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Role of Social Relationship in Predicting Health in China

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Abstract There is increasing acknowledgement of social relationship as an important determinant of health. However, most evidence comes from developed countries, and the question of whether social relationship can predict health in developing countries remains poorly understood. This paper empirically examined how social relationships influence health in China. Data was collected from the Chinese Household Income Project, contained around 5000 migrant households, 8000 rural households and 5000 urban households. Self-reported general health and psychological health which was assessed by General Health Questionnaire. Social relationship was positively associated with health and psychological health, although the indices varied in strength. Social support, social connectedness and trust operated differently in predicting health in the three populations. The findings supported that social relationship influences health through both a stress-buffering process (helping people to cope with stress) and a main-effect process (promoting positive psychological states or healthy behaviors irrespective of stress). Among all the measures, neighborhood relationship satisfaction as one variable to capture social connectedness and generalized trust showed a stable and sizable effect in predicting health across the three populations, suggesting that neighborhood ties and generalized trust are important supportive resources for Chinese.

Keywords Social relationship · Health · China · Urban · Rural and migrant workers

1 Introduction

Growing evidence suggests that social relationship can influence our physical health (e.g., Berkman and Glass 2000; Cohen et al. 2000; Uchino et al. 1996). Empirical studies can be

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traced to the early 1970's (e.g., Cassel 1976; Berkman and Syme 1979), and the topic continues to be an area of interest (Fujiwara et al. 2016; Mithen et al. 2015).

However, most of the findings come from developed countries. Cross-country studies suggest that the association of social relationship and health varies as a function of societal development. Hamamura and his colleagues (2016), determined that trust was more strongly associated with physical health in developed societies than in developing societies with World Value Survey data. The effect of trust to promote social interactions may be weaker in developing countries because more risks can be associated with trust due to ineffective public management in developing countries. Evidence about social relationship and health within developing countries is scarce and the results are mixed. For example, a study from Colombia found that neither trust nor membership in organizations was related to self-reported mental health (Harpham et al. 2004). This study suggested that factors related to poverty were dominant in predicting poor mental health. Compared to the abundant literature in developed countries, more knowledge of social relationship and health in developing countries is needed. China can be particularly suitable for such a study, as it has such a large population; however, very little research has been done on this topic. Meanwhile, Chinese economy has improved in leaps and bounds, and the transition economy changes both income inequality and poverty dynamics, as well as the social relationship in society (Naughton 2007; Nee 1996). To what extent does social relationship influence people's health in China? So far, only one study has examined data with three rural counties of Shandong province in China, and found that only trust is positively correlated with health (Yip et. al. 2007). However, the result is limited to be generalized to overall China in consideration of regional inequality. Does social relationship influence health through similar mechanisms, such as research explained in developed countries? In addition, with urbanization, more rural people come to cities as migrant workers. Does social relationship influence the rural, urban, and migrant people in China differently?

These questions have important implications. If social relationship influences health similarly in China, as it does in developed countries, this suggests a consistent effect of social relationship across countries in spite of society development level. Further, the answer to the question whether, and what aspect of social relationship influences urban, rural, and migrant workers differently, can be used by policy makers. Policy can be targeted to specific recipients to promote health and well-being.

1.1 Social Relationship and Health

Social relationship consists of different layers extending from individual intimate relations, to social networks, to collective activities at a contextual level (Berkman and Glass 2000). In a board sense of structural/cognitive distinction, social relationship manifest in both behavioral dimension ("structural") such as participation in group activities and attitudinal dimension ("cognitive") such as trust in others and reciprocity relationship (Harpham et al. 2002).

Characteristics of social relationship have been identified in examining its effects on health, such as social support and social connectedness. As described by House (1981), social support includes emotional, instrumental, appraisal and informational support, which can benefit people to cope with stress. Social connectedness refers to participation in a broad sense of social relationship (Brissette et al. 2000).

In a review, Cohen and Wills (1985) concluded that social relationship benefits health, not only through a buffering process that is in response to stressful events, but also through

a main-effect model that promotes positive psychological states (See also Cohen 2004). The stress buffering model emphasizes the effect of social support and the interaction with stressful events. Social support can influence the stress appraisal wherein, with available help, people may redefine stressful events less harmful or bolster one's coping capability. In addition, adequate support may reduce the stress reaction and directly influence the physiological process. In a longitudinal study, researchers compared healthy Swedish men aged 50 years and above, in a 7-year follow-up period (Rosengren et al. 1993). They found that participants encountering high numbers of stressful life events in the year before the baseline exam were at a substantially greater risk for mortality. In contrast, the effect was much less for those who perceived high levels of emotional support. A main-effect of social relationship has been reported with a measure of neighborhood and community involvement, or contacts with relatives, neighbors, friends, and community participation (Lin et al. 1979; Bell et al. 1982). The main-effect model argues that social connectedness is beneficial. Social network can influence normative health behaviours, such as exercise or smoking, through peer pressure. Social connection can aid emotional regulation to increase positive affect and, therefore, reduce the strength of negative affective states (Cohen 1988). Many community-based studies indicate that social connection is predictive of physical health. For example, Berkman and Syme (1979) found residents in Alameda County, California who were more socially connected (married, with close family and friends), were more likely to live still at the 9-year follow-up than those who were more isolated.

The effect of trust in predicting health has drawn more attention recently, as trust was defined as a crucial element of social capital (Putnam 2000). Research suggests that trust enables individuals to form interpersonal relationship with others (Yamagishi and Yamagishi, 1994). The association between interpersonal trust and mortality has been reported in a dozen of studies (e.g., Everson et al. 1997; Barefoot et al. 1998). Analyzing National Health Survey of England, Poortinga (2006) found that people who were more likely to trust others were less likely to report poor health, as compared to those who did not trust others generally. Another country study found that in the United States, people living in states with low social trust were associated with higher risk of poor health, as compared to people living in the high social trust states (Kawachi et al. 1999).

1.2 Differences Among Rural, Urban and Migrant Population

The rural–urban differences in health have been well studied. Determinants of health differences include social status, income, education, occupation (McKinlay et al. 1989), heath care system (Tarlov 1999), and social relationship (Berkman and Syme 1979; Roux et al. 2001). Evidence also suggests that social relationship predicts the health differently for urban and rural residents (Ziersch et al. 2009). In South Australia, social relationship was significantly associated with better mental health for both urban and rural participants, but with better physical health only for urban participants. One of the marked differences evident in the context of social relationship between rural and urban peopple is that rural people are more embedded in giving and receiving social support as compared to urban people (Hofferth and Iceland 1998).

Previous findings suggested that the migration process is stressful and associated with mental illness and poor cardiovascular health (Kunitz and Levy 1986; Salmond et al. 1989). In a study examining health among Latinos in California, the researchers found both instrumental social support and religious support can moderate the effects of discrimination on physical health (Finch and Vega 2003). Therefore, although the migration process

can be very stress-inducing phenomenon, social relationship can influence the health condition positively.

1.3 Present Study

This study explored the association of social relationship and health in China across its provinces. Several aspects of social relationship were captured in the current study including social support (social help), social connectedness (individual level as social network size and community level as neighborhood relationship satisfaction), and trust (generalized trust), which were consistent with previous research on social determinants of health (Berkman and Glass 2000). Additionally, the study tested the mechanism underlying the association of social relationship and health in both the stress-buffering and the main-effect models. The study also aimed to provide insights in the differences between urban, rural and migrant population regarding the effects of social relationships in predicting health. The association was anticipated to vary across regions and to be accounted for by differences in social relationship. In sum, this study aimed to fill the gaps in the literature by examining different aspects of social relationship in predicting health in a developing country with a large-scale of dataset; validating the underlying mechanisms in the framework of dual models-stress buffering and main-effect, and assessing the effect differences among urban, rural and migrant populations.

2 Method

Data was collected from the Chinese Household Income Project (CHIP) (2010), which is a project to track the income distribution and inequality in China through household surveys of the urban, rural and migrant populations. The latest wave was collected in 2009 and contained around 5000 migrant households, 8000 rural households and 5000 urban households. The household surveys were conducted in ten provinces, namely Shanghai (for urban and migrant surveys, replaced by Hebei in rural survey), Jiangsu, Zhejiang, and Guangdong from eastern China; Anhui, Henan, and Hubei from central China, and Chongqing and Sichuan from western China. The population of the ten provinces accounts for 48.9% of the total Chinese population. The sampling also covers different economic development areas encompassing the developed eastern and the underdeveloped western area. All surveys were conducted by trained professionals. In urban and rural surveys, samples were taken from the national household survey of the National Bureau of Statistics (NBS), whereas the rural-urban migrant survey was conducted separately—a migrant household was selected when one of its working members was drawn from his or her work place.

2.1 Measures

2.1.1 Health

Generally, public health is measured by the occurrence of disease, disability, injury, and death rates (Harpham et al. 2002). Other than morbidity, disability and mortality, measures of quality of life or functional status are utilized. For example, the General Health Questionnaire (GHQ) is a well-established questionnaire for mental health suitable for use in the general population samples (Goldberg 1972). Self-reported general health (SRH) as a

subjective assessment of people's own physical and mental health condition is supported by its strong association with mortality rate (Idler and Benyamini 1997; Idler and Kasl 1991).

In current study, self-reported general health (SRH) was assessed using a 5-point Likert scale, wherein the respondents were asked to identify their current health condition compared to people of the same age with 1 for "excellent" to 5 for "very poor". This question captured general health condition.

Psychological health was assessed by General Health Questionnaire (GHQ-12) which was comprised of twelve questions regarding the respondent's current mental health condition (see Appendix 1). Some sample questions are: "Have you been able to concentrate on whatever you are doing in the past weeks?" or "Did you feel constantly under strain?" Respondents were asked to respond with a 4-point Likert scale (from 1 = not at all, to 4 = most of the time). GHQ has been previously conducted among the Chinese population (Pan and Goldberg 1990), and proved with good validity (Yip et al. 2007). In the current study, the scale was internally consistent (Cronbach's $\alpha = 0.84$). The responses were summed, wherein lower scores indicate fewer occurrences of mental problems and better mental health condition.

Measure of stress was assessed by the occurrence of stressful events. Nine stressful life events were listed which included marriage, starting relationship, pregnancy, giving birth, finding a good job, divorce/separation, having serious sickness/accident/injury, family member passing away, and building/purchasing a property.

2.1.2 Social Relationship

Social support was measured by the number of social help the respondents have received in the last year including lending money, introducing a job, taking care of child, or talking with someone when encountering difficulties and offering advice.

Social connectedness was indicated by social network size and neighborhood relationship. Social network size was measured by the number of people in total whom the respondents sent greetings to during the 2009 Chinese New Year. Neighborhood relationship satisfaction was assessed by a 5-point Likert scale ranging from 1 ("very unsatisfied") to 5 ("very satisfied").

Trust was measured by asking the respondents to choose: 1 ("most people are trustworthy"), 2 ("when dealing with other people, the more careful the better") or 3 ("don't know"). This item has been commonly used to measure generalized trust in the literature (Nannestad 2008).

Other demographic variables–region, gender, age, marital status, education and income–were also included in the analysis. Considering the cross-region inequality in China, region was coded in three categories, namely eastern, central and western. Education was coded in terms of years of education. Income was measured by a question of household income satisfaction with a 5-point Likert scale from 1 ("very unsatisfied") to 5 ("very satisfied"). Because two questions—monthly salary and monthly salary from other part time job have very high rate of missing cases, for migrants 3%, rural 69% and urban 46%. Previous study supported that subjective indicators of social economic status predict health status and health status change better than objective indicators (Singh-Manoux et al. 2005).

2.2 Analysis

First, to test the main-effect model, regression model was conducted with all the demographic variables–region, age, gender, marital status, education and income, measures of stress, and social relationship–to predict self-reported health and psychological health. Three regression models were analyzed for urban, rural and migrant sample separately. If social relationship influences health through the main-effect model, social connectedness will be positively associated with better health, irrespective of stress. In a stress-buffering model, social support can buffer the effects of stress but not social connectedness (Rosengren et al. 1993). Thereafter, the interaction term of stress and social support was added in the regression models to test the moderating effect. The interaction term of stress and trust was also added to understand if trust had an influence on health through a stress-buffering process.

3 Results

3.1 Descriptive Statistics

GHQ only surveyed respondents who were at least 16 years old and were present at site, which left 3751 migrants, 11,852 rural residents and 7582 urban residents in the dataset. The rate of missing data is 7.2% for rural sample, 1.4% for urban sample, 0.2% for migrant sample (See Appendix 2 for the number of missing case of each variable). Simple imputation was used for continuous variables that mean of variable was imputed and then list wise deletion was applied to the dataset (255 cases, 1% of original dataset). Thus, in our analysis, the urban sample included 7543 individual respondents, 11,637 for the rural sample and 3750 for the migrant sample. Three continuous independent variables–stressful events, social network and social help were all right-skewed, and neighborhood relationship satisfaction was left-skewed in the three samples. Table 1 listed out the descriptive statistics of all the samples.

The ANOVA analysis showed that the three populations differed significantly on both dependent and independent variables. In terms of health condition, most of the people rated their health as good (urban 46.0%, rural 46.9% and migrant 46.8%) or excellent (urban 9.7%, rural 19.0% and migrant 36.8%). Migrant people indicated fewest symptoms of mental health issues (urban 20.0, rural 20.4 and migrant 19.6). Most people indicated high level of generalized trust ($\geq$ 58.0%). Rural people maintained the largest social network (*Mean* = 37.8 persons) and also received most social help (*Mean* = 6.8 persons). As the migrant sample was mainly comprised of migrant workers, their mean age was around 30 years old, which was much younger than the urban and rural samples. This could be related the differences in health condition and social relationship among the three samples. The middle aged group could encounter more stressful events (marriage, having a child, etc.) and could act more often as help giver in their social network.

Correlational analysis was conducted for the indices of social relationships. Social network size was correlated with social help (for urban, $r = .24$, $p < .001$, for rural, $r = .39$, $p < .001$, for migrant, $r = .35$, $p < .001$). Neighborhood relationship satisfaction was positively correlated with social network size though the effect size was small (for rural $r = .04$, $p < .001$ and for migrant $r = .04$, $p < .01$), and was only correlated with social help in rural sample ($r = .03$, $p < .01$). Trust promotes better social relationship nevertheless the

Table 1 Descriptive statistics of samples by urban, rural and migrant surveys

	Urban Mean/%	Rural Mean/%	Migrant Mean/%
Age	47.9[a]	50.8[b]	30.8[c]
Male	43.7%[a]	56.9%[b]	59.7%[c]
Married	87.4%[a]	92.2%[b]	53.5%[c]
Education (years)	11.3[a]	6.9[b]	9.7[c]
Income (subjective)	3.1[a]	3.1[b]	2.9[c]
Health	2.4[a]	2.2[b]	1.8[c]
Very poor	0.8%	0.8%	0.2%
Poor	5.1%	5.7%	1.5%
Fair	38.5%	27.6%	15.7%
Good	46.0%	46.9%	46.8%
Excellent	9.7%	19.0%	36.8%
GHQ	20.0[a]	20.4[b]	19.6[c]
Stressful events	0.28[a]	0.27[a]	0.51[b]
Social network (persons)	34.5[a]	37.8[b]	23.3[c]
Social help (persons)	5.6[a]	6.8[b]	3.3[c]
Trust (trustable)	75.9%[a]	68.6%[b]	58.0%[c]
Relationship satisfaction	3.7[a]	3.6[b]	3.8[c]

Different superscripts within a row indicate significant difference ($p < 0.001$)

impact on different indices of social relationship was varied among the three samples. People who think others are more trustworthy had better neighborhood relationship in all three samples (for urban, $F = 35.34$, $p < .001$; for rural, $F = 41.25$, $p < .001$; and for migrant $F = 15.77$, $p < .001$), had larger social network size (for urban, $F = 14.35$, $p < .001$; for migrant $F = 8.65$ $p < .001$), and more social help (for urban, $F = 7.19$, $p < .001$; for rural $F = 10.01$, $p < .001$). The pattern suggested that the structure of social relationship was varied among the three samples.

Stata 14.0 was used in the following regression analysis. Specifically, self-reported health was predicted by ordinal logistic regressions and psychological health was predicted by OLS regressions. SRH and GHQ were reverse coded wherein higher scores indicate better health condition. Social network and stressful events were centered for the interaction analysis. Squared age term was also added in the regressions as people get older the effect of age may be lessoned.

3.2 Social Relationship in Predicting Health

The ordinal logistic regression models for the three samples were all statistically significant (for urban χ^2 (14) = 1279.83, $p < .001$, Pseudo R^2 =.07; rural χ^2 (14) = 2176.60, $p < .001$, Pseudo R^2= .08; migrant χ^2 (14) = 347.74, $p < .001$, Pseudo R^2 = .04) (Table 2). More stressful life events were associated with worse health in all three samples (for urban, OR = .81, $p < .001$, for rural, OR = .87, $p < .001$, for migrant, OR = .81, $p < .001$). Generally the indices of social relationship predicted better health, although the effect size of indices was varied in three samples. In the urban sample, the larger social network size (OR = 1.00, [$z = 3.23$], $p < .001$), more generalized trust (OR = .90, $p < .05$), and more satisfied

Table 2 Summary of regression analysis predicting health as main-effect model

Control	Urban			Rural			Migrant		
	OR	*z*	*Sig*	OR	*z*	*Sig*	OR	*z*	*Sig*
Region[a]									
Middle	1.35	5.80	***	1.07	1.52	.13	.80	− 3.00	**
Western	1.27	3.90	***	.58	− 12.03	***	.64	− 5.09	***
Marital[b]									
Unmarried	.94	− 0.83	.41	.81	− 2.74	**	.90	− 1.09	.28
Gender[c]									
Female	.77	− 5.57	***	.70	− 9.74	***	.85	− 2.56	*
Age	.91	− 5.02	***	.89	− 6.38	***	.92	− 2.23	*
Squared age	1.87	2.44	*	2.21	3.27	***	1.99	1.53	.13
Income	1.44	11.91	***	1.42	13.95	***	1.45	8.92	***
Education	1.02	2.42	*	1.02	3.57	***	1.03	2.25	*
Stressful events	.81	− 5.64	***	.87	− 4.54	***	.81	− 5.64	***
Trust[d]									
Not trust	.90	− 1.99	*	.86	− 3.80	***	.80	− 3.36	***
Don't know	.65	− 2.77	**	.59	− 5.30	***	.65	− 2.71	**
Social network	1.00	3.23	***	0.99	− 3.75	***	1.00	1.44	.15
Social help	1.00	1.61	.11	1.00	.10	.92	.99	− 1.80	.07
Relationship satisfaction	1.37	8.77	***	1.21	6.64	***	1.44	7.20	***
N	7543			11,637			3750		
df	14			14			14		
LRχ^2	1279.83		***	2176.60		***	347.74		***
Pseudo R^2	.07			.08			.04		

[a]Criterion = eastern; [b]criterion = married; [c]criterion = male; [d]criterion = trustful

*$p < .05$, **$p < .01$, ***$p < .001$

neighborhood relationship (OR = 1.37, $p < .001$) predicted better health. In the rural sample, the smaller social network size (OR = 0.99, [$z = -3.75$], $p < .001$), more generalized trust (OR = .86, $p < .001$), and more satisfied neighborhood relationship (OR = 1.21, $p < .001$) predicted better health. In the migrant sample, more generalized trust (OR = .80, $p < .001$) and more satisfied neighborhood relationship (OR = 1.44, $p < .001$) predicted better health.

3.3 Social Relationship in Predicting Psychological Health

The next analysis examined whether social relationship influences psychological health. The regression models were all statistically significant (for urban F (14, 7543) = 197.23, $p < .001$, adjust R^2=.16; rural F (14, 11,637) = 230.25, $p < .001$, adjust R^2= .22; migrant F (14, 3750) = 35.26, $p < .001$, adjust R^2= .11) (Table 3). More stressful life events were associated with worse psychological health in urban and rural samples (for urban, $\beta_{stressful\ events} = -.04$, $p < .001$, for rural, $\beta_{stressful\ events} = -.06$, $p < .001$). Social help was only significant in migrant sample ($\beta = -.04$, $p < .05$). Trust and relationship satisfaction with neighbors showed sizable effect (for urban,

Table 3 Summary of regression analysis predicting psychological health as main-effect model

Control	Urban			Rural			Migrant		
	Beta	*t*	*Sig*	*Beta*	*t*	*Sig*	*Beta*	*t*	*Sig*
Region[a]									
Middle	− .02	− 1.40	.16	− .01	− 1.04	.30	− .14	− 8.43	***
Western	.09	8.22	***	− .02	− 1.99	*	− .05	− 3.18	***
Marital[b]									
Unmarried	− .04	− 3.09	***	− .09	− 9.11	***	− .09	− 3.81	***
Gender[c]									
Female	− .10	− 8.92	***	− .14	− 16.63	***	− .12	− 7.99	***
Age	− .15	− 1.24	.22	− .50	− 5.00	***	− .10	− .53	.59
Squared age	.05	.39	.69	.31	3.07	***	.04	.20	.84
Income	.24	21.21	***	.20	23.16	***	.19	11.78	***
Education	.11	9.32	***	.07	7.22	***	.03	2.05	*
Stressful events	− .04	− 4.19	***	− .06	− 6.70	***	− .02	− 1.59	.11
Trust[d]									
Not trust	− .11	− 9.85	***	− .17	− 20.63	***	− .11	− 7.10	***
Don't know	− .12	− 11.17	***	− .17	− 19.95	***	− .04	− 2.64	***
Social network	.01	.81	.42	− .01	− 1.52	.13	.03	1.89	.06
Social help	.01	.78	.44	− .01	− 1.66	.10	− .04	− 2.51	*
Relationship satisfaction	.09	7.79	***	.06	7.03	***	.11	6.66	***
N	7543			11,637			3750		
F total	197.23		***	230.25		***	35.26		***
df	14			14			14		
Adjusted R^2	.16			.22			.11		

[a]Criterion = eastern; [b]criterion = married; [c]criterion = male; [d]criterion = trustful

*$p < .05$, **$p < .01$, ***$p < .001$

$\beta_{don't\ trust} = -.11$, $p < .001$, $\beta_{relationship\ satisfaction} = .09$, $p < .001$; for rural, $\beta_{don't\ trust} = -.17$, $p < .001$, $\beta_{relationship\ satisfaction} = .06$, $p < .001$; for migrant, $\beta_{don't\ trust} = -.11$, $p < .001$, $\beta_{relationship\ satisfaction} = .11$, $p < .001$). It seems people who agree with most people are trustworthy and have better neighbor relationship are healthier psychologically.

The results, after controlling the stressful events, suggested social connectedness indicated by neighborhood relationship, and trust was both positively associated with better self-rated health and psychological health. These provided evidence for the main-effect model. Generally, the models have more power in predicting psychological health than general health. It is possible that social relationship is more positively associated with psychological health (Kawachi and Berkman 2001).

3.4 Stress-Buffering Model

To examine the stress-buffering model, interaction terms of measure of stress and social support and trust were added into the regression models (Tables 4 and 5). Interestingly, the three samples showed very different patterns in the stress-buffering model. For urban people, trust was more effective in moderating the effect of stress in predicting psychological

Table 4 Summary of regression analysis predicting health as stress-buffering model

Control	Urban			Rural			Migrant		
	OR	*z*	*Sig*	OR	*z*	*Sig*	OR	*z*	*Sig*
Region[a]									
Middle	1.35	5.83	***	1.06	1.50	.13	.80	− 2.99	**
Western	1.27	3.96	***	.58	− 11.96	***	.64	− 5.06	***
Marital[b]									
Unmarried	.93	− .87	.39	.81	− 2.67	**	.90	− 1.14	.25
Gender[c]									
Female	.77	− 5.58	***	.69	− 9.77	***	.85	− 2.58	**
Age	.91	− 5.00	***	.89	− 6.44	***	.92	− 2.21	*
Squared age	1.86	2.41	*	2.24	3.33	***	1.97	1.50	.13
Income	1.44	11.92	***	1.42	13.96	***	1.45	8.85	***
Education	1.02	2.40	*	1.02	3.53	***	1.03	2.31	*
Stressful events	.92	− .82	.41	.71	− 4.15	***	.73	− 2.96	**
Trust[d]									
Not trust	.90	− 1.97	*	.86	− 3.79	***	.80	− 3.40	***
Don't know	.66	− 2.72	**	.59	− 5.31	***	.66	− 2.61	**
Social network	1.00	3.19	***	.99	− 3.83	***	1.00	1.38	.17
Social help	1.00	1.27	.21	1.00	.38	.71	.98	− 2.25	*
Relationship satisfaction	1.37	8.79	***	1.21	6.58	***	1.44	7.19	***
Stressful events x Social help	1.00	1.58	.12	1.00	− 1.08	.28	1.01	2.28	*
Stressful events x Trust	.90	− 1.36	.17	1.16	2.74	**	1.06	.92	.36
N	7543			11,637			3750		
df	16			16			16		
LR χ^2	1284.57		***	2185.62		***	353.95		***
Pseudo R^2	.07			.08			.04		

[a]Criterion = eastern; [b]criterion = married; [c]criterion = male; [d]criterion = trustful

*$p < .05$, **$p < .01$, ***$p < .001$

health ($\beta = -.06$, $p < .05$). For rural people, trust was more effective in moderating the effect of stress in predicting health (OR = 1.16, $p < .01$). However, for migrant workers, social support can alleviate the impact of stress in predicting health, OR = 1.01, $p < .05$).

In sum, the analysis suggests that the indices of social relationship predicted the health in China for different populations–urban, rural and migrant. In addition, social relationship influences health through stress-buffering and main-effect processing differently in the three populations.

4 Discussion

The findings of the current study provide evidence that the indices of social relationship are positively associated with general health and psychological health in China among urban, rural and migrant populations. Specifically, social support, social connectedness and trust operated differently in predicting health in the three populations.

Table 5 Summary of regression analysis predicting psychological health as stress-buffering model

Control	Urban			Rural			Migrant		
	Beta	t	*Sig*	*Beta*	t	*Sig*	*Beta*	t	*Sig*
Region[a]									
Middle	− .02	− 1.39	.17	− .01	− 1.05	.29	− .14	− 8.43	***
Western	.09	8.22	***	− .02	− 1.98	*	− .05	− 3.19	***
Marital[b]									
Unmarried	− .04	− 3.12	**	− .09	− 9.10	***	− .09	− 3.81	***
Gender[c]									
Female	− .10	− 8.93	***	− .14	− 16.66	***	− .13	− 8.04	***
Age	− .15	− 1.22	.22	− .50	− 5.03	***	− .10	− .50	.61
Squared age	.05	.38	.71	.31	3.09	**	.04	.17	.86
Income	.24	21.25	***	.20	23.19	***	.19	11.73	***
Education	.11	9.31	***	.07	7.18	***	.04	2.09	*
Stressful events	.01	.45	.65	− .08	− 3.71	***	− .03	− .61	.54
Trust[d]									
Not trust	− .11	− 9.82	***	− .17	− 20.67	***	− .11	− 7.13	***
Don't know	− .12	− 11.03	***	− .16	− 19.95	***	− .04	− 2.65	***
Social network	.01	.82	.41	− .01	− 1.42	.16	.03	1.85	.06
Social help	.01	.72	.47	− .02	− 2.06	*	− .05	− 2.88	**
Relationship satisfaction	.09	7.79	***	.06	6.98	***	.11	6.68	***
Stressful events x Social help	.00	.05	.96	.02	1.89	.06	.03	1.87	.06
Stressful events x Trust	− .06	− 2.11	*	.03	1.17	.24	− .00	− .07	.95
N	7543			11,637			3750		
F total	94.14		***	201.81		***	31.08		***
df	16			16			16		
Adjusted R^2	.17			.22			.11		

[a]Criterion = eastern; [b]criterion = married; [c]criterion = male; [d]criterion = trustful

*$p < .05$, **$p < .01$, ***$p < .001$

4.1 Social Support, Social Connectedness and Trust in Predicting Health

In the current study, social support was measured with the number of help the respondents received in the last year, of which the items mainly captured the received instrumental help. However, emotional social support can be an important supportive system for psychological well-being (Adams et al. 1996). In addition, perceiving or believing that others can provide appropriate aid without actually receiving it can also be beneficial (Cohen 1988). The present measure of social help is limited in representativeness in this sense. This could cause the small effect size of social help in predicting health.

Social connectedness showed consistent and positive association with health and psychological health. Particularly, neighborhood relationship satisfaction was significant for all the three samples. More satisfied neighborhood relationships indicated better mental health, which is consistent with previous evidence that good neighborhood relationship is linked with lower homicide rates (Sampson et al. 1997). The result of the current study provides consistent evidence that social connectedness can promote better health through

a main-effect model. Evidence suggested that residents of close-knit neighborhoods are more likely to have common goals, to exchange information more and to maintain informal social controls, which could contribute to healthy behaviours at both, individual and community level (Sampson et al. 2002; Putnam 1993). Additionally, the effect on relationship satisfaction may be related to the collectivism nature of Chinese culture. People attach more value on relationships and depend more on family, neighborhood, and other networks of generalized social reciprocity. The culture's influence on health can also be reflected by the effect of trust in predicting health and psychological health. People who believe others more trustworthy have better physical and mental health. This effect is stable across all the three samples.

4.2 Differences Among Urban, Rural and Migrant Population

Consistent with previous findings, the results of the current study indicated that in China both rural and urban people showed different patterns in their health condition as well as in their social relationship. Rural people have more social help and maintain larger social network as compared with urban people. However, social network influences rural and urban people differently; thus, larger social network predicted better health in the urban sample but worse health in the rural sample. This may result from a sense of well-being associated with more reciprocal relationship beyond the family in urban living, as 55.2% of the social network connection is beyond family. While rural social network consists of 59.8% family relatives, considering larger household size is associated with high financial burden (e.g. Lanjouw and Ravallion 1995); this may cause the opposite association. In Yip et al's study (2007), they also found household size negatively predicted subjective well-being in rural people.

The current research extended the understanding of migrant workers' health. Previous findings have suggested that migration is stressful and associated with poor health (Bhugra 2004). Individual and social factors such as the reason of migration can vary the psychological stress involved in the migrating process (Berry et al. 1987). In the current study, migrant workers had highest occurrences of stressful events but showed good health condition, probably because of the young age of the sample. It can also be explained by the upward economic mobility and improved opportunities (Li et. al. 2007). Social relationship also plays a beneficial role in health. Trust and relationship satisfaction, both predicted better physical and psychological health. Social help also significantly buffers the stress for migrant workers. To be noticed, the migrant worker model had least predictive power among the three populations. Besides the small variances explained by controlled variables, an alternative possibility is that many other factors in transition life may account for their health condition, which were not included in current study.

The findings contribute to the knowledge of social relationship and health with evidence of the dual model mechanisms. To the best of my knowledge, the dual model has been first examined with developing country data. With multi-level regression analysis, the result is found to be consistent with previous findings that suggest that social relationship benefits health through stress-buffering as well as a main-effect model which benefits health, irrespective of whether one is under stress. Further, previous studies posed the question whether generalized trust can impact health in a developing country similarly as that in a developed country. The current result provides the answer that in China, generalized trust strongly predicts both physical health and mental health.

Despite the unique findings, a few limitations of the study should be addressed. First, although many studies have argued that social relationship benefit health, the interpretation of the result of the current study is limited to associations and not causation. Second, the measure of social relationship is more constrained on the individual level. The dataset is not allowed to analyze the structural level social capital. In the study of Yip et al. (2007), they found that in rural China, organization membership was neither associated with health nor well-being. However, that result may not be generalized to urban and migrant samples. The effect of social relationship at the contextual level should be considered and explored in further study.

These limitations notwithstanding, the current study with large scale survey data provides a description of social relationship and health condition of urban, rural and migrant people in China, and illuminates the association between the indices of social relationship and health. This result also implies that in China, social and public programs to promote social connection and facilitate exchange of social support can be an effective policy to improve health.

Appendix 1: General Health Questionnaire

Have you ever had any of the following feelings in the last few weeks?

1. Been able to concentrate on whatever you are doing
①Better than usual ②Same as usual ③Less than usual ④Much less than usual
2. Lost much sleep over worry
①Not at all ② No more than usual ③Rather more than usual ④Much more than usual
3. Felt that you are playing a useful part in things
①More so than usual ②Same as usual ③Less so than usual ④Much less than usual
4. Felt capable of making decisions about things
①More so than usual ②Same as usual ③Less so than usual ④Much less than usual
5. Felt constantly under strain
①Not at all ②No more than usual ③Rather more than usual ④Much more than usual
6. Felt you couldn't overcome your difficulties
①Not at all ②No more than usual ③Rather more than usual ④Much more than
7. Been able to enjoy your normal day to day activities
①More so than usual ②Same as usual ③Less so than usual ④Much less than usual
8. Been able to face up to your problems
①More so than usual ②Same as usual ③Less so than usual ④Much less than usual
9. Been feeling unhappy and depressed
①Not at all ②No more than usual ③Rather more than usual ④Much more than usual
10. Been losing confidence in yourself
①Not at all ②No more than usual ③Rather more than usual ④Much more than usual
11. Been thinking of yourself as a worthless person
①Not at all ②No more than usual ③Rather more than usual ④Much more than usual
12. Been feeling reasonably happy, all things considered
①More so than usual ②Same as usual ③Less so than usual ④Much less than usual

Appendix 2: Missing Data

See Table 6.

Table 6 The numbers and proportions of missing data for each independent variable

	Urban (N = 7543)		Rural (N = 11,637)		Migrant (N = 3750)	
	N	%	N	%	N	%
Region	0	0.00	0	0.00	0	0.00
Age	0	0.00	3	0.03	1	0.03
Gender	0	0.00	1	0.01	0	0.00
Marital	2	0.03	9	0.08	0	0.00
Education[a] (years)	6	0.08	248	2.13	6	0.16
Income	36	0.48	163	1.40	0	0.00
Stressful events[a]	13	0.17	314	2.70	0	0.00
Social network[a] (persons)	2	0.03	123	1.06	6	0.16
Social help[a] (persons)	8	0.11	249	2.14	6	0.16
Trust	1	0.01	14	0.12	0	0.00
Relationship satisfaction	14	0.19	170	1.46	0	0.00

Superscripts indicated that mean of variable was imputed for the missing cases

References

Adams, G. A., King, L. A., & King, D. W. (1996). Relationships of job and family involvement, family social support, and work–family conflict with job and life satisfaction. *Journal of Applied Psychology, 81*(4), 411.

Barefoot, J. C., Maynard, K. E., Beckham, J. C., Brummett, B. H., Hooker, K., & Siegler, I. C. (1998). Trust, health, and longevity. *Journal of Behavioral Medicine, 21*(6), 517–526.

Bell, R. A., Leroy, J. B., & Stephenson, J. J. (1982). Evaluating the mediating effects of social support upon life events and depressive symptoms. *Journal of Community Psychology, 10*(4), 325–340.

Berkman, L. F., & Glass, T. (2000). Social integration, social networks, social support, and health. In L. F. Berkman & I. Kawachi (Eds.), *Social epidemiology* (pp. 137–173). Oxford, New York: Oxford University Press.

Berkman, L. F., & Syme, S. L. (1979). Social networks, host resistance, and mortality: A nine-year follow-up study of Alameda County residents. *American Journal of Epidemiology, 109*(2), 186–204.

Berry, J. W., Kim, U., Minde, T., & Mok, D. (1987). Comparative studies of acculturative stress. *International migration review*, *21*(3), 491–511.

Bhugra, D. (2004). Migration, distress and cultural identity. *British Medical Bulletin*, *69*(1), 129–141.

Brissette, I., Cohen, S., & Seeman, T. E. (2000). Measuring social integration and social networks. In S. Cohen, L. Underwood, & B. Gottlieb (Eds.), *Measuring and intervening in social support* (pp. 53–85). New York, NY: Oxford University Press.

Cassel, J. (1976). The contribution of the social environment to host resistance. *American Journal of Epidemiology, 104*(2), 107–123.

Chinese Household Income Project (2010). Available from http://www.ciidbnu.org/chip/.

Cohen, S. (1988). Psychosocial models of social support in the etiology of physical disease. *Health Psychology, 7,* 269–297.

Cohen, S. (2004). Social relationships and health. *American Psychologist, 59*(8), 676.

Cohen, S., Gottlieb, B., & Underwood, L. (2000). Social relationships and health. In S. Cohen, L. Underwood, & B. Gottlieb (Eds.), *Measuring and intervening in social support*. New York: Oxford University Press.

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin, 98*(2), 310.

Everson, S. A., Kauhanen, J., Kaplan, G. A., Goldberg, D. E., Julkunen, J., Tuomilehto, J., et al. (1997). Hostility and increased risk of mortality and acute myocardial infarction: The mediating role of behavioral risk factors. *American Journal of Epidemiology, 146*(2), 142–152.

Finch, B. K., & Vega, W. A. (2003). Acculturation stress, social support, and self-rated health among Latinos in California. *Journal of Immigrant Health, 5*(3), 109–117.

Fujiwara, T., Yamaoka, Y., & Kawachi, I. (2016). Neighborhood social capital and infant physical abuse: A population-based study in Japan. *International Journal of Mental Health Systems, 10*(1), 1.

Goldberg, D. P. (1972). *The detection of psychiatric illness by questionnaire (Institute of Psychiatry Maudsley Monographs No. 21)*. London: Oxford University Press.

Hamamura, T., Li, L. M. W., & Chan, D. (2016). The association between generalized trust and physical and psychological health across societies. *Social Indicators Research*, *134*(1), 1–10.

Harpham, T., Grant, E., & Rodriguez, C. (2004). Mental health and social capital in Cali, Colombia. *Social Science & Medicine, 58*(11), 2267–2277.

Harpham, T., Grant, E., & Thomas, E. (2002). Measuring social capital within health surveys: Key issues. *Health Policy and Planning, 17*(1), 106–111.

Hofferth, S. L., & Iceland, J. (1998). Social capital in rural and urban communities. *Rural Sociology, 63*(4), 574–598.

House, J. S. (1981). *Work stress and social support*. Reading, MA: Addison-Wesley.

Idler, E. L., & Benyamini, Y. (1997). Self-rated health and mortality: A review of twenty-seven community studies. *Journal of Health and Social Behavior, 38*(1), 21–37.

Idler, E. L., & Kasl, S. (1991). Health perceptions and survival: Do global evaluations of health status really predict mortality? *Journal of Gerontology, 46*(2), S55–S65.

Kawachi, I., & Berkman, L. F. (2001). Social ties and mental health. *Journal of Urban Health Bulletin of the New York Academy of Medicine, 78*(3), 458–467.

Kawachi, I., Kennedy, B. P., & Glass, R. (1999). Social capital and self-rated health: A contextual analysis. *American Journal of Public Health, 89*(8), 1187–1193.

Kunitz, S. J., & Levy, J. E. (1986). The prevalence of hypertension among elderly Navajos: A test of the acculturative stress hypothesis. *Culture, Medicine and Psychiatry, 10*(2), 97–121.

Lanjouw, P., & Ravallion, M. (1995). Poverty and household size. *Economic Journal, 105,* 1415.

Li, L., Wang, H. M., Ye, X. J., Jiang, M. M., Lou, Q. Y., & Hesketh, T. (2007). The mental health status of Chinese rural–urban migrant workers. *Social Psychiatry and Psychiatric Epidemiology, 42*(9), 716–722.

Lin, N., Ensel, W. M., Simeone, R. S., & Kuo, W. (1979). Social support, stressful life events, and illness: A model and an empirical test. *Journal of Health and Social Behavior, 20*(2), 108–119.

McKinlay, J. B., McKinlay, S. M., & Beaglehole, R. (1989). A review of the evidence concerning the impact of medical measures on recent mortality and morbidity in the United States. *International Journal of Health Services, 19*(2), 181–208.

Mithen, J., Aitken, Z., Ziersch, A., & Kavanagh, A. M. (2015). Inequalities in social capital and health between people with and without disabilities. *Social Science and Medicine, 126,* 26–35.

Nannestad, P. (2008). What have we learned about generalized trust, if anything? *Annual Review of Political Science*, *11*(1), 413–436.

Naughton, B. (2007). *The Chinese economy: Transitions and growth*. Cambridge, MI: MIT press.

Nee, V. (1996). The emergence of a market society: Changing mechanisms of stratification in China. *American Journal of Sociology, 101*(4), 908–949.

Pan, P. C., & Goldberg, D. P. (1990). A comparison of the validity of GHQ-12 and CHQ-12 in Chinese primary care patients in Manchester. *Psychological Medicine, 20*(4), 931–940.

Poortinga, W. (2006). Social capital: An individual or collective resource for health? *Social Science and Medicine, 62*(2), 292–302.

Putnam, R. D. (1993). The prosperous community. *The American Prospect, 4*(13), 35–42.

Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. New York: Simon & Schuster.

Rosengren, A., Orth-Gomer, K., Wedel, H., & Wilhelmsen, L. (1993). Stressful life events, social support, and mortality in men born in 1933. *BMJ: British Medical Journal, 307*(6912), 1102.

Roux, A. V. D., Merkin, S. S., Arnett, D., Chambless, L., Massing, M., Nieto, F. J., et al. (2001). Neighborhood of residence and incidence of coronary heart disease. *New England Journal of Medicine, 345*(2), 99–106.

Salmond, C. E., Prior, I. A. M., & Wessen, A. F. (1989). Blood pressure patterns and migration: A 14-year cohort study of adult Tokelauans. *American Journal of Epidemiology, 130*(1), 37–52.

Sampson, R. J., Morenoff, J. D., & Gannon-Rowley, T. (2002). Assessing "neighborhood effects": Social processes and new directions in research. *Annual Review of Sociology, 28*(1), 443–478.

Sampson, R. J., Raudenbush, S. W., & Earls, F. (1997). Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science, 277*(5328), 918–924.

Singh-Manoux, A., Marmot, M. G., & Adler, N. E. (2005). Does subjective social status predict health and change in health status better than objective status? *Psychosomatic Medicine, 67,* 855–861.

Tarlov, A. R. (1999). Public policy frameworks for improving population health. *Annuals of the New York Academy of Sciences, 896*(1), 281–293.

Uchino, B. N., Cacioppo, J. T., & Kiecolt-Glaser, J. K. (1996). The relationship between social support and physiological processes: A review with emphasis on underlying mechanisms and implications for health. *Psychological Bulletin, 119*(3), 488.

Yamagishi, T., & Yamagishi, M. (1994). Trust and commitment in the United States and Japan. *Motivation and emotion, 18*(2), 129–166.

Yip, W., Subramanian, S. V., Mitchell, A. D., Lee, D. T., Wang, J., & Kawachi, I. (2007). Does social capital enhance health and well-being? Evidence from rural China. *Social Science and Medicine, 64*(1), 35–49.

Ziersch, A. M., Baum, F., Darmawan, I., Kavanagh, A. M., & Bentley, R. J. (2009). Social capital and health in rural and urban communities in South Australia. *Australian and New Zealand Journal of Public Health, 33*(1), 7–16.