Economic strain and well-being in late life: Findings from a 14-year population-based longitudinal study of older adults in Taiwan

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Abstract

Using data from the Taiwan Longitudinal Study on Aging, we estimated the effects of economic strain and economic resources such as income and homeownership on well-being of older Taiwanese adults cross-sectionally and longitudinally. Individual well-being is measured by self-reported life satisfaction, psychological distress, and perceived health status. Results from multivariate regression modeling with the estimates of generalized estimating equations show that older adults who experienced economic strain had poorer well-being in comparison to older adults without strain, both cross-sectionally and over time (p's < 0.01), after adjusting for economic resources, socio-demographic characteristics, physical health, and survival status. By contrast, economic resources were not consistently associated with most measures of well-being in the cross-sectional and longitudinal analyses. These findings suggest a strong, negative, long-term effect of economic strain on well-being among older adults. Interventions to promote well-being among older adults could benefit by addressing economic strain as an important threat to health in later life.

INTRODUCTION

In Taiwan, there is increasing attention from public health and social policy professionals to address the challenges to health and well-being wrought by the rapid growth of the aged population.[1] The number and proportion of older adults in Taiwan continues to increase since 10.7% by 2009, there is growing concern that quality of life does not always accompany increased longevity. Broadly defined, well-being is considered as a self-evaluation of individual lives, and is typically assessed by measures of life satisfaction, psychological distress, and perceived health.[2-4] Previous studies have demonstrated that poor well-being has a negative influence on indicators of physical health, functioning, and quality of life of individuals and their families[5-7] and contributes to the increased risk for mortality.[8, 9]

In studies of Western populations poor health and well-being has been shown to be associated with low income.[10-12] There are many pathways posited through which material factors affects health and well-being, from the influence of poverty in the broader social environment to individual material and resource deprivation.[12-14] Spicker (1999; 2007) defined the concept of poverty as *unacceptable hardship* embedded in material need, economic circumstances, and social relationships. Research examining the effect of experiencing financial difficulties on health and well-being supports the idea that the subjective experience of *economic strain* is related to, but independent of overall financial resources (i.e., income).[15-19] Kahn and Pearlin (2006) have provided evidence that financial strain has a consistent and significant influence on a wide range of health indicators, even after controlling for household income and other socioeconomic characteristics. Using retrospective data from 1,167 older adults, their analyses have further demonstrated sustained financial hardship that had a cumulative negative effect on a number of health outcomes later in life, independent of income.[20]

As of yet, there is not a comparable body of work that investigates the effect of economic strain among older adults in Taiwan. This study, then, seeks to address a need for a longitudinal analysis of both the concurrent and cumulative effects of economic strain on well-being among older adults in a society that has experienced rapid economic development such as Taiwan. The relationship between economic strain and well-being has been understudied among Asian populations which may be differentially influenced by the effects of economic strain and resources at the end of life in comparison to Western populations.[21] The social values of the Taiwanese people emphasize the adequacy of how basic needs are met relative to overall levels of income and wealth. Our analysis begins to explore these issues using a national representative population-based sample of older adults who were surveyed for 14 years to examine longitudinal effects of economic strain, controlling for economic resource such as income and homeownership, socioeconomic status, sociodemographic characteristics, physical health status,

social functioning, and survival status in a multivariate model.

Methods

Data and Sample

We used data from the Taiwan Longitudinal Study on Aging (TLSA), a nationally representative survey designed to study the impact of socioeconomic development on physical and emotional well-being of the older adult population in Taiwan. Data were collected by the Bureau of Health Promotion of the Taiwan Public Health Department from 1989 to 2003. The sample was derived using a multi-stage sampling framework. A total of 4,049 older adults aged 60 and older were interviewed in 1989, with follow-up surveys administered in 1993, 1996, 1999, and 2003. Information on TLSA can be found at www.bhp.doh.gov.tw and details on the TLSA study sample and design pertaining to this analysis are reported in a previous study.[22] For our research purposes, the analytic sample is restricted to the adult respondents aged 65 and older at the baseline interview with complete data on well-being measures. This selection yielded a final analytic sample of 2,247 older adults and these participants were re-interviewed in 1996, 1999, and 2003.

Measures

Well-being was assessed by three self-reported measures: life satisfaction, psychological distress, and perceived health status. The Life Satisfaction Index (LSI) is a 10-item scale adaptation of the original 20-item LSI-A.[23]. LSI statements include: Has your life been better than most people's lives? Are you satisfied with your life? Do you find what you do interesting? Each item was rated on a yes or no, indicating whether the respondents agreed with the statement in respect to their current views or feelings about their life. Responses were reverse scored when necessary so that higher scores represent better life satisfaction [23] and summed; total scores range from 0 to 10. Psychological distress was measured by a 10-item version of the Center of Epidemiological Studies-Depression (CES-D) scale.[24] Each item was rated on a four-point scale, indicating the frequency of experiencing each symptom in the past week. Responses were reverse scored when necessary such that higher scores represent greater levels of depressive symptomatology. Previous analysis of the TSLA data demonstrated two distinct domains in the 10-item CES-D: negative affect and lack of positive affect.[25] Items were thus summed within each of the two domains. The total score on the lack of positive affect domain ranged from 0 to 6 and the total score on the negative affect domain ranged from 0 to 24. Perceived health status is measured on the SF-36 item which asks individuals to rate their health as "poor," "fair," "good," "very good," or "excellent" on a scale of 1 to 5.[25]

Economic strain is a time-varying covariate that was assessed by asking older adults whether they had enough living expenses or experienced a shortage of living expenses. The

original responses ranged from more than enough to very insufficient but the points of the rating scales used varied across waves. Therefore, we used a dichotomous measure of economic strain for consistency where: "insufficient" (i.e., strain) was coded as 1 and "sufficient" (i.e., no strain) was coded as 0.

The primary control measures included indicators of economic resources and socioeconomic status obtained from baseline interviews: **monthly income, home ownership, education level,** and **work status**. Monthly income was categorized into three levels: less than less than 5000, 5000-199999, and 2000 and above. Home ownership was also used as a proxy of economic status and was dichotomized according to whether the individual owned their current residence (coded as 1) or not (coded as 0).

Other control measures included family background, socio-demographic characteristics, health status, and social functioning. Family background comprised of three variables: **marital status**, **number of children** and **family living arrangement**. The former two variables were determined from the baseline responses. The presence of family members in the immediate environment can be a source of both stress and social support for older adults[20, 27] and is also an important feature of Taiwanese culture. Family living arrangement was a time-varying covariate and it contained two categories: living alone and living with extended family members. The socio-demographic controls included **gender** and **ethnicity**, which were determined from the baseline interviews. The time-varying covariates of **age**, **the presence or absence of a limited physical function** and **a chronic disease**, and **social activity participation** were obtained from each wave of interviews. Respondents' physical disability status was measured according to eight items derived from the ADLs and IADLs scales. Respondents were asked if they had difficulty with any of the following eight activities: crouching, standing, stooping, lifting heavy objects, walking, climbing stairs, grasping small objects with their fingers, and taking a bus alone. We dichotomized disability status into those with no functional problems and those with at least one limitation; this was based on prior studies.[28] Chronic illness was a dichotomous measure (yes/no) indicating whether respondents had been diagnosed with one of the following five health problems: hypertension, diabetes, stroke, respiratory disease, and cardiovascular disease. Lastly, older adults were asked whether they ever participated in any one of six types of social activities, namely club, religious, political, retirement, profit, or non-profit social groups, across the four waves.

Data Analysis

Linear regression models are used to estimate cross-sectional and longitudinal associations of perceived economic strain and economic status with well-being. Generalized estimating equations (GEE) with robust standard error estimates are used to take into account within-subject

correlations during the 14-year follow-up period.[29, 30] Estimated associations are described in the form of adjusted coefficients and STATA version 9.0[31] are used to manage and analyze data; the xtgee procedure is for GEE estimation.[32]

Using progressive adjustments, parallel analyses were conducted to estimate cross-sectional and longitudinal associations of perceived economic strain, economic resources, and socioeconomic status for each measure of well-being (i.e., life satisfaction, psychological distress, and self rated health). The analyses began examining the association between perceived economic strain and outcome well-being. We then included economic resource and socioeconomic status variables to determine whether these variables accounted for variation in well-being. Data from the 1989 baseline, 1996, 1999, and 2003 follow-up interviews are assessed simultaneously in all analyses. All cross-sectional models adjusted for age, gender, ethnicity, marital status, living arrangement, number of children, participating in a social activity, presence of a chronic disease or a limited function, whether or not the individual was deceased in 2003, and baseline well-being value. In addition to this set of covariates, all longitudinal models also include previous well-being values. These models are used to examine associations between perceived economic strain, economic status and subsequent well-being.

Results

Sample Characteristics

The characteristics of the analytic sample (N = 2,247) at baseline are shown in Table **1**. The sample was approximately equally distributed by gender. Most of the participants were were between ages 65-74. Overall, this sample indicated a notable amount of disadvantage, with nearly half of the sample reporting being illiterate and earning a monthly income of less than 5,000 NTD (approximately $190 USD). More than half (58%) of the people in the sample owned their home. In terms of social support, the majority of the sample were married at baseline (59%), and a large portion lived with a family member (57%). Overall, this sample reported having large families (e.g., 41% had six or more children). While over half the sample (58%) reported experiencing a functioning limitation, a small portion (16%) indicated that they had been diagnosed with a selected chronic health condition. Most of the sample (63%) did not report participating in any type of community social activity. Of the baseline sample, 70% of the individuals survived to 1996, 57% survived to 1999, and 39% survived to the final (2003) follow-up interview.

Table 1 also shows the results for tests of bivariate differences in the distributions of the sample characteristics by reported economic strain at baseline. Economically strained older adults were *more* likely to report lower education attainment and lower monthly income. Older adults with economic strain were *less* likely to have a larger number of children, be free from

physical disability and to participate in a social activity. Economically strained older adults were more likely to be deceased before 2003. Age, gender, home ownership, marital status and living arrangement did not differ by whether older adults experienced economic strain at the .05 significance level.

[Table **1** Inserted Here]

Cross-Sectional Associations

Table 2 presents multivariate regression results for adjusted cross-sectional associations between economic strain and economic resource with each well-being measures at baseline. For each outcome, well-being decreases significantly as economic strain increased, even adjusting for the effects of economic resources, sociodemographic characteristics, health, and social participation. That is, older adults who reported economic strain perceived lower levels of life satisfaction and health status, and higher levels of psychological distress on both domains in comparison to older adults with no strain. Relative to the effect observed for economic strain, the associations between economic resource (i.e., income and home ownership) were not as strong; in the final multivariate models, only income appeared to have any appreciable positive in predicting life satisfaction. As for the associations of family background variables with concurrent well-being, life satisfaction increased as number of children increased and living alone significantly increased levels of psychological distress on both negative affect and lack of positive affect domains. Lastly, as expected, older adults with a greater sense of well-being (as indicated by greater life satisfaction, fewer depressive symptoms, and better self rated health) were more likely to be among the group that survived to the 2003 data collection.

[Table 2 Inserted Here]

Longitudinal Associations

Table 3 presents multivariate regression results for adjusted longitudinal associations of economic strain with subsequent well-being. Overall, we observed that previous economic strain significantly decreases subsequent well-being. The levels of life satisfaction at the subsequent assessment were significantly lower among older adults with economic strain relative to those who did not ($\beta = -0.54$; $p < 0.001$) after adjusting for prior satisfaction and the other covariates. These findings suggest that the effects of economic strain accumulate over time. It is worth noting that the magnitude of the longitudinal effects we observed were was smaller than the cross-section effects, partially due to the inclusion of prior measures of each outcome, respectively. Life satisfaction and perceived health were affected by baseline levels of monthly income over time. Specifically, the difference was between the highest v.s. lowest income categories. Compared to those with a monthly income of NTD 20,000 and above, older adults

with a monthly income of less than 3,000 had subsequent poorer life satisfaction ($p<0.001$), poorer self rated health ($p<0.05$) and more severe psychological distress on the negative domain ($p<0.05$) over time.

The results on the effects of family background variables on well-being over time differed across the well-being measures. Having larger families significantly increased reported life satisfaction and decreased psychological distress (the negative affect domain) over time. These findings indicate that a large number of children decreased psychological distress in the long-term (but not cross-sectionally). Living alone increased subsequent levels of psychological distress over time. Lastly, older adults with a greater subsequent well-being were more likely to be among the group that survived to the 2003 data collection (p's<0.05).

[Table 3 Inserted Here]

Discussion

To our knowledge, this is the first longitudinal study that examines the relationship between economic strain and a range of indicators of well-being for older adults in Taiwan. We hypothesized that economic strain would predicts well-being over and above the protective effects of economic resources and found that strain was a more potent predictor of well-being at the end of the lifecourse in comparison to overall resources, both cross-sectionally and longitudinally. Our analyses support previous studies demonstrating a robust cross-sectional association between economic strain and well-being.[16, 19, 21] When the data were averaged across all waves of observation, more economically strained older adults reported considerably lower levels of well-being than their counterparts. The association was consistent across all four measures of well-being, suggesting that economic strain affects a relatively broad spectrum of well-being. The results from the adjusted longitudinal analysis further demonstrates that the harmful effect of earlier economic strain accrues over time, indicating that economic strain is cumulatively associated with declining well-being in later life.

Our results demonstrated that income is less consistently predictive of well-being than economic strain. When controlling for previous economic strain, prior well-being, individual demographic characteristics, health measures, and other socioeconomic status, older adults with lower income tended to have poorer subsequent life satisfaction and self rated health as well as more subsequent depressive symptoms on the negative affect domain. This corroborates other evidence of a positive association between income and self-rated health in a population-based study of Asian Americans aged 18 and older.[21] However, when concurrent economic strain, baseline well-being, and other covariates are considered, the effects of income are rendered non-significant across all four concurrent well-being measures over time. Taken together, our

results suggest that economic strain, rather than income and economic resource alone, may contribute to poorer well-being for older adults in Taiwan. This relationship has not been well-explored, particularly in Asian samples, and therefore this analysis represents an important first step in examining multiple aspects of socioeconomic status and poverty from a longitudinal perspective.

Overall, our findings suggest a causal path between of economic strain and declining well-being in later life. However, an important issue is reverse causation. Using longitudinal data, we examined well-being (controlling for prior well-being) as a function of economic strain at the prior survey. We also adjusted for various indicators of physical and mental health status to reduce the likelihood that the observed relationship between economic strain and well-being was spurious. While this analytical strategy intends to establish a causal link of economic strain to well-being, reciprocal causation could arise from a process of multiple system strain. That is, decline in well-being leads to economic strain, which in turn accelerates decline of well-being. In a separate analysis, we further restricted the sample who reported their health as fair and better or whose baseline well-being was above 50 percentile. Economic hardship was still a significant predictor of subsequent well-being decline among the selected sample.

Although our research provides new information via a longitudinal analysis regarding economic strain, economic resources, and well-being for older adults, this work is not without constraints. First, well-being as measured by the LSI, CES-D, and self rated health is is subject to recall bias. Second, the assessment of other important covariates to predict relationships between economic strain and well-being is limited by the use of existing data in the TLSA, which lacks measures of related constructs such as financial support. Third, we assessed the effects of economic status measured at baseline. The variable of income is likely to have changed over the 14-year period of study for older adults. Even though we included home ownership as another indicator of economic status in the analysis, it remains limited to understand the effect of income. Fourth, this analysis covered a 14year period, but it was obtained on a series of combined periods. The problem with measuring well-being decline over longer periods of time is that there is greater risk of attrition due to mortality, particularly for older adults. We included the variable of survival status in the analysis and found that survivors had significant higher levels for all four well-being measures.

In summary, our analysis builds upon and extends previous studies of well-being in older adults, providing convincing evidence of the cumulative effect of economic strain: economic strain appears to be harmful to concurrent and subsequent well-being. The findings imply that programmatic strategies aimed at promoting elder’s well-being should consider the issue of financial hardship experienced by some elders as a possible risk factor to health and well-being

in later life.

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Table 1. Univariate description of baseline sample characteristics of the Taiwan Longitudinal Study on Aging (TLSA), 1989 (n=2,247) and bivariate differences by economic strain.

	Baseline distribution (%)	Economic strain		
		Yes	No	
Gender				
Female	45.35	23.26	76.74	
Male	54.65	21.17	78.83	
Age (years)				
65-74	74.86	21.94	78.06	
75-84	22.92	22.91	77.09	
≧85	2.23	20.00	80.00	
Ethnicity				*
Fukianese	64.31	23.46	76.54	
Hakka	15.31	17.15	82.85	
Mainlander	20.38	21.62	78.38	
Education				***
Illiterate	47.59	27.09	72.91	
Incomplete primary education	15.97	26.54	73.46	
Completed primary education	20.16	15.49	84.54	
High school graduate and above	16.28	11.23	88.77	
Work status				
No work	53.21	21.67	78.33	
Full- or part-time work	20.12	21.90	78.10	
Assisting family	26.67	23.21	76.79	
Monthly income in NTD				***
<5,000	48.89	28.07	71.93	
5,000-19,999	41.44	19.17	80.83	
20,000 & +	9.66	4.67	95.33	
Home ownership				
None	41.74	22.46	77.54	
Owned	58.26	21.64	78.36	
Marital status				
Married	59.11	21.18	78.82	
Widowed	34.70	22.72	77.28	
Separated/divorced/never married	6.19	28.60	71.40	
Living alone				
None	57.28	21.35	78.65	
Yes	42.72	23.37	76.63	
Number of children				***
0-3	28.99	28.71	71.29	
4-5	29.86	21.29	28.71	
≧6	41.15	17.22	82.78	
Physical disability				***
None	42.50	15.81	84.19	
Any of eight selected limited functions	57.50	26.78	73.22	
Chronic disease				***
None	84.02	23.57	76.43	
Any of five selected chronic diseases	15.98	14.48	85.52	
Social activity participation				*
None	62.97	23.75	76.25	
Any of six types of social activity	37.03	19.35	80.65	
Survival status in 2003				*
Deceased in 2003	61.33	24.09	75.91	
Alive until 2003	37.12	19.06	80.94	
Data missing	1.56	17.14	82.86	

$^{*}p<0.05$; $^{**}p<0.01$; $^{***}p<0.001$

Table 2. Adjusted **cross-sectional associations** of subjective economic strain and economic status with life satisfaction, psychological distress, and self rated health, TLSA 1989-2003

	Life Satisfaction		**Psychological Distress**				**Self-Rated Health**	
			Negative Affect		Lack of Positive Affect			
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
	Coeff (SE)	Coeff (SE)	Coeff (SE)	Coeff (SE)	Coeff (SE)	Coeff (SE)	Coeff (SE)	Coeff (SE)
Economic strain								
Concurrent economic strain (ref=no)	-1.45(0.08)***	-1.36(0.08)***	1.86(0.13)***	1.84(0.14)***	0.68(0.07)***	0.64(0.07)***	-0.29(0.03)***	-0.28(0.03)***
Baseline economic resource								
Monthly income in NTD (ref=<5,000)								
5,000-19,999		0.03(0.08)		0.03(0.13)		-0.03(0.06)		0.01(0.03)
20,000 & +		0.26(0.12)*		-0.14(0.22)		-0.20(0.10)		0.03(0.05)
Home ownership (ref=no)		0.03(0.07)		-0.02(0.13)		-0.03(0.06)		-0.03(0.03)
Socioeconomic status								
Education (ref=illiterate)								
Incomplete primary education		0.11(0.10)		-0.28(0.19)		-0.17(0.09)		0.03(0.04)
Completed primary education		0.36(0.10)***		-0.25(0.17)		-0.26(0.08)**		0.02(0.04)
High school graduate and above		0.32(0.12)**		-0.25(0.21)		-0.19(0.10)		0.10(0.04)*
Work status (ref=no work)								
Full- or part-time work		-0.11(0.09)		0.15(0.16)		-0.17(0.08)*		-0.05(0.03)
Assisting family		-0.02(0.09)		-0.13(0.15)		-0.11(0.07)		0.06(0.03)
Survival status								
Deceased in 2003 (ref=Alive)	-0.12(0.07)	-0.08(0.07)	0.32(0.12)**	0.30(0.13)**	0.46(0.06)***	0.41(0.07)***	-0.05(0.03)*	-0.05(0.03)
Comparison of Model 2 to Model 1								
Chi-square		224.81***		25.76***		6.37		51.67***
Degree of freedom		8		8		8		8

Note: All models adjusted for age (age for life satisfaction; age and age square for self rated health and psychological distress), gender, ethnicity, presence of disease, ADL/IADL, participating in social activities, number of close friends/neighbors with at least weekly contact, baseline values of life satisfaction, psychological distress, and self rated health.

*p<0.05; **p<0.01; ***p<0.001

Table 3. Adjusted **longitudinal associations** of subjective economic strain and economic status with subsequent life satisfaction, psychological distress, and self rated health, TLSA 1989-2003

	Life Satisfaction		**Psychological Distress**				**Self-Rated Health**	
			Negative Affect		Lack of Positive Affect			
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
	Coeff (SE)	Coeff (SE)	Coeff (SE)	Coeff (SE)	Coeff (SE)	Coeff (SE)	Coeff (SE)	Coeff (SE)
Economic strain								
Previous economic strain (ref=no)	-0.70(0.13)***	-0.62(0.13)***	1.35(0.23)***	1.28(0.23)***	0.38(0.12)**	0.31(0.12)**	-0.20(0.05)***	-0.16(0.05)**
Baseline economic resource								
Monthly income in NTD (ref=<5,000)								
5,000-19,999		0.27(0.09)**		-0.29(0.16)		0.02(0.08)		0.06(0.04)
20,000 & +		0.77(0.15)***		-0.49(0.25)		-0.24(0.12)		0.12(0.06)*
Home ownership (ref=no)		-0.06(0.09)		0.18(0.15)		-0.01(0.08)		-0.10(0.04)**
Socioeconomic status								
Education (ref=illiterate)								
Incomplete primary education		0.17(0.13)		-0.25(0.22)		-0.18(0.11)		0.06(0.05)
Completed primary education		0.65(0.12)***		-0.46(0.20)*		-0.34(0.10)**		0.08(0.05)
High school graduate and above		0.73(0.14)***		-0.36(0.25)		-0.45(0.12)***		0.18(0.06)**
Work status (ref=no work)								
Full- or part-time work		-0.07(0.11)		0.14(0.19)		-0.10(0.09)		0.01(0.04)
Assisting family		-0.07(0.11)		0.05(0.18)		-0.08(0.09)		0.11(0.04)*
Survival status								
Deceased in 2003 (ref=Alive)	-0.31(0.09)**	-0.26(0.08)**	0.75(0.15)***	0.73(0.15***	0.27(0.07)***	0.24(0.08)**	-0.19(0.04)***	-0.18(0.04)***
Comparison of Model 2 to Model 1								
Chi-square		109.38***		3.85		15.38		26.07***
Degree of freedom		8		8		8		8

Note: All models adjusted for age (age for life satisfaction; age and age square for self rated health and psychological distress), gender, ethnicity, presence of disease, ADL/IADL, participating in social activities, number of close friends/neighbors with at least weekly contact, previous values of life satisfaction, psychological distress, and self rated health.

$^{*}p<0.05$; $^{**}p<0.01$; $^{***}p<0.001$