	5.2	5.7
Cognitive Impairment (0-11)	6.5	2.4
Self Assessed Health (1= Excellent and 5 = Poor)	2.7	1.1

[a] Measured in 1989 for those aged 60 and older and in 1996 for those aged 50 – 66.

Table 2. *Zero-inflated Poisson Regressions of Number of Mobility Restrictions on Life Satisfaction and Optimism (n = 3,363)*

Covariates measured at baseline	**Model (a)**				**Model (b)**			
	Inflate		**Poisson**		**Inflate**		**Poisson**	
	b	*SE*	*b*	*SE*	*b*	*SE*	*b*	*SE*
Intercept	-6.431**	.529	-.443**	.162	-6.427**	.534	-.300†	.164
Life Satisfaction	.026	.029	-.018*	.008	.088†	.046	-.011	.009
Optimism	-.043	.114	-.027	.031	-.250	.247	.016	.038
Life Satisfaction x Zero mobility restrictions					-.073†	.043	-.020*	.009
Optimism x Zero mobility restrictions					.269	.261	-.105*	.053
Age	.087**	.006	.019**	.002	.088**	.006	.018**	.002
Female	.809**	.117	.095**	.035	.811**	.118	.073*	.035
Education	-.027*	.011	-.010**	.004	-.027*	.011	-.010*	.004
Married or companion	-.146	.118	.037	.030	-.146	.119	.041	.030

Table 2 continued.

Covariates measured at baseline	**Model (a)**				**Model (b)**			
	Inflate		**Poisson**		**Inflate**		**Poisson**	
# of social activities	-.033	.035	-.004	.011	-.033	.035	-.003	.011
Fewer than 8 social ties	.039	.160	-.016	.039	.031	.159	-.005	.039
Smoking	-.064	.114	.127**	.038	-.062	.114	.124**	.038
# of chronic conditions	.131**	.039	.013	.008	.128**	.039	.008	.008
Mobility restrictions	.500**	.065	.074**	.007	.422**	.083	.052**	.008
Cognitive Impairment	-.002	.019	.022**	.006	.000	.020	.022**	.006
CES-D	.031**	.011	.000	.003	.031**	.011	.000	.003
Self-assessed health	.195**	.051	.041**	.016	.194**	.051	.033*	.016

† $p < .10$; * $p < .05$; ** $p < .01$