Neighborhood Context and Psychological Distress among Older Taiwanese Adults: Relationships over Time

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ABSTRACT

Studies continue emphasizing the importance of neighborhood environment on health. Relatively little research has been directed at understanding the pathways through which neighborhood influences mental health develop among older adults in industrialized Asian nations. This study is to explore the relationships between individual social group participation, neighborhood context and distress trajectories among older Taiwanese adults, with a specific focus on the role of community interaction. Data are from a nationally representative sample of adults aged 60-64 followed from 1989 to 2003. Psychological distress is measured with a short form of the Center for Epidemiologic Studies-Depression Scale. Individual growth modeling is used to examine whether differences in community interaction can explain variations in distress trajectories by social group participation. Implications of these findings particularly benefit future policy and programmatic strategies aiming at promoting mental health and improving quality of life among a rapidly growing segment of the Taiwanese population.

INTRODUCTION

Depression is one of the most common and chronic mental health conditions among older adults in Chinese communities (Chi et al 2005; Chou et al 2005). Symptoms of depression experienced in late life have serious implications for the health and functioning of older individuals as rates of depression are consistently associated with cognitive impairment (Mehta et al 2003; Steffens et al 2006), physical illnesses such as heart disease and stroke, as well as functional impairment (Rowan et al 2005; Turvey et al 1999) and risk of suicide (Coren & Hewitt 1999; Gottfries 2001; Kessler, Borges, & Walters 1999; Tsoi & Kua 1987). The issue is further complicated by the social fact that some groups of individuals are more vulnerable to experiencing depressive symptoms than others (Blazer & Hybels 2005; Townsend, Miller, & Guo, 2001; Turner & Lloyd, 1999).

Growing evidence suggests an influential role of communities played in health status of individuals. Strong community participation provides older adults with extensive informal social networks and encouragements from peers to maintain their mental health (Folland 2007; Putnam 2003). Studies by Glass and his colleagues (1999) and Hsu (2007) showed that the risk of death was lowered by participating in social activities among the older adults. Social capital arises from aspects of the social structure that provide resources to individuals and facilitate collective action. The concept of social capital includes structural and cognitive components. The structural aspect assesses the extent and intensities of associational links (Subramanian, Kim & Kawachi 2002). Individuals living in neighborhoods with well-established structural networks may have more social interaction, which could, in turn, lead to direct functional support and promote mental health for the older adults. For example, a community could provide counseling services for older adults with mental health problems. The cognitive component assesses individual's perceptions of the level of interpersonal trust, sharing and reciprocity in the community. This component can be also viewed as collective efficacy, or the expectation that community members will act collectively for the common good (Sampson 2003). Individuals living in communities with greater community social trust will have more community participation, which may lead to the improvement of mental health through received advices from community members.

Community social capital thus may promote health through collective efficacy, psychosocial effects and direct functional support.

In this study, social capital is defined as older people's participation in voluntary community organization. The present study sought to assess the relationship between social group participation, neighborhood context, and trajectories of psychological distress among older adults. Specifically, this study aims: 1) to examine the trajectories of depressive symptoms among older Taiwanese adults over time by levels of social group participation; and 2) to assess if community interaction actually affects the relationships between social group participation and symptom trajectories, even when controlling for individual socioeconomic status and other individual characteristics.

METHODS

Sample and Data Collection

This study analyzes the existing data from the Taiwan Longitudinal Study on Aging (TLSA). Data were collected by the Bureau of Health Promotion of the Taiwan Public Health Department from 1989 to 2003. This survey was designed to study the impact of socioeconomic development on the physical and emotional well-being of the older adult population in Taiwan. A multi-stage equal probability sampling frame was used to obtain a nationally representative sample of both community-dwelling and institutionalized older adults. In the first stage of the design, a sample of 56 townships was selected from 331 non-aboriginal administrative units. Subsequently, blocks (*lins*) were sampled within each of selected townships. Finally, residents of the sampled blocks aged 60 or older as of December 31, 1988 were randomly selected for study participation.

Baseline interviews were conducted in 1989, with follow-up surveys administered in 1993, 1996, 1999, and 2003. A total of 4,049 out of the 4,412 sampled individuals completed the initial face-to-face interviews in 1989 and 3,954 belonged to three ethnic groups. Response rates were 92%, 91%, 89%, 90% and 91% for each wave of data collection. For purpose of this study, the sample is restricted to the members aged 60-64 in 1989 with complete data on a short form (10 items) of the Center of

Epidemiological Studies-Depression (CES-D) scale. This yielded a final analytic sample of 1,388 in the analyses. All the analyses use sampling weights and statistical procedures with robust standard errors corrected for any potential bias. STATA version 9.0 (Stata Corporation, 2003) is used for descriptive analysis and employed for the hierarchical linear model approach.

Measures

Dependent variable. Depressive symptomatology was measured by a 10-item version of the Center of Epidemiological Studies-Depression (CES-D) scale at each wave of the TLSA survey. The original 20-item CES-D has been widely used in survey research to assess emotional distress (Radloff 1977), and has demonstrated validity and reliability for use among older adults and Asian populations (Cheng and Chan 2005). Each item was rated on a four-point scale, indicating the frequency of experiencing each symptom in the past week. Responses were reversely scored when necessary such that higher scores represent greater levels of depressive symptomatology. Our prior analyses suggested two factors in depressive symptomatology using the CES-D measure: (1) negative affect domain assessed by eight items and (2) lack of positive affect domain by two items (Chiao, Weng, & Botticello *in press*). The total score on negative affect domain ranged from 0 to 24 with reliability alpha of 0.79-0.87 across waves. The total score on lack of positive affect domain ranged from 0 to 6 with coefficient alpha of 0.79-0.95 across waves.

Explanatory variables. We hypothesize two possible mechanisms through which community characteristics affect psychological distress of older adults: (1) social capital and (2) community interaction. As noted, *social capital* is operationalized in terms of civic engagement or participation and their continuity of such involvement in particular. Older adults were asked whether they ever participated in any one of the six types of social groups (i.e. club, religious, political, retirement, profit, or non-profit social groups) across five waves. We seek to explore the possible effect of continuity of social group participation across wave and hence created a categorical variable that distinguishes levels of participation continuity over time. This created variable included five categories: (1) continuous participation in a social group before 70; (2) participation from ever to none before 70; (3) participation

from none to ever before 70; (4) never participating in a social group before 70; and (5) drop-outs before 70. In addition, *community interaction* was measured by numbers of close friends and neighbors talked to in the past week.

Community characteristics included levels of (1) community education and (2) community social group participation of older adults aged 65 and above. Community education and group participation were obtained from all interviewed respondents at the baseline and derived from the community unit of *lin*. Individuals may learn more about how to cope with their bad mood by talking to their educated neighbors who could know better about where and how to utilize mental health services. In addition, participating in a social group may increase the likelihood of receiving emotional or functional support and decreasing psychological distress particularly for individuals who resided in a community with a large proportion of residents also participating in a social group.

Other measures. Analyses include a time-variant variable of *age* to establish the trajectory models of depressive symptoms over the 14-year period. In addition, analyses also adjust for baseline backgrounds such as socio-demographics, socioeconomics status (SES) and physical health status in 1989. The socio-demographic variables included *gender* and *ethnicity, with the latter* categorized as Fukianese, Hakka, and Mainlander (China-born). *SES* was assessed by *education, employment status,* and *home ownership*. Levels of completed education included illiterate, incomplete primary education, completed primary education, and high school graduate and above. Current employment status was coded as not working, employed (full- or part-time), and assisting family. Home ownership is a proxy of economic status and it was dichotomized according to if older adults fully paid for their current residence. The presence of family members in the immediate environment is a source of both stress and social support for older adults (Smith and Kington 1997; Kahn and Pearlin 2006). Therefore, *family living arrangement* is included in the analysis. Family living arrangement contained two categories: living alone and living with extended family members.

Lastly, physical health was assessed by the presence or absence of *physical disability* and *chronic illness*. Much of the mental health research related to older adults documents a robust association between

physical limitations and chronic illness experienced by older adults (Chiou et al 2005). Respondents' physical disability status was measured according to eight items derived from ADLs and IADLs scales. Respondents were asked if they had difficulty with each of eight activities: crouching, standing, stooping, lifting heavy objects, walking, climbing stairs, grasping small objects with fingers, and taking a bus alone. We dichotomized disability status into those with no functional problems and those with at least one limitation (Pavalko, Mossakowski, and Hamilton 2003). Chronic illness was a dichotomous measure indicating whether respondents had any one of the following five health problems with doctor diagnosis: hypertension, diabetes, stroke, respiratory disease, and cardiovascular disease.

Analytic Strategy

This analysis addresses 1) if risk for trajectories of depressive symptoms varies across levels of participating in a social group over time; and 2) if this variation is affected by community interaction, even when controlling for individual socioeconomic status and other individual characteristics. Descriptive analyses and individual growth curve models are conducted using STATA (StataCorp 2005). First, bivariate tabulations were conducted to characterize the distribution of sociodemographic characteristics of the sample population by categories of social group participation. Then, we conduct individual growth modeling for depressive trajectories, separately on negative affect and lack of positive affect domains. Employing progressive adjustment in our models assesses the relative effects of social group participation, community interactions, and neighborhood characteristics. The first model include the variables of social group participation and time to examine whether there is significant variability in psychological distress for different categories of social group participation controlling for the age effect. The second model adds baseline variables of community interaction and neighborhood characteristics to understand possible effects of community on the association between social group participation and depressive trajectories. The final model is the full model that adjusts for individual socio-demographics, socioeconomic status, and baseline health conditions.

Individual growth model is estimated within a multilevel framework (Raudenbush and Bryk 2002). Two-level multilevel regressions are specified with individuals at level 2 and time points at level 1. Model specifications are represented by equations 1 and 2. In the level-1 repeated observations model, each person's growth trajectory in CES-D score is a function of age and other covariates:

$$Y_{ti} = \pi_{0i} + \pi_{1i} (AGE_{ti}) + \pi_{2i} (AGE_{ti})^2 + e_{ti} \quad (1)$$

where Y_{ti} is the CES-D score for individual i at time t, for $i = 1, \ldots, n$ and $t = 1, .., 5$, the number of waves; AGE_{ti} is the age of participant i at time t. The intercept, π_{0i}, is the expected CES-D of individual i at the grand mean age; π_{1i} is the expected rate of increase or growth rate per year of age for individual i; and e_{ti} is the random error at the level 1 for individual i at t and is assumed to be normally distributed. Our previous work suggests a significant quadratic age coefficient, though of very small effect size, at the end of the lifecourse, even after controlling for individual socioeconomic position (Chiao, Weng, and Botticello *in press*). We thus employed the quadratic growth model in the distress trajectories.

The individual growth parameters may depend on levels of social group participation and vary by individual and community characteristics. The level-2 model thus specifies various levels of social group participation and incorporates within-subject explanatory covariates:

$$\pi_{0i} = \beta_{00} + \beta_{01} (\text{Social Participation})_i + \Sigma\beta_{0q} X_{qi} + \gamma_{0i} \quad (2)$$
$$\pi_{1i} = \beta_{10} + \gamma_{1i}$$
$$\pi_{2i} = \beta_{20} + \gamma_{2i}$$

where social group participation is categorized into five types; and X_{qi} includes community interaction, community characteristics, individual health status, and SES. For example, X_{qi} = (frequency of talking to close friends/neighbors, community social participation, community education), for $q = 3$. In equation (2), β_{00} is the expected CES-D score at the grand mean age for older adults who never participated in a social group before age 70 and these adults who resided in the community with reference characteristics. The reference characteristics included less than 45 percent of older people participating in a social group and less than 65 percent of older people with incomplete primary education and lower. β_{01} is the mean difference in CES-D between various levels of social group participation as compared to the reference group who never participated in a social group before 70. Combing equations (1) and (2), the intercept, π_{0i},

is the expected CES-D of individual *i* at the grand mean age and when all other covariates are held constant at their grand means; and γ_{0i}, γ_{1i}, γ_{2i} is the residual random effect.

RESULTS

Table 1 summarizes individual and community characteristics stratified by categories of social group participation. Sample characteristics differed markedly among the various categories of social group participation. For instance, more than half of older adults who continued social group participation until 70 talked to more than 3 close neighbors in the past week, compared to 42% of older adults who never had such participation and 35% of older adults who dropped out after the baseline interview. More than two-thirds of older adults who continued their social group participation were free from any of functional limitations at the baseline interviews, comparable to older adults who never had such participation (59%) or those who dropped out after the baseline interviews (57%).

<Insert Table 1 about Here>

Table 2 presents the findings for negative affect domain. Models 1-3 assess the effects of social group participation and community interaction in the presence of age effect and progressively adjust for community characteristics and individual backgrounds. Model 1 shows the significant effect of social group participation after controlling for the age effect. In comparison to those who never participated in any social group before age 70, older adults who continued participating in a social group before age 70 or who transited from never to participating in a social group before age 70 have a significantly lower levels of depressive symptoms.

Model 2 tests the hypothesis of community interaction and community characteristics by including the variables of numbers of close friends or neighbors whom participants talked to in the past week, levels of community education, and levels of social participation of the community. As expected, an increase in number of close friends or neighbors whom participants talked to significantly decreases levels of depressive symptoms on negative affect domain. Older adults living in neighborhoods with a larger proportion of less educated peer residents have significantly higher levels of depressive symptoms.

Contrary to expectations, community social participation is associated with higher levels of depressive symptoms among older adults.

Model 3 is the final full model which accounts for social group participation, community interaction and community characteristics, background variables, and age effect. The addition of background variables did not alter the significant effect of social group participation but reduced the magnitude substantially. Adding individual background characteristics reduced the significance of the association of community interaction and negative affect symptoms to nonsignificance. For individual characteristics, lower levels of depressive symptoms were associated with being free from disability, higher levels of education attainment, full- or part-time employment, home ownership, and living with family members.

<Insert Table 2 about Here>

Table 3 presents the results for lack of positive affect domain. Like the findings on negative affect domain, lower levels in symptoms of lack of positive affect are more likely to be among older adults who continued participating in a social group or those who transited from never to participating in a social group than older adults who never participated in a social group. This relationship persists even after adjusting for other variables. In contrast to the negative affect domain, we find that community social participation is associated with lower levels of symptoms of lack of positive affect among older adults even after controlling for individual characteristics.

<Insert Table 3 about Here>

CONCULSION

The goal of this study is to better understand the relationships between individual social group participation, neighborhood context and distress trajectories among older Taiwanese adults. We hypothesized two possible mechanisms through which neighborhood characteristics affect psychological distress of older adults: (1) community interaction and (2) social capital. Community interaction is defined in terms of numbers of close friends and neighbors whom respondents talked to in the past week.

Social capital is measured by degree of social group participation. Growth curve modeling with progressive analyses showed that the significant effects of community interaction disappear after adjusting for individual background characteristics. Yet, a positive effect of social capital remained, even controlling for individual and community characteristics. Older adults who continued participating in any social group have a significantly lower level of symptoms than those who never participated in any social group. In addition, older adults who transited to participating in any social group from no participation also have a significant lower level of symptoms than those who never participated in any social group. This finding suggests that making the effort to participate in a social group at later life seems to be a commitment to preserving elder's health and wellbeing, although there are many other potentially motivating factors such as the desire to attend social functions and seek for emotional supports.

The analyses of distress trajectories and community influence in Taiwan have yielded a range of significant results, but not all in the hypothesized direction. It is clear that further research is needed to confirm the findings of this study in greater detail and qualitative studies, in particular, could be used to explore some of the links suggested by these results. As the need for appropriate forms of social group participation remains a pressing concern for promoting well-beings of older adults, more research is needed on how elder's participating in a social group. This includes additional research on dynamics within a social group that older adults participate in. We are currently in the process of studying the interactions of socioeconomic variables with social group participation in order to provide more detailed information on complex relationships between social participation and individual socioeconomic status. There is also need for research on neighborhood context changes and needs of inactive elders and how available social resources meet these needs. Research in this area is necessary to inform federal, state, and county-level initiatives to improve elder's social resources and address social needs of older adults.

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TABLE **1.** Sample characteristics by categories of social group participation (%) at 1989 baseline interviews in the Taiwan Longitudinal Study on Aging (TLSA)

	Continuous participation before 70 (n=259)	Participation from never to ever before 70 (n=274)	Participation from ever to none before 70 (n=200)	Never participation before 70 (n=359)	Drop-outs after baseline interviews) (n=296)
Community characteristics					
Percent with older community residents participating in a social group					
Less than 45%	71.04	85.40	68.00	83.84	82.09
45% and higher	28.96	14.60	32.00	16.16	17.91
Percent of older community residents with incomplete primary education and lower					
Less than 65%	79.54	82.12	86.50	87.19	88.85
65% and higher	20.46	17.88	13.50	12.81	11.15
Community interaction					
Number of close friends/neighbors talked to					
None	15.44	22.26	21.50	28.69	30.07
1-3 persons	29.73	33.94	28.00	29.53	34.46
More than 3 persons	54.83	43.80	50.50	41.78	35.47
Health status					
Physical disability					
None	71.43	66.06	66.50	59.33	57.09
Any of eight selected limited functions	28.57	33.94	33.50	40.67	42.91
Chronic disease					
None	84.17	86.50	83.00	85.24	77.36
Any of five selected chronic diseases	15.83	13.50	17.00	14.76	22.64
Socio-demographics					
Gender					
Male	80.31	57.66	76.50	43.73	68.58
Female	19.69	42.34	23.50	56.27	31.42
Ethnicity					
Fukianese	51.35	62.77	47.50	65.74	58.11
Hakka	15.06	16.06	14.00	15.32	10.14
Mainlander	33.59	21.17	38.50	18.94	31.76
Socioeconomics					
Education					
Illiterate	17.76	31.02	19.50	38.44	25.68
Incomplete primary education	10.04	15.69	15.00	18.11	17.91
Completed primary education	36.68	33.58	34.00	27.02	28.72
High school graduate and above	35.52	19.71	31.50	16.43	27.70
Work status					
No work	27.03	17.15	33.50	30.92	40.54
Full- or part-time work	53.28	51.09	47.00	37.05	38.51
Assisting family	19.69	31.75	19.50	32.03	20.95
Home ownership					
No	25.48	21.90	26.00	27.30	39.86
Yes	74.52	78.10	74.00	72.70	60.14
Family living arrangement					
Living alone	19.31	18.25	26.00	26.74	35.81
Living with family	80.69	81.75	74.00	73.26	64.19

TABLE **2.** Growth curve models predicting symptom trajectories on **negative affect** domain, the Taiwan Longitudinal Study on Aging (TLSA) 1989-2003

	Model 1		Model 2		Model 3	
Fixed effects	Est	S.E.	Est	S.E.	Est	S.E.
Social group participation						
Participation before 70 (ref=never)						
Continuous participation	-1.471***	0.262	-1.510***	0.264	-0.803**	0.256
From no to ever	-1.142***	0.256	-1.157***	0.255	-0.759**	0.238
From ever to no	-0.709*	0.283	-0.742**	0.283	-0.240	0.271
Drop-outs	0.058	0.278	0.011	0.277	0.094	0.266
Community interaction						
Number of close friends/neighbors talked to (ref=None)						
1-3 persons			0.011	0.240	0.229	0.224
More than 3 persons			-0.628**	0.227	-0.293	0.214
Community characteristics						
Percent with older community residents participating in a social group (ref=<45%)						
45% and higher			0.543*	0.224	0.311	0.210
Percent of older community residents with incomplete primary education and lower (ref=<65%)						
65% and higher			0.647**	0.248	0.259	0.242
Health status						
Physical disability (ref=None)						
Any of eight selected limited functions					1.780***	0.182
Chronic disease (ref=None)						
Any of five selected chronic diseases					-0.355	0.223
Socio-demographics						
Gender (ref=Male)						
Female					0.325	0.223
Ethnicity (ref=Fukianese)						
Hakka					0.105	0.251
Mainlander					-0.111	0.223
Socioeconomics						
Education (ref=Illiterate)						
Incomplete primary education					-0.433	0.274
Completed primary education					-0.792**	0.229
High school graduate and above					-1.236***	0.270
Work status (ref=No work)						
Full- or part-time work					-0.648**	0.202
Assisting family					-0.690**	0.241
Home ownership (ref=No)						
Yes					-0.523**	0.190
Family living arrangement (ref=Alone)						
Living with family					-0.515*	0.201

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

TABLE **2.** Continued

	Model 1		Model 2		Model 3	
Fixed effects	Est	S.E.	Est	S.E.	Est	S.E.
Intercept, β_{00}	3.006***	0.217	3.103***	0.264	3.901***	0.397
Growth rate: Age, β_{10}	0.249***	0.040	0.247***	0.040	0.236***	0.040
Acceleration: Age^2, β_{20}	-0.009***	0.002	-0.009***	0.002	-0.009***	0.002
Random effects						
Variance in random intercept	3.981***	0.748	3.749***	0.738	2.073***	0.379
Variance in random slope	0.014**	0.008	0.014**	0.008	0.013**	0.004
Variance in residuals	12.615***	0.402	12.629***	0.401	12.649***	0.332

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

TABLE **3.** Growth curve models predicting symptom trajectories on **lack of positive affect** domain, the Taiwan Longitudinal Study on Aging (TLSA) 1989-2003

	Model 1		Model 2		Model 3	
Fixed effects	Est	S.E.	Est	S.E.	Est	S.E.
Social group participation						
Participation before 70 (ref=never)						
Continuous participation	-0.739***	0.111	-0.712***	0.111	-0.549***	0.114
From no to ever	-0.475***	0.108	-0.493***	0.107	-0.413***	0.105
From ever to no	-0.257*	0.119	-0.213	0.119	-0.106	0.120
Drop-outs	-0.075	0.129	-0.089	0.128	-0.056	0.128
Community interaction						
Number of close friends/neighbors talked to (ref=None)						
1-3 persons			0.087	0.103	0.100	0.101
More than 3 persons			-0.246*	0.098	-0.177	0.097
Community characteristics						
Percent with older community residents participating in a social group (ref=<45%)						
45% and higher			-0.128	0.096	-0.203*	0.095
Percent of older community residents with incomplete primary education and lower (ref=<65%)						
65% and higher			0.258*	0.106	0.117	0.109
Health status						
Physical disability (ref=None)						
Any of eight selected limited functions					0.319***	0.082
Chronic disease (ref=None)						
Any of five selected chronic diseases					-0.146	0.102
Socio-demographics						
Gender (ref=Male)						
Female					-0.228*	0.101
Ethnicity (ref=Fukianese)						
Hakka					0.048	0.113
Mainlander					-0.023	0.101
Socioeconomics						
Education (ref=Illiterate)						
Incomplete primary education					-0.327**	0.124
Completed primary education					-0.506***	0.103
High school graduate and above					-0.685***	0.121
Work status (ref=No work)						
Full- or part-time work					-0.102	0.092
Assisting family					-0.003	0.109
Home ownership (ref=No)						
Yes					-0.125	0.086
Family living arrangement (ref=Alone)						
Living with family					-0.195*	0.091

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

TABLE **3.** Continued

	Model 1		Model 2		Model 3	
Fixed effects	Est	S.E.	Est	S.E.	Est	S.E.
Intercept, β_{00}	3.873***	0.110	3.937***	0.128	4.534***	0.188
Growth rate: Age, β_{10}	-0.197***	0.023	-0.197***	0.023	-0.198***	0.022
Acceleration: Age^2, β_{20}	0.007***	0.001	0.007***	0.001	0.007***	0.001
Random effects						
Variance in random intercept	0.750***	0.166	0.706***	0.163	0.659***	0.165
Variance in random slope	0.00002*	0.0001	0.00002*	0.0001	0.0001	0.0002
Variance in residuals	4.766***	0.107	4.766***	0.107	4.757***	0.107

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