**A geographical multivariate multi-level analysis of social exclusion among older people in China: evidence from the CLASS ageing study**

**Abstract**

Social exclusion is increasingly considered to be a multi-faceted concept involving more than simply material disadvantage among older people. The process of social exclusion may be driven by various factors and at different levels including individual, household, group, community, country and global levels. Using data from the 2014 China Longitudinal Aging Social Survey (CLASS) focusing on respondents aged above 60, we employed multivariate multilevel models to estimate simultaneously four dimensions of social exclusion among older people between individuals and between provinces. The results show that the social exclusion of older people varies not only between individuals but also between provinces. From the individual perspective, older people with lower education attainment (often illiterate), in the lowest quintile of personal income and in poor health condition, were the most likely to be excluded. From a geographical perspective, although there are no province-level characteristics (social, economic and social security development) significantly related to the four dimensions of social exclusion, there is nevertheless significant unexplained variation for all dimensions of social exclusion. The negative relationships between exclusion from social relationships and exclusion from financial products, between subjective feeling of exclusion and social activities, and between subjective feeling of exclusion and exclusion from financial products at the provincial level indicate that a province may do well on one dimension of social exclusion but it will not automatically tend to do well on the other dimensions.

**Key words**: social exclusion, older persons, China, geographical multivariate, multi-level analysis, geographical differences

1. **Introduction**

Social exclusion is a broad concept that refers to the separation of individuals or groups from mainstream society. It is a dynamic and multi-dimensional process that deprives people of the rights, resources and services available to the majority (Kneale, 2012; Walsh et al., 2017; Sacker et al., 2017). The process of social exclusion can be driven by poverty, lower levels of educational attainment, ill health, limited social support, age-based discrimination or other unequal power relationships interacting across four main dimensions: economic, political, social and cultural (Phillipson and Scharf, 2004; Bradshaw et al., 2004; Popay et al, 2008); and arising at different levels including individual, household, group, community, country and global levels (Popay et al, 2008).

Walsh and his colleagues (2017) summarised that social exclusion among older people reflects “the combination of demographic ageing patterns, on-going economic instability and the susceptibility of ageing cohorts to increasing inequalities”. A theoretical framework to explain the factors that may lead to social exclusion of older people includes at least four perspectives: age-related characteristics (including loss of paid work, low income, and poor health - frailty or prevalence of illness due to ageing); cumulative disadvantage (vulnerable social position over the life-course that leads to inequalities being more pronounced in later compared to earlier life); ageism; and inadequate infrastructure and planning of living environments (Jose and Cherayi, 2017; Yuan and Ngai, 2012; Phillips and Feng, 2015; Regenmortel et al., 2016; Magleod et al., 2018). All of these features may limit social contact or participation of older adults in various domains of life which results in older people being more vulnerable to social exclusion than younger age groups (Feng, 2011; Scharf and Keating, 2012; Tong and Lai, 2016). Nevertheless, studies of social exclusion among older people are still relatively rare and have mainly been undertaken in higher-income countries (Regenmortel et al., 2016; Walsh et al., 2017). International studies of critical, comparative and analytical perspectives of social exclusion are very few (Scharf, 2015; see also Walsh et al., 2017). This study addresses this research gap and explores social exclusion of older people in China, a rapidly developing country with the largest ageing population in the world. Such research assists understanding of the vulnerability to social exclusion of older people in China and points to associated policy and practice response needs for older people facing social exclusion in their later lives.

There were 209.2 million people aged 60 and over in China in 2014, about 14.4% of the total population, which is expected to reach 36.5% by 2050 (HelpAge International, 2015). Such a large and growing percentage of older people, and rapid population ageing, will increase pressure on Chinese society and will present considerable challenges for the Chinese government. It is widely recognized that China has experienced fundamental changes in economic, demographic and social structures in the last forty years. These have included changes that many older people have also experienced, such as marginalisation and social exclusion during a period of considerable modernisation, and major transition in the institutions of China (Tong and Lai, 2016). It is believed that rapid socio-economic development and demographic change are associated with a generalised decline in close family relationships and pose challenges to filial piety, a traditional value in China that relies on reciprocal duties and responsibilities between the generations (Phillips and Cheng, 2012).

Social changes include a marked decline in average family household size and the migration of many young adults to urban areas or wealthier cities, especially to the eastern seaboard provinces, often in search of better jobs. This phenomenon has exacerbated the growth of numbers of “empty-nest” older people (those living alone or with a spouse only) and weakened the practical availability of inter-generational support from children. In addition, although China has achieved remarkable recent economic success and nearly universal coverage of pension and health insurance for older people since 2011, formal benefits that older persons actually receive are minimal due to inequity among different types of insurance, and variation between provinces as well as between urban and rural areas (Phillips and Feng, 2015; Wu, 2013). Older people without appropriate or sufficient financial and medical support from the state may create a burden on their families and promote tension and anxiety among family members (Feng et al., 2015). Social exclusion could doubly threaten the well-being of older people when institutional challenges intertwine with possible family exclusion. This of course is not unique to China but is a growing problem in many demographically ageing societies even in richer nations. However, in China, it appears that social exclusion may take on a particularly serious expression. Based on the theoretical and empirical evidence from China, we hypothesize that older people who are in the older age cohorts, rural residents, with lower levels of educational attainment and income, without any property, economically inactive, and “empty-nesters” and with poor health are more likely to report social exclusion than those who are in younger-age cohorts, urban residents, with higher levels of educational attainment and income, owning property, economically active, and living with others and in good health [Hypothesis 1].

From a geographical perspective, different dimensions are likely related to the environment of older residents in the ‘operationalization’ of social exclusion in later life (Regenmortel et al., 2016). Older people may be more reliant on resources available in and around their living residence and dependent on the support of others locally and less able to adapt than younger adults (Muramatsu, 2003; Robert and Li, 2001; see also in Feng et al., 2012; Phillips and Yeh, 1999). After 40 years of economic development and an open economic policy, China has witnessed the emergence of spatially differentiated economic and environmental development, and socio-economic and cultural transitions at the province level. Social security is often implemented by local governments, resulting in large geographical variations in social security provision across China. All of these could result in different impacts on and extents of social exclusion among older people due to the different quality and availability of resources that older people can access and use to enable them to maintain connections with society. We predict that higher levels of economic assistance, social services and security development at provincial level are associated with older people being less likely to be socially excluded as they can access higher-quality resources in such areas [Hypothesis 2].

No study has yet explored social exclusion among older people geographically in China. Therefore, this paper will fill this research gap by exploring social exclusion of older people from these individual and geographical perspectives simultaneously, and will depict the experience of disadvantage of older people living in different areas *via* different forms of social exclusion.

1. **Data and Methods**

2.1 Survey Data

This study has used a national representative sample of persons aged 60 and older from the 2014 China Longitudinal Aging Social Survey (CLASS). This survey used a multi-stage sampling method. County-level units (counties, county-level cities, and districts) within provinces were selected as Primary Sampling Units (PSUs); villages (*cun*) in rural areas and neighbourhoods (*shequ* or *juweihui*) in urban areas were selected as Secondary Sampling Units (SSUs). PSUs were randomly selected with a “proportionate to population size” sampling technique from a sampling frame containing all county-level units. The selection of SSUs follows the sample procedures used in the selection of PSUs and the ratio of urban and rural sizes of relevant populations was set at 6:4. People aged 60 and above were randomly selected from each SSU based on a sampling map. The final sample of 476 villages/neighbourhoods within 134 counties fell within 28 out of 31 provinces (or municipalities) in China (CLASS webpage[[1]](#footnote-2)). There were 7,518 respondents with sufficient data for the present analysis, nested within 28 provinces.

2.2 Dependent variables

Four dimensions of social exclusion were available from the CLASS data: exclusion from social relationships, exclusion from social activities, subjective feeling of exclusion and exclusion from financial products. These four dimensions of social exclusion were largely based on Kneale’s (2012) construction of social exclusion.

*Social relationship exclusion* reflects whether older people report relationships with children, friends, and other immediate family members, how close the respondent perceives these relationships to be, and the extent to which these relationships are maintained through meeting up, helping each other, or through talking on the phone. Exclusion from social relationships may be treated as an individual’s ability to maintain the kinds of relationship that the majority of older people report experiencing (Kneale, 2012). CLASS respondents were asked three sets of questions regarding their relationship with children, friends and their immediate family members. For each question, the CLASS questionnaire allocated 4 columns for information on respondents’ relationships with children. The questions were “How many times have you met with this child”, “how many times has this child helped you for housework”, and “how many times have you and your child called each other” for the relationship with children. For each question, respondents rated the frequency on a 0-4 scale (where 0=almost never, 1=a couple of times a year, 2=at least once a month, 3=at least once a week, and 4=almost every day). These scales were further transferred into points: 0, 0.25, 0.5, 0.75 and 1 respectively. In addition, there is one derived question for relationships with children: “number of close relationships with children” with points for 0 (None), 0.5 (have one close child), 1 (two close children) and 1.5 for those with three or more close children. In terms of the relationship with friends/immediate family, “at least how many friends are you able to meet each month”, “how many friends are you comfortable talking about private affairs with” and “how many friends are able to provide you their help when you need” were questions used to measure such social relationships. For each question, respondents rated one of six categories: None, 1, 2, 3-4, 5-8, and 9 and above. These categories were further transferred into points: 0, 0.2, 0.4, 0.6, 0.8 and 1 respectively. The scale of exclusion from social relationships was constructed by summing the unweighted points from these questions. A higher score indicates a greater level of inclusion in social relationships. The resultant values range between 0 and 26 (the maximum scores for the relationship with children, number of close relationships with children, relationship with friends, and relationship with immediate family were 20, 1.5, 3 and 3 respectively; however, no one could have all the maximum scores for these four relationships).

*Subjective feeling of exclusion* includes the feeling of being ignored, isolated and lonely in the last week (respondents replied “No”, “Sometimes” or “Yes” to these questions, and the points for these categories were 1, 0.5 and 0 respectively); and also whether they agree or disagree to feeling isolated because of their age, that feeling of growing old is a form of loss (such as experiencing poorer health and loss of friends), and feeling that it is more difficult to make new friends. Points for completely disagree, disagree, neutral, agree, and completely agree were 1, 0.75, 0.5, 0.25 and 0 respectively. Again, the scale of the subjective feeling of exclusion was constructed by summing the unweighted points from these questions. A higher score indicates a lower level of subjective feeling of exclusion. Values range from 0 to 6 (the maximum score for each question was 1); higher scores imply feelings of inclusion.

*Exclusion from social activities* may indicate inability to participate effectively in social, political and cultural life, and isolation and distance from mainstream society (Duffy 1995; see also in Kneale 2012). The CLASS dataset collected information on whether respondents participated in various activities, including community security patrols, help for other older people, environmental protection, dispute resolution, chatting with others as a psychological consulting service, providing professional volunteer service (i.e. in a clinic), taking care of another family’s children, and any other participation in the last three months. We dichotomised this into “excluded” (scored as zero) if people did not participate any activities and “not excluded” (scored as 1) if people participated in at least one social activity.

*Exclusion from financial products* reflects the fact that many older people are unable to have the financial independence which might enable them to access resources to help them manage their finances either in the long term or on a day-to-day basis. Financial exclusion is increasingly being recognized as a very important aspect of exclusion in older age and one which has numerous social and other ramifications (Aguila et al., 2015, 2016) and is relatively little studied, especially in lower- and middle-income countries. Financial exclusion can result in older people falling into debt and being unable to afford common consumer goods that others enjoy, and a general inability to be financially assured or independent (Kneale, 2012; Feng et al., 2015). Financial products are defined broadly to include short-term incomes (income from labour and work as a main financial source), medium-term products (savings and other financial products) and long-term products (pension and pension support). Points for short-term income, medium-term products and long-term products were 2, 1, and 2 respectively according to Kneale’s (2012) method. The scale of exclusion from financial products was constructed by summing the unweighted points from these questions (values range 0 - 5). We dichotomised this into “excluded” (0) for values of 0 to 2 for those who only have 1 or no financial product, and “not excluded” (1) for values of 3 to 5 for those who have at least 2 financial products, according to Kneale’s (2012) method.

Therefore, there are two continuous dependent variables (exclusion from social relationships and subjective feeling of exclusion) and two binary variables (exclusion from social activities and exclusion from financial products) in this study (distributions in Table 1).

2.3 Independent variables

The independent variables selected for this study include both individual-level and province-level variables. The individual level variables are age, gender, urban-rural residency, ethnicity, educational attainment, living arrangements, housing tenure, economic activity, total personal income last year and self-rated health. Six variables from the *Chinese Statistical Yearbook* in 2015 were selected to reflect the environmental effects of each province including urbanisation, migration, economic development (GDP per capita and mean income), social security and social services investments. As the correlations among these six variables are above 0.55, and to avoid multicollinearity in the model, a factor analysis was used to derive a summary score for each province (Johnston, 1978). The factor analysis generated one factor with a communality of 76% so that the majority of the variation in the six variables is captured in just one dimension. The factor is positively correlated with the five variables (urbanisation, migration, economic development (GDP per capita and mean income), and social service investments), and negatively correlated with social security. This means that a high value on this score indicates a province that is characterised by a higher level of urbanisation, GDP per capita, migrant rates, average income, and service investments, but has a lack of social security development. This is consistent with previous literature (see for example, Li & Wei, 2010). Table 1 also shows the distributions of the independent variables’ values across the sample.

<Table 1 about here>

3 Methods: Hierarchical analysis with multi-variate multi-level models

Given the number of responses and the hierarchical structure of the data with individuals nested within provinces, an appropriate model is the multi-variate multi-level model (Rasbash et al., 2009). Such models estimate parameters for multiple response outcomes at the same time, but also take account of the variability between individuals and between places simultaneously (Goldstein et al., 2009). The advantages of using this method include that it can first test whether a predictor variable is differently related to each of the responses. It also provides the covariance between response variables at each level, which provides understanding of the pattern of correlation at an individual level as well as the correlation at province level conditional on predictor variables (partial correlation). Finally, it can capture the ‘micro-level’ individual characteristic effect and the ‘macro-scale’ effect at the provincial level, simultaneously. The variance of the between-province differences are conditional on whatever variables are specified in the fixed part. In this study, a multi-variate model with two linear models and two Binomial probit models are used (Deeming and Jones, 2015) (the details of multi-variate multilevel model are provided in the Supporting Information). The analysis was conducted in the MLwiN software 3.01 (Rasbash et al., 2009). Because of the discrete nature of the exclusion from social activities and exclusion from financial products, Bayesian MCMC estimation is used for more robust estimation (Browne & Draper, 2006). The Variance Partition Coefficient (VPC) (Goldstein, 2003) is used to portray the proportion of higher-level provincial variation relative to total variation.

The analysis consists of a sequence of three models: a null model to ascertain the unexplained variance for each dimension and the correlations at each level without any predictors (this will be discussed in section 4.2, on geographical differences); a model incorporating all individual characteristics of older people initially (Model 1), then Model 2 adding the factor scores for provincial characteristics. To improve estimation, age and factor scores of the province (continuous variables) are centred on their grand mean so that the estimated constant is then not a value outside the range of the observed data. Table 2 shows results of the multi-variate multi-level models. This also shows the residual variances at the individual and provincial levels after taking into account the variables that are included in the fixed part of the model. The covariances between responses at individual level and province levels in the models have been transformed into correlations.

1. **Results**

4.1 Effects of individual characteristics on social exclusion

From the results of Model 1 in Table 2, individual characteristics have different statistical effects on the four dimensions of social exclusion among older people. In terms of exclusion from social relationships, the coefficient of 0.123 for age is significant at p=0.01 and being positive, shows that older people were less likely to be excluded. The strongest effects are those showing that older people who were female, non-Han Chinese, with education attainment lower than high school (being illiterate; or with only elementary schooling), and not owning any property were less likely to be excluded from social relationships than people just over 60 (younger in this cohort) who were male, Han-Chinese, with educational attainment of high school level and above, and owning their property. Those older people who were in the third quintile income category were significantly less likely to be excluded from social relationships than those in the lowest quintile income category (coefficient=0.306). “Empty nest” older people and those only in poor or fair health were more likely to be excluded from social relationships than those living with others and in good health (coefficient=-1.45 for “Empty nest” older people, and -0.325 and -0.859 respectively for fair and poor health).

In terms of the subjective feeling of exclusion, older groups amongst the over-60s were more likely to feel excluded (coefficient=-0.007), with other strong effects being for rural residents, non-Han Chinese and those with educational attainment lower than high school (being illiterate; elementary or middle school). Respondents who were “empty nesters”, in the lowest quintile income category, in poor or fair health, and who did not own any property were significantly more likely to feel excluded than those who were female, urban residents, Han-Chinese, with educational attainment of high school and above, living with others, economically active, in the 3rd, 4th and 5th quintile income categories, in good health and owning any property (Table 2).

Although the models for exclusion from social activities and exclusion from financial products are different from the previous two outcomes, the results of probit models in Table 2 show the effects of individual characteristics were more or less similar. Age has a possibly declining effect on one’s participation in social activities and having at least 2 financial products (-0.012 and -0.007 respectively); older people who were in a poor health condition and had the lowest quintile income were also significantly less likely to participate in social activities and to have at least 2 financial products than those who were in good health and with income above the lowest quintile. For exclusion of social activities, older people who were female, non-Han Chinese, with high school and above educational attainment, and living with others were significantly less likely to be excluded from social activities than those who were male, Han-Chinese, educational attainments of lower than high school (illiterate, elementary or middle school), and “Empty nesters”. While older people who were male, rural residents, economically active, and those who own property were significantly less likely to be excluded from financial products than females, urban residents, the economically inactive, and those who did not own any property. No substantial differences were found in the individual effects on the social exclusion when the province characteristics were added to Model 2 and there were no province-level characteristics significantly related to the four dimensions of social exclusion in Model 2.

<Table 2 about here>

4.2 Geographical differences of social exclusion in China

Table 2 also shows the results for the variances at level 2 (individual) and level 3 (provinces), and the VPC for three models. Although the variances in model 1 and 2 become smaller in comparison to the Null model when individual and provincial characteristics are included, there is nevertheless significant unexplained variation for all dimensions of social exclusion. The VPC of each type of social exclusion shows that a slight proportion of the remaining unexplained variation lies at the province level. For example, 5.6% of the total variation lies at the province level for the exclusion from social relationships in the Null model, and this proportion does not change much in Model 1 and Model 2 (5.5%). In order to illustrate the provincial differentials for each dimension, Figures 1A - 1D plot the geographic differentials for each dimension of social exclusion for Model 2, and show the 95% comparative confidence intervals (CIs). The constant/probit on the vertical axis represents the level 3 province differentials, that is the term associated with the Variable constant/probit at that level in Table 2. The value of 0 stands for the mean score of each dimension of social exclusion controlled both for individual and province characteristics (against the national average). Looking at spatial variations, in terms of exclusion from social relationships, Tianjin was the municipality least likely to show people were excluded from social relationships while Yunnan at the other end of the graph was the most likely to show exclusion. According to the CIs, six provinces, older people in Sichuan, Heilongjiang, Jiangxi, Henan, Fujian, and Guizhou, were less likely to be excluded from social relationships than the national average; while in some, such as Zhejiang and Hunan, they were significantly more likely to be excluded from social relationships than the national average. The overlapping 95% CIs among the other provinces indicates no substantial differences among these provinces (Figure 1A) (the detailed values for each province can be found in Supporting Information 2). In the case of the subjective feeling of exclusion, those in Tianjin, Guizhou and Henan were less likely to feel excluded than the national average; while, those in Shaanxi, Shanghai and Jiangxi were more likely to feel being excluded than the national average (Figure 1B). Figure 1C shows that in Shaanxi, older people are least likely to be excluded from social activities, but in Figure 1B, they were the most likely to feel excluded, which appears contradictory. Shaanxi province is located in the western part of China, and it is a less developed province. Younger people from Shaanxi province may have migrated to rich provinces for higher salaries, and left their older parents behind. Older people may try to participate in social activities to release subjective feeling of exclusion; however, the results show that participating in social activities could not release older people’s feeling of exclusion in Shaanxi province. In four provinces, Anhui, Hubei, Liaoning, and Guizhou, older people were more likely to be excluded from social activities than the national average. For exclusion from financial products, those in Yunnan, Qinghai, Sichuan and Heilongjiang were less likely to be excluded than the national average, while those in several provinces such as Henan, Liaoning, and Guizhou were more likely to be excluded from financial products than the national average.

<Figure 1 about here>

To illustrate the spatial patterns of the four dimensions of social exclusion in China, Figure 2 presents the provincial differentials of social exclusion within four regions: the Western region, the North and Northeast region, the Central region, and the Coastal region. Light grey indicates provinces with significantly lower likelihood of being excluded than the national average, grey shows provinces within the national average of exclusion, and dark grey shows provinces where older people are significantly more likely to be excluded than the national average. Two pairs of adjacent provinces (Sichuan and Guizhou, and Jiangxi and Fujian) are where people are less likely to be excluded from social relationships, while in the other adjacent provinces they are more likely to be excluded (Yunnan, Hunan and Zhejiang) (Figure 2A). The variances in geographic differentials in subjective feeling of exclusion are very small (Figure 2B). Apart from the North and Northeast part of China, each region has one province in which people were more likely to feel excluded (Shaanxi in the western region, Jiangxi in the central region, and Shanghai in the coastal region). People in the central area of China were more likely to be excluded from social activities (Figure 2C). In terms of the exclusion from financial products, people in the Western region were less likely to be excluded from financial products (Figure 2D). There is no clear pattern on the four dimensions of social exclusion among older people across China. These maps could partly illustrate the contention that social exclusion varied across mainland China in ways which could not be explained by the province characteristics in Model 2.

<Figure 2 about here>

Table 2 also indicates the correlations among the four dimensions of social exclusion at the individual level as well as province level. Although the correlation coefficients of four dimensions of social exclusion among three models are different, the directions are similar. From the results of Model 2, at the individual level, the correlations were very small and thus, there were effectively no correlations among the four dimensions of social exclusion at this level. Therefore, each type of social exclusion was relatively independent and has to be treated in policy terms as a separate dimension which needs to be tackled on its own merits. We have seen that, at the province level, some provinces were better on one dimension of social exclusion but were poorer on others (such as Shaanxi).

Apart from the positive relationship between exclusion from social relationships and exclusion from social activities (0.051), and exclusion from social activities and exclusion from financial products (0.119), the negative signs of other correlations support these results. If a province did well on the exclusion from social relationships, it did not tend to do so well on the other two dimensions (correlation coefficients being -0.096 and -0.249 on subjective feeling of exclusion and exclusion from financial products respectively). So, if a province did well on the subjective feeling of exclusion, it did not tend to do as well on exclusion from social activities (correlation coefficient= -0.395) and exclusion from financial products (correlation coefficient= -0.198), but it was inclined to do well on exclusion from financial products (correlation coefficient= -0.353).

**5 Discussion and conclusions**

This paper identifies four dimensions of social exclusion among older people in China. Informed by three perspectives on the theory of social exclusion among older people, results show that the effects of different individual characteristics on the four dimensions of social exclusion vary. This partly supports our Hypothesis 1. Older age was associated with being less likely to be excluded from social relationships but more likely to be excluded from social activities and financial products and a greater likelihood of feeling excluded. It is generally accepted outside Asia that older people at advanced ages have a higher likelihood of experiencing social exclusion than older people closer to 60, and Key and Culliney (2018) found in the UK that the oldest-old (85+) are at greater risk of experiencing exclusion from social relations than those aged 65 to 84. The finding in this study in Asia may reflect the effect of a different tradition, that of filial piety, which has previously been particularly prominent in China. Here, older people at a more advanced age receive greater respect both within societies and families, which may ensure that the oldest people meet, contact and receive help from their children and other immediate family members regularly. Local governments also provide financial and care assistance to the oldest old in China which could potentially reduce their risk of exclusion from social relationships (Phillips and Feng, 2015). Age-related mobility and other problems may however be barriers for older people at advanced age, preventing their participation in social activities, a finding consistent with research in Belgium (Regenmortel et al., 2017). Combined with ageism, they could be more likely to feel isolated from others.

Important gender and social difference are also evident. For example, females were less likely to be excluded from social relationships and social activities, and less likely to feel excluded than males, but they were more likely to be excluded from financial products. This is different from a study in India where older women reported severe social exclusion (Jose and Cherayi, 2017), but is consistent with previous findings in China that female older people were economically excluded (Feng, 2011). This may reflect different cultures between Asian countries. Different from Feng’s (2011) findings, these current results show that rural residents were less likely to be excluded from financial products than urban residents, which may reflect the social security development in rural areas in recent years (Phillips and Feng, 2015). However, whilst rural residents were more likely to be involved in social relationships, they were more likely to feel they were being excluded. This may well reflect an emerging issue of rural older people being “left-behind” in contemporary China. They are more likely to keep in contact by phone with their children who have often migrated to urban areas for better prospects but, subjectively, they are more likely to feel they are being excluded. Having more education at high school level and above was associated with being more likely to be excluded from social relationships, but less likely to feel excluded. Higher levels of education could perhaps help older people to reduce psychological stress and relieve the feeling of exclusion (Ross and Zhang, 2008). Data from Australia also suggest that higher education is an important protective factor from social exclusion for older people (Miranti and Yu, 2015). “Empty nest” older people, whose children have left home, were more likely to be excluded from social relationships and activities but they were less likely to be excluded from financial products. We speculate this is perhaps because they receive remittances from children working elsewhere. The empty nest phenomenon is new in China but of growing importance, as in many other demographically ageing countries. In China, it seems that older people who are better off are often more likely to live alone or with a spouse only (the empty nest), possibly in order to enjoy independence and a better quality of life and to avoid intergenerational conflicts (Feng et al., 2015; Zhou and Qian, 2008). Higher income and good health were, perhaps unsurprisingly, associated with being less likely to be excluded on the four dimensions, which supports research in the West (Australia, Miranti and Yu, 2015; UK, Kneale, 2012; Sacker et al., 2017). Higher income and better health conditions appear as important protective factors against social exclusion for older people.

Regarding geographical differences on four dimensions of social exclusion, the findings did not support Hypothesis 2 even after considering the key social, economic and social security development as province characteristics in China. The unexplained province variances on four dimensions of social exclusion indicate that there are substantial geographical differences in these dimensions, but there is no clear geographical patterning to the distribution of social exclusion distribution according to Coastal, Central and Western regions of China, given the spatial diversity of development in the nation. Some provinces show significantly lower or higher likelihood of being excluded than the national average which implies there might be other special province characteristics (possibly ageism-related social cohesion, quality of access to services, or local government policy benefits) that we are not able to measure quantitatively. A province may do well on one dimension of social exclusion but it will not automatically tend to do well on the other dimensions. Particularly, the correlation between exclusion from social activities and subjective feeling of exclusion (correlation coefficient= -0.395) implies that encouraging older people to engage in social activities is not effective in preventing older people from feeling they are being excluded at the province level. In addition, this suggests that a higher level of financial security would not necessarily relieve older people from feeling excluded at the province level according to the correlation between exclusion from financial products and the subjective feeling of exclusion (correlation coefficient= -0.198).

Whilst portraying interesting and novel findings, this paper has limitations. First, the survey lacks information to analyse the full spectrum of dimensions of social exclusion among older people in China. For example, it does not have information on cultural activities, civic activities and access to information, nor on local amenities, public transport and common consumer goods, as in some international studies such as Kneale’s (2012). However, for China, with the largest number of older people in any nation, we have reviewed this national representative survey for older people and the CLASS data present the most comprehensive and recent information on social exclusion currently available. Ultimately, qualitative data on social exclusion would be of value in explaining the findings and our analysis helps identify themes for a subsequent research agenda. Second, we tried to enter each province’s characteristic into the model to identify whether there is a possible effect of specific province characteristics on social exclusion, which would assist policy development at this level. However, none were individually important in accounting for province differentials. Third, the province level as a spatial unit maybe too large and a finer-resolution spatial unit might generally be preferred. However, we can only identify the sample at province level and we believe the province level remains appropriate as the majority of government investments are from governments at province level rather than from central government. Furthermore, CLASS data could be linked with other data from the Chinese Statistical Yearbook at the province level. Other provincial-level environmental determinants could be considered, such as access to transport, social cohesion, local culture or other institutions. We do not have such information but we have included the key factors to reflect the social, economic and social security development in China.

This study has addressed the lack of studies and has conducted multi-level analysis to investigate the role of objective individual/environmental features of social exclusion among older people (Regenmortel et al., 2016). The findings in this paper provide important insights into the growing challenges of social exclusion among older people in China. We have found that social exclusion of older people varies not only among individuals but also between provinces. From the individual perspective, these results suggest that it is worth paying attention to the most excluded older people: those with lower educational attainment (who are often functionally illiterate), those in the lowest quintile for personal incomes and those in poor health. From the macro-scale provincial and geographical perspective, older people who are in provinces showing better social activities and access to financial products do not tend to be less likely to feel they are being excluded. From a policy perspective, this implies that encouraging older people to engage in social activities or to aim for better financial security will not necessarily be effective in relieving older people’s feelings of being socially excluded. These findings therefore have important policy implications. For example, the public sector needs to develop home-visit services or psychological consulting services for older people to help them face social exclusion rather than just encouraging them to participate in social activities. In addition, there is no clear pattern on the four dimensions of social exclusion among older people across China, which implies that a unique ‘universal’ national policy may not help to adjust well for any social exclusion among people in different places. This points to the need for the development of locally sensitive and probably differential policies to face social exclusion at the local government scale. This geographical study has provided an important perspective which has proven particularly interesting in indicating spatial differentiation of some magnitude among China’s provinces in exclusion terms. It raises numerous policy and research questions for further investigation.

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**Table 1 Descriptive univariate information for individual variables**

|  |
| --- |
| **Dependent variables** n=7,518 |
| Exclusion from social relationships | 0-26, mean=8.9 |
| Subjective feeling of exclusion | 0-6,mean=4.1 |
| Exclusion from social activities | Excluded (77.7%), Not excluded (22.3%) |
| Exclusion from financial products | Excluded (75.2%), Not excluded (24.8%) |
|  |  |
| **Independent variables** |
| Age | 60-113, mean=69 |
| Gender | Male (53.9%), Female (46.1%) |
| Resident | Urban (64.4%), Rural (35.6%) |
| Ethnicity | Han-Chinese (93.4%), Non-Han (6.6%) |
| Educational attainment  | Illiterate (20.6%), Elementary School or below (35.9%), Middle School (23.9%), High school & above (19.5%) |
| Living arrangements | Empty nest (47.3%), Other living arrangements (52.7%) |
| House tenure  | Own any property (86.8%), No (12.8%), Missing (0.4%) |
| Economically Active  | Economic Activity (20.4%), Economic Inactivity (79.5%), Missing (0.1%)  |
| Total personal income  | In quintiles: Lowest quintile (0-2,000 RMB), 2nd quintile (2,000-7,200RMB), 3rd quintile (7,200-20,000), 4th quintile (20,000-31,609RMB), Highest quintile (31,610+RMB), and Missing (7.5%) |
| Self-rated Health  | Good (45.8%), Fair (30.4%), Poor (23.7%), No answer (0.1%) |
| Factor scores for province characteristic | -1.34-2.6 |

**Table 2 Multivariable multilevel models results for four dimensions of social exclusion**

|  |  |
| --- | --- |
|   | Null Model |
|   | Exclusion from social relationships | Subjective feeling of exclusion | Exclusion from social activities | Exclusion from financial products |
| **Fixed Part** |
| **Constant /probability** | 8.941(0.169)\*\*\* | 4.117(0.054) \*\*\* | 0.22++ |  0.24++ |
|    |
| **Random Part** |
| **Level3: Province** |
| Variance | 0.707 (0.216) \*\*\* | 0.075(0.023) \*\*\* | 0.079(0.026) \*\*\* | 0.074(0.023) \*\*\* |
| **Correlation** |   |   |   |   |
| Exclusion from social relationship | 1 |   |   |   |
| Subjective feeling of exclusion | -0.275 | 1 |   |   |
| Exclusion from social activities | -0.003 | -0.211 | 1 |   |
| Exclusion from financial products | 0.143 | -0.506 | 0.249 | 1 |
| **Level2: Individual** |
| Variance | 11.732 (0.196) \*\*\* | 1.284(0.021) \*\*\* | - | - |
| **Correlation** |   |   |   |   |
| Exclusion from social relationship | 1 |   |   |   |
| Subjective feeling of exclusion | 0.146 | 1 |   |   |
| Exclusion from social activities | - | - | 1 |   |
| Exclusion from financial products | - | - | 0.048 | 1 |
| VPC | 0.056 | 0.055 | 0.073 | 0.069 |

Notes: ++: for the binary outcomes (exclusion from social activities and exclusion from financial products), the probit form has been convert to a probability form

 \*\*\*p<0.01, \*\*p<0.05, \*p<0.1

**(Continued) Table 2 Multivariable multilevel models results for four dimensions of social exclusion**

|  |  |  |
| --- | --- | --- |
|  | Model 1 | Model 2 |
|  | Exclusion from social relationships | Subjective feeling of exclusion | Exclusion from social activities | Exclusion from financial products | Exclusion from social relationships | Subjective feeling of exclusion | Exclusion from social activities | Exclusion from financial products |
| **Fixed part** |
| **Constant /probability** | 9.032(0.227)\*\*\* | 4.372(0.067)\*\*\* | 0.20++ | 0.09++ | 9.058(0.225) \*\*\* |  4.369(0.066)\*\*\* | 0.20++ | 0.09++ |
| **Age** | 0.123(0.005)\*\*\* | -0.007(0.002) \*\*\* | -0.012(0.002)\*\*\* | -0.007(0.003)\*\*\* | 0.123(0.005) \*\*\* | -0.007(0.002)\*\*\* | -0.012(0.002)\*\*\* | -0.007(0.003)\*\*\* |
| **Female (ref: Male)** | 0.522(0.08) \*\*\* | 0.057(0.026) \*\* | 0.126(0.035) \*\*\* | -0.206(0.038)\*\*\* | 0.521(0.078) \*\*\* | 0.056(0.026) \*\* | 0.126(0.034) \*\*\* | -0.209(0.038) \*\*\* |
| **Rural (ref: Urban)** | 0.175(0.097) \*\* | -0.122(0.032) \*\*\* | 0.036(0.044)  | 0.436(0.044) \*\*\* | 0.175(0.096) \*\* | -0.123(0.032) \*\*\* | 0.033(0.045) | 0.435(0.044) \*\*\* |
| **Non-Han (ref: Han-Chinese)** | 0.962(0.157) \*\*\* | -0.071(0.053)\* | 0.415(0.066) \*\*\* | -0.076(0.077) | 0.959(0.157) \*\*\* | -0.073(0.053) \* | 0.415(0.066) \*\*\* | -0.075(0.079) |
| **Educational attainment (ref: High school & above)** |
| Illiterate | 0.478(0.144) \*\*\* | -0.269(0.048) \*\*\* | -0.117(0.064)\*\* | -0.007(0.071) | 0.472(0.143) \*\*\* | -0.268(0.048) \*\*\* | -0.122(0.063) \*\* | -0.009(0.069) |
| Elementary School or below | 0.514(0.12) \*\*\* | -0.174(0.041) \*\*\* | -0.076(0.054)\* | 0.07(0.06) | 0.512(0.122) \*\*\* | -0.175(0.04) \*\*\* | -0.077(0.054) \* | 0.069(0.058) |
| Middle School | 0.213(0.117) \*\* | -0.065(0.04) \* | 0.033(0.051)  | -0.012(0.057) | 0.212(0.118) \*\* | -0.066(0.039) \*\* | 0.031(0.052) | -0.014(0.059) |
| **Empty nest (ref: Other living arrangements)** | -1.45(0.076) \*\*\* | -0.151(0.026) \*\*\* | -0.07(0.034) \*\* | 0.033(0.036) | -1.45(0.075) \*\*\* | -0.152(0.026) \*\*\* | -0.072(0.034) \*\* | 0.032(0.036) |
| **House tenure (ref: Own any property)** |
| No | 0.388(0.113) \*\*\* | -0.106(0.037) \*\*\* | 0.013(0.051)  | -0.133(0.058) \*\* | 0.387(0.114) \*\*\* | -0.108(0.038) \*\*\* | 0.011(0.051) | -0.135(0.057) \*\* |
| **Economically Active (ref: Economically inactive)** |
| Economically active | 0.039(0.103) | 0.075(0.035) \*\* | 0.056(0.045)  | 1.348(0.046) \*\*\* | 0.039(0.104) | 0.075(0.035) \*\* | 0.054(0.045) | 1.347(0.045) \*\*\* |
| **Income (ref: Lowest Quintile)** |
| 2nd Quintile | -0.146(0.134)  | 0.015(0.045)  | 0.107(0.061) \*\* | 0.197(0.063) \*\*\* | -0.148(0.133) | 0.014(0.045) | 0.107(0.06) \*\* | 0.193(0.063) \*\*\* |
| 3rd Quintile | 0.306(0.13) \*\*\* | 0.196(0.044) \*\*\* | 0.113(0.06) \*\* | 0.265(0.064) \*\*\* | 0.306(0.133) \*\* | 0.195(0.044) \*\*\* | 0.113(0.058) \*\* | 0.26(0.063) \*\*\* |
| 4th Quintile | 0.017(0.145)  | 0.302(0.049) \*\*\* | 0.059(0.066)  | 0.145(0.073) \*\* | 0.017(0.145) | 0.303(0.048) \*\*\* | 0.056(0.065) | 0.139(0.074) \*\* |
| Highest Quintile | 0.185(0.156)  | 0.409(0.052) \*\*\* | 0.153(0.07) \*\* | 0.223(0.075) \*\*\* | 0.183(0.156) | 0.41(0.051) \*\*\* | 0.153(0.069) \*\* | 0.217(0.078) \*\*\* |
| Missing | 0.319(0.166) \*\* | 0.137(0.057) \*\*\* | -0.03(0.077)  | 0.183(0.078) \*\*\* | 0.314(0.167) \*\* | 0.137(0.056) \*\*\* | -0.031(0.079) | 0.186(0.083) \*\* |
| **Self-rated Health (ref: Good)** |
| Fair | -0.325(0.089) \*\*\* | -0.225(0.029) \*\*\* | -0.067(0.038)\*\* | -0.018(0.042) | -0.323(0.086) \*\*\* | -0.226(0.029) \*\*\* | -0.067(0.04) \*\* | -0.019(0.042) |
| Poor | -0.859(0.098) \*\*\* | -0.626(0.032)\*\*\* | -0.202(0.043)\*\*\* | -0.1(0.047) \*\* | -0.86(0.095) \*\*\* | -0.628(0.033) \*\*\* | -0.204(0.045) \*\*\* | -0.101(0.047) \*\* |
| Unable to answer+ | -3.433(1.305) \*\*\* | 0.261(0.443)  | 1.129(0.569) \*\* | -22.819(18.985)\*\* | -3.458(1.293) \*\*\* | 0.272(0.435) | 1.12(0.572) \*\* | -15.259(10.251) \*\* |
| **Factor scores for province characteristics** | 0.165(0.167) | -0.033(0.033) | -0.045(0.054) | -0.009(0.061) |
| **Random Part** |
| **Level3: Province** |
| Variance | 0.593(0.185) \*\*\* | 0.031(0.01) \*\*\* | 0.082(0.026) \*\*\* | 0.066(0.022) \*\*\* | 0.593 (0.196) \*\*\* | 0.03 (0.01) \*\*\* | 0.084 (0.027) \*\*\* | 0.071 (0.025) \*\*\* |
| **Correlation** |
| Exclusion from social relationships | 1 |  |  |  | 1 |  |  |  |
| Subjective feeling of exclusion | -0.162 | 1 |  |  | -0.096 | 1 |  |  |
| Exclusion from social activities | 0.009 | -0.347 | 1 |  | 0.051 | -0.395 | 1 |  |
| Exclusion from financial products | -0.244 | -0.181 | 0.119 | 1 | -0.249 | -0.198 | 0.119 | 1 |
| **Level2: Individual** |
| Variance | 10.104 (0.166) | 1.145 (0.019) | - | - | 10.101 (0.166) | 1.145 (0.019) | - | - |
| **Correlation** |  |  |  |  |  |  |  |  |
| Exclusion from social relationships | 1 |  |  |  | 1 |  |  |  |
| Subjective feeling of exclusion | 0.167 | 1 |  |  | 0.167 | 1 |  |  |
| Exclusion from social activities | - | - | 1 |  | - | - | 1 |  |
| Exclusion from financial products | - | - | 0.021 | 1 | - | - | 0.020 | 1 |
| VPC | 0.055 | 0.026 | 0.076 | 0.062 | 0.055 | 0.026 | 0.077 | 0.066 |

Notes: + Self-rated health should be answered by older people themselves. “Unable to answer” means that older people did not provide their answer.

++: for the binary outcomes (exclusion from social activities and exclusion from financial products), the probit form has been convert to a probability form.

 \*\*\*p<0.01, \*\*p<0.05, \*p<0.1

1. http://class.ruc.edu.cn/index.php?r=index/index&hl=en [↑](#footnote-ref-2)