Is Current Depressive Symptoms Associated with the Perception of Poor Neighborhood Quality in Childhood? A Population-based Study

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Abstract

Background Elderly depressive symptoms are an increasing important issue worldwide. Poor neighborhood quality in childhood may increase the risk of depressive symptoms in old age from the perspective of life span theory. The aims of this study were to examine the association between the perception of neighborhood quality during childhood and depressive symptoms in older age.

Methods Data was taken from the China Health and Retirement Longitudinal Study (CHARLS), and a total of 7207 individuals aged 60 years or older were included. Robust multivariable linear regression analysis was applied to estimate the association between the perception of childhood community quality and depressive symptoms, and to examine the interaction effects of education and childhood community quality on depressive symptoms.

Results This study suggested that individuals who perceived the childhood community as unsafe, deficient in close relationship, unclean demonstrated higher risk in suffering from depression. Furthermore, a significant gender difference has been found. However, no significant interaction effect of education revealed.

Conclusion This study proposed that the perception of neighborhood quality during childhood is an important factor associated with depressive symptoms in old age. We urge that older adults' mental health issues could be examined from a childhood neighborhood quality perspective, and call for further steps to promote neighborhood quality lived by Chinese citizens.

Background

Depression was ranked as the second leading cause of global burden of disease in 2010 [1, 2], and expected to be the first by 2030. In particular, elderly have been proved to be of great risk in developing depressive symptoms [3–5], because of complex interactions among genetic vulnerabilities, cognitive diathesis, age-associated neurobiological changes, and stressful events [6]. Particularly, in modern society of China, along with increasing migrant labor, more elderly became empty nest. Living without daily care and social support from family members, things became even worse to the elderly [7]. As shown in one study, overall prevalence of depression among Chinese older adults have reached about 22.6%, and act in a growing trend [8]. Furthermore, it has been testified that suicidal rate among depressed elderly was significantly higher than those who not [8]. In a nutshell, elderly depressive symptoms are an important issue deserves more public attention.

When it comes to the risk factors associated with elderly depressive symptoms, the neighborhood quality is the one that have attracted many attentions. Generally speaking, the neighborhood quality is an indicator which suggests individual's satisfaction towards their neighbors and the community they live in [9], and can be measured by physical and social features [10, 11]. Physical features of the neighborhood quality encompass physical condition of housing [12, 13], access to basic resources [14, 15], dirty-looking [16], noise [17], green space [18] and so on. Social features consist of community-level socioeconomic

status [19, 20], social process (including social cohesion, crime, disorder, organizational participation and so on) [21–23], and the relationship of neighborhood residents [15].

Prior studies have noted that neighborhood quality was associated with self-perceived depressive symptoms greatly, even adjusting for demographic and other individual level factors [24]. For example, neighborhood social cohesion, referring to norms of trust, solidarity and reciprocity, have been extensively examined in relation to depressive symptoms among English older adults [25]. Meanwhile, higher level of community safety has been found to be a protective factor in reducing elderly depressive symptoms, for it enables more physical and social activities [26] and reduces safety concern [27]. Also, the cleanness of community environment examined to be a protective factor in reducing elderly depressive symptoms [16]. However, few of these studies have been conducted in Chinese social settings. Since Chinese older adults engaged more in core families and tied loosely with communities, whether the influences from communities are valid is still unknown. More studies are in need.

Additionally, from the perspective of life span theory, childhood neighborhood quality may have potential influence on individuals' later mental health status until elderly life [28–30]. The reason maybe as following: Firstly, childhood neighborhood conditions represent the lower socioeconomic status, thus leading to more negative life event and increased mental health disorders [31]. Secondly, individuals with poor childhood neighborhood experience may be more prone to experiencing negative emotional states than others, and stress related to neighborhood condition accumulated over the early part of life may affect health outcomes in the future [33, 34]. Finally, individuals lived with poor childhood neighborhood may be less likely to engage in healthy behaviors, such as exercising, not drinking smoking, which was related to depressive symptoms [31]. Accordingly, this study assumed that poor neighborhood quality during childhood will leads to an accumulation of substantial health disadvantages by adulthood, and increases depressive risks in old age.

Furthermore, when it comes to the relationship between neighborhood quality during childhood and depressive symptoms in later life, some social demographic characteristics do matters. Gender difference was discussed but with different answers. Some studies suggested that women may be more vulnerable than men to certain aspects of the neighborhood environment due to differences in social roles [34, 35], while other studies claimed that no significant gender differences exists [36]. However, none of them was conducted among older adults, and whether gender difference is significant in association between elderly depressive symptoms and neighborhood quality during childhood is still unclear. Besides, education was been proved as an important factor related to depressive symptoms in previous studies [37]. In light of the growing enthusiasm for education as a policy lever to improve population health, whether the association between childhood neighborhood and depressive symptoms was moderate with different education level is need of further examination.

Therefore, the objectives of this study were to: 1) determine the association between the perception of neighborhood quality during childhood and depressive symptoms among Chinese older adults; 2) explore whether there is gender difference exists in the association mentioned above; 3) examine the interaction

effect of education, if exists, within the association between the perception of childhood neighborhood quality and depressive symptoms among old people.

Methods

Procedure

This study used the data of China Health and Retirement Longitudinal Study (CHARLS), which is a nationally representative survey. CHARLS aims to collect information on respondents' demographic characteristics, socioeconomic status, health-related behaviors and lifestyles, health status like health conditions, health insurance and health services use. In order to collect those information, hundreds of trained interviewers conducted face-to-face interviews in respondents' homes during 2011–2015 (Wave1, 2011; Wave2, 2013; Wave3: Life History survey, 2014; Wave4, 2015). The current study is an analysis of de-identified public data associated with senior citizens' life history from the CHARLS survey in 2014 and 2015.

Eligible respondents (people aged 45 years or over) of CHARLS were selected through four-stage, stratified, cluster sampling. At first, 150 counties which represent the socioeconomic and geographic pattern of all counties in China were randomly selected. And then, three primary sampling units were selected in each county by probability proportional of the population size. In the third stage, all households in each selected primary sampling unit (PSU) were mapped and a random sample of 24 households was selected. Finally, one resident who aged 45 and above in each household was randomly selected as a subject in the survey [38, 39]. Overall, 17,708 respondents participated in the first wave of CHARLS in 2011 and those people were followed up every 2 years. While, the CHALS also conducted a Life history survey among these respondents in 2014. For the current study, a total of 7207 individuals aged 60 years or older were included. These participants were who had answered the questions of childhood living community quality and childhood related variable in 2014, and the questions on depressive symptoms in 2015.

Measures

Major dependent variables

Depressive symptoms were assessed using the scale of 10-item CESD (Center for Epidemiological Studies Depression) [40], which has been widely used to measure depressive symptoms in older adults. Previous studies have proven that this scale has high reliability and validity among Chinese older adults [41, 42]. Respondents reported the frequency of each symptoms item on a four-point scale: 0 (rarely or none of the time; less than 1 day), 1 (some of the time; 1–2 days), 2 (much or a moderate amount of the time; 3–4 days), or 3 (most or all of the time; 5–7 days) [43] The total score ranges from 0 to 30, with a higher score indicating a higher level of depressive symptoms. With a cut-off point at 10, respondents were divided into two categories, "depressed" or "no depressive symptoms" [40]. The Cronbach's alpha for the ten items was 0. 80 in this study.

Major independent variables

Based on previous studies and all questions related to community quality in the questionnaire, the perception of childhood (before 17 years old) neighborhood quality was measured by the following questions: a. Was it safe being out alone at night; b. Were the neighbors willing to help each other out; c. Were the relationship of neighbors very close-knit; d. Was the community very clean and attractive. The response options of four questions were ranging from 1 to 4 (1 = very safe/ very willing to/ very close-knit/ very clean and attractive; 2 = somewhat safe/ somewhat willing to/ somewhat close-knit/ somewhat clean and attractive; 3 = not very safe/ not very willing to/ not very close-knit/ not very clean and attractive; 4 = not safe at all/ not willing to at all/ not close-knit at all/ not clean and attractive at all). In this study, the total score of "childhood neighborhood quality" (CNQ) was calculated as the sum of all items, ranking between 4 and 16. Higher scores indicated poorer CNQ. Then, in each item, option 1 and 2 were merged as "Yes", and option 3 and 4 were merged as "No".

Potential confounding variables

In reference to previous studies [44, 45], related sociodemographic variables were controlled in this study, including age, gender (male/female), marital status (have spouse/none), years of education, self-reported health status (good/poor), family monthly income, current residence (urban/rural), region (eastern /central /western), family financial situation during childhood(rich/poor) and medical insurance (have/ not have).

Statistical analyses

The data were analyzed using Stata Version 14. Descriptive statistics were calculated to describe the sociodemographic and other characteristics of the sample. And the chi-square (for categorical variables) and t-test (for continuous variables) were conducted to examine the relationship between depressive symptoms and all of the other independent variables. Robust multivariable linear regression analysis adjusted for the cluster effects of the current community ID was applied to estimates the association between the perception of childhood community quality and depressive symptoms in the overall sample. Then, the whole sample was divided into 2 groups (female and male), in order to examine the overall associations between the perception of childhood community quality and depressive symptoms, and the gender difference within it. In addition, three multivariable linear regression analyses were performed to examine the interaction effect of education level and childhood neighborhood quality on the level of depressive symptoms.

Results

As shown in Table1, the average age of the sample was 67.67 (SD = 6.17) and female took an equal place with the male. About 62.04% of respondents lived in rural areas and 23.52% of them reported poor health. In accordance with the poor financial situation during childhood, where 40.36% of the respondents lies in, 91.44% of the elderly received only rudimentary education. The average score of depressive

symptoms was 8.42, and about 57.69% of the surveyed old people had depressive symptoms. With subscale to the neighborhood quality during childhood, the majority of the individuals held a relative negative attitude. Among 7207 participants, 49.45% of them thought the community was not safe, and 54.13% suggested the neighbors were not willing to help each other. Also, 56.96% of the respondents didn't think they develop close relationships with their neighbors. However, only 8.03% of the elderly revealed that the community they live was not clean. Other details were presented in Table 1.

Table 1
Childhood neighborhood quality and socio-demographic characteristics of the sample. (N = 7207).

Variable		Frequency	Percent
Childhood neighborhood quality	Safe		
	Yes	3643	50.55
	No	3564	49.45
	Help each other or not		
	Yes	3306	45.87
	No	3901	54.13
	Close-knit or not		
	Yes	3102	43.04
	No	4105	56.96
	Clean		
	Yes	6628	91.97
	No	579	8.03
Socio-demographic characteristics	Family's Financial Situation		
	Rich	4298	59.64
	Poor	2909	40.36
	Current living place		
	Rural	4471	62.04
	Urban	2736	37.96
	Self-report health		
	Good	5512	76.48
	Poor	1695	23.52
	Education		
	Primary school/below	6590	91.44
	Middle school	493	6.84
	High school	124	1.72
	Medical insurance		

Variable		Frequency	Percent
	Not have	182	2.53
	Have	7025	97.47
	Marry status		
	Not have spouse	1331	18.47
	Have spouse	5876	81.53
	Gender		
	Male	3720	51.62
	Female	3487	48.38
	Region		
	East	2729	37.87
	Central	1813	25.16
	West	2665	36.97
	Variable	Mean	Standard deviation
	Age	67.67	6.17
	Ln(Month income)	4.49	1.16
	Depressive symptom score	8.42	6.58

Insert Table 1 here.

Table 2 demonstrated a detailed covariance analysis based on whether individuals were depressed. Results showed that all four dimensions of the perception of childhood neighborhood quality had significant association with depressive symptoms. Sense of safety and affinity, interpersonal help and the cleanness of the community were positively associated with a better mental health status. Also, many confounding factors such as family's financial situation, current living place, self-perceived health status, gender, education was examined to have significant relationship with depressive symptoms. On the contrary, whether having medical insurance or not was of no significance in this study. Details can be seen in Table 2.

Table 2
Comparison of community neighborhood quality and socio-demographic characteristics by level of depressive symptoms (N = 7207).

Variable	No(%)	Yes(%)	P Value
Safe			< 0.001
Yes	2603(71.45)	1040(28.55)	
No	2368(66.44)	1196(33.56)	
Help each other or not			< 0.001
Yes	2396(72.47)	910(27.53)	
No	2575(66.01)	1326(33.99)	
Close-knit or not			< 0.001
Yes	2235(72.05)	867(27.95)	
No	2736(66.65)	1369(33.35)	
Clean			< 0.001
Yes	4609(69.54)	2019(30.46)	
No	362(62.52)	217(37.48)	
Family's Financial Situation			< 0.001
Rich	3135(72.94)	1162(27.06)	
Poor	1836(63.11)	1073(36.89)	
Current living place			< 0.001
Urban	2086(76.24)	650(23.76)	
Rural	2885(64.53)	1586(35.47)	
Self-report health			< 0.001
Good	4266(77.39)	1246(22.61)	
Poor	705(41.59)	990(58.41)	
Education			< 0.001
Primary school/below	4450(67.53)	2140(32.47)	
Middle school	417(84.58)	76(15.42)	
High school	104(83.87)	20(16.13)	

Note: Std.E was Standard deviation.

Variable	No(%)	Yes(%)	P Value
Medical insurance			0.566
Not have	122(67.03)	60(32.97)	
Have	4849(69.02)	2176(30.98)	
Marry status			< 0.001
Not have spouse	800(60.11)	531(39.89)	
Have spouse	4171(70.98)	1705(29.02)	
Gender			< 0.001
Male	2822(75.86)	898(24.14)	
Female	2149(61.63)	1338(38.37)	
Region			< 0.001
East	2081(76.26)	648(23.74)	
Central	1211(66.80)	602(33.20)	
West	1679(63.00)	986(37.00)	
Variable	Mean(Std.E)	Mean(Std.E)	
Age	67.63(0.09)	67.74(0.13)	0.49
Ln(Month income)	4.54(0.02)	4.40(0.03)	< 0.001
Note: Std.E was Standard deviation.			

Insert Table 2 here.

Table 3 presented the results of multivariable linear regression analysis. After adjusting for sociodemographic and other potentially confounding variables, model 1 showed the association between CNQ and depressive symptoms and model 2–4 showed the results of the relationship between four items about childhood community quality and depressive symptoms among overall sample, female and male respectively. In overall sample, the perception of childhood community quality was poorer, the risk of developing depressive symptoms was higher. Compared with those lived in safe atmosphere, individuals who thought their communities was unsafe suffering from higher risk in developing depressive symptoms among overall sample (β = 0.458) and female sample (β = 0.644). But there was no significance among male sample. Interpersonal help demonstrated no significance among three samples. Whether developing affinity with neighbors or not was significantly associated with depressive symptoms among old people, both male and female. Individuals from unclean communities, compared with those from clear environment, had higher risk in developing depression, but female group seems to be weak at this correlation. Details were offered in Table 3.

Table 3
Linear regression analysis for the relationship between Childhood neighborhood quality and depressive symptoms among Chinese older adults (N = 7207).

Variable	Model1 β (Full model)	Model2 β (Full model)	Model3 β (Male)	Model4 β (Female)
CNQ	0.376*** (0.044)			
Safe(Yes)				
No		0.468** (0.160)	0.295 (0.208)	0.644** (0.245)
Help each other or not (Yes)				
No		0.258 (0.202)	0.259 (0.266)	0.260 (0.264)
Close-knit or not (Yes)				
No		0.695*** (0.187)	0.539* (0.271)	0.843** (0.261)
Whether clean(clean)				
No		0.997** (0.320)	1.530*** (0.402)	0.204 (0.428)
Family's Financial Situation(Rich)				
Poor	0.720*** (0.155)	0.820*** (0.154)	0.494* (0.211)	1.190*** (0.232)
Current living place(Urban)				
Rural	-1.292*** (0.203)	-1.286*** (0.203)	-1.000*** (0.222)	-1.538*** (0.278)
Self-report health(Good)				
Poor	5.137*** (0.212)	5.165*** (0.212)	4.898*** (0.322)	5.421*** (0.264)

Note: ß: beta; Parentheses was reference group and robust standard errors

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Variable	Model1 β (Full model)	Model2 β (Full model)	Model3 β (Male)	Model4 β (Female)
Education status(Primary school/below)				
Middle school	-1.161*** (0.280)	-1.181*** (0.281)	-0.756* (0.358)	-2.077*** (0.486)
High school/up	-0.583 (0.541)	-0.646 (0.525)	-0.574 (0.562)	-0.888 (0.846)
Medical insurance(Not have)				
Have	-0.735 (0.561)	-0.802 (0.571)	-0.897 (0.829)	-0.623 (0.606)
Marry status(Not have spouse)				
Have spouse	-1.195*** (0.211)	-1.213*** (0.213)	-1.205*** (0.334)	-1.195*** (0.280)
Gender(Male)				
Female	1.900*** (0.148)	1.906*** (0.149)		
Region (East)				
Center	1.146*** (0.225)	1.165*** (0.224)	1.228*** (0.278)	1.146*** (0.297)
West	1.508*** (0.221)	1.504*** (0.221)	1.335*** (0.243)	1.699*** (0.311)
Age	-0.024 (0.014)	-0.021 (0.014)	-0.023 (0.018)	-0.012 (0.020)
Ln(Month income)	-0.073 (0.082)	-0.073 (0.082)	-0.213* (0.100)	0.065 (0.112)
Constant	6.637*** (1.242)	8.309*** (1.222)	9.440*** (1.631)	8.619*** (1.648)

Note: ß: beta; Parentheses was reference group and robust standard errors

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Variable	Model1 β (Full model)	Model2 β (Full model)	Model3 β (Male)	Model4 β (Female)
Observations	7207	7207	3720	3487
R-squared	0.220	0.217	0.182	0.212
Note: ß: beta; Parentheses was reference group and robust standard errors				
*** p < 0.001, ** p < 0.01, * p < 0.05				

Insert Table 3 here.

Table 4 revealed the interaction effects of education and the perception of childhood community quality on depressive symptoms. However, no significant interaction effect has been observed. Details are presented in Table 4.

	Model1 β (Full model)	Model2 β (Full model)	Model3 β (Male)	Model4 β (Female)

Table 4
Linear regression analysis for the interaction effect of education level and childhood neighborhood quality on the level of depressive symptoms among Chinese older adults (N = 7207).

Variable	Model1 β (Full model)	Model2 β (Male)	Model3 β (Female)
CNQ	0.372***(0.047)	0.346***(0.063)	0.389***(0.064)
Interaction(Primary school/below #CNQ)			
Middle school # CNQ	0.085(0.235)	0.106(0.277)	0.034(0.277)
High school/up # CNQ	-0.062(0.255)	-0.238(0.307)	0.980(0.736)
Family's Financial Situation (Rich)			
Poor	0.720***(0.155)	0.415(0.215)	1.057***(0.231)
Current living place(Urban)			
Rural	-1.290***(0.204)	-0.992***(0.223)	-1.543***(0.278)
Self-report health(Good)			
Poor	5.137***(0.211)	4.883***(0.323)	5.363***(0.262)
Education status(Primary school/below)			
Middle school	-1.748 (1.681)	-1.491 (2.057)	-2.286 (1.964)
High school/up	-0.179 (1.690)	1.065(2.123)	-6.873(4.261)
Medical insurance(Not have)			
Have	-0.743(0.556)	-0.915(0.848)	-0.517(0.590)
Marry status(Not have spouse)			
Have spouse	-1.196***(0.211)	-1.221***(0.333)	-1.162***(0.276)
Gender(Male)			
Female	1.901***(0.148)		
Region (East)			
Center	1.145***(0.225)	1.182***(0.278)	1.153***(0.297)
West	1.506***(0.221)	1.2941***(0.244)	1.733***(0.312)

Note: CQS: Community quality score;
ß: beta; Parentheses was reference group and robust standard errors
*** p < 0.001, ** p < 0.01, * p < 0.05

Variable	Model1 β (Full model)	Model2 β (Male)	Model3 β (Female)
Age	-0.024(0.014)	-0.029(0.018)	-0.016(0.019)
Ln(Month income)	-0.073(0.082)	-0.214* (0.101)	0.069(0.111)
Constant	6.681***(1.217)	8.126***(1.624)	6.908***(1.662)
R-squared	0.220	0.183	0.215
Note: CQS: Community quality score;			
ß: beta; Parentheses was reference group and robust standard errors			
*** p < 0.001, ** p < 0.01, * p < 0.05			

Insert Table 4 here.

Discussion

This study tried to understand depressive symptoms among old people in China from a childhood neighborhood quality perspective, and further to identify whether there was gender difference and interaction effect of education existed. With evidence from CHARLS, we found that the perception of neighborhood quality during childhood, which was measured by neighborhood safety, affinity between neighbors and the cleanness of community, was associated with depressive symptoms significantly among old people. In addition, it also found that female, compared with male, was more likely to develop depressive symptoms under disadvantage community environment, especially under unsafe environment, while no significant interaction effect of education was observed.

Generally speaking, the connection between elderly mental health issues and neighborhood quality during childhood identified by our study further validates the Life Span Theory. Life events happened earlier do have influence on later life stage, which acts in correspondence with previous studies [46]. Mechanisms for this association could be explained as followings. Firstly, neighborhood quality, such as the affinity and interpersonal relationship between neighbors would help to instill the way children interact with the environment and ruminate social behaviors, which have potential enduring influences on mental health status when they get old [47, 48]. More detailed, poor neighborhood quality during childhood can be considered as an accumulative stressor since it fosters conditions brimming with stress. Individuals may develop fear from an unsafe community, loneliness from an indifferent interpersonal relationship. All these were negative emotions that may lead to unbalanced psychological systems and then depression. Secondly, neighborhood quality lived by children may associated with elderly depressive symptoms through public service utilization. Individuals from poorer communities enjoy fewer social service and public infrastructure, being exposed to more crimes and social bullying, means they suffering from higher risk in developing depressive symptoms but having limited resources to cope with it [49]. In a nutshell,

association between childhood neighborhood quality and elderly depressive symptoms have been examined in Chinese context. On this basis, we urge more public resources should be delivered to those disadvantaged communities, which would benefit long-term depressive symptoms prevention service in the future.

Secondly, female was testified to be more sensitive about childhood neighborhood quality, and easier to develop depressive symptoms when being exposed to poorer neighborhood environment. This finding acts in correspondence with previous studies, which suggested that women were contagious to neighborhood disadvantages through cognitive and psychological pathways [34]. Interestingly, male faced a higher risk in developing depressive symptoms than female when being exposed to an unclean environment. We didn't find similar findings which discussed the gender difference in the relationship between unclean environment and depressive symptoms. However, a study conducted in Jamaica did suggest that poor physical conditions within communities, compared to social conditions, would deteriorate depressive symptoms among male [50]. Thus, it's reasonable for this study to posit that while depressive symptoms of female were more likely to derive from interpersonal relationships within communities, that of male was more likely to arise along with physical conditions of communities. However, this position is supposed to be validated with further evidence.

Thirdly, the interaction effect of education on the relationship between childhood neighborhood qualities was not found in this study. This is counter to most previous studies [37, 51]. The reason may be explained by: previous study was examined among young adulthood [37], while our study was conduct among old adult. Due to no chance or low chance to get high education before 1977s in China, more than 91.44% of participant graduated from primary school or below. While in line with the increasing economic benefits of a college education for younger cohorts, most studies shows a college degree can protects against depressive symptoms [52, 53]. It is possible a similar change is occurring for education and depressive symptoms. Besides education, a set of characteristic factors are found to associated with depressive symptoms either. Those who lived in poor financial situation, with lower education and poor self-perceived health, without spouse were more vulnerable to depression. Thus, this paper called for more mental health service to those elderly lived in disadvantaged status.

Strengths and limitations

There were several limitations within this study have to be acknowledged. Firstly, since the paper was based on a cross-sectional study, there was no causal relationship could be determined. Further longitudinal studies are in need to support the claims made by this study. Secondly, potential confounding factors have not been taken into consideration completely yet. Regarding confounding factors, there would be a degree of residual confounding from people life experiences which perhaps cannot be adjusted for. Thirdly, recall bias existed because the study was retrospective rather than prospective. The measurement of childhood community quality relied on recall. Finally, though CES-D have been widely applied in depression screening, such a self-report instrument may result in missing cases, clinical diagnose should be used to increase the viability of this study. Though the above

weakness exists, this study strength our knowledge about elderly depression from perspective of neighborhood quality in Childhood.

Conclusions

The results of this study provide evidence that the perception of childhood neighborhood quality is a significant factor associated with depressive symptoms among old people, and gender plays an important role in fostering mental health differences among Chinese older adults. We urge that older adults' mental health issues could be examined from a childhood neighborhood quality perspective, and call for further steps to promote neighborhood quality lived by Chinese citizens and efficiency of mental health service delivery in China.

Declarations

Ethics approval and consent to participate The study protocol was approved by the Institutional Review Board of Peking University, Beijing, China. All participants gave consent after being informed to the aim of the survey and their rights to refuse to participate.

Consent for publication Not applicable.

Availability of data and materials The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests The authors declare that they have no competing interests

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Authors' contributions JG, LF, & YZ draft the manuscript, MF & LM was involved in the revised. All authors approved the finally version.

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