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Types of integration and depressive symptoms: A latent class analysis on the resettled population for the Three Gorges dam project, China

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ABSTRACT

Focusing on China's Three Gorges Project (TGP)-Induced Resettlement, the largest scale resettlement induced by a single development project, this study aims to investigate different types of integration patterns among the TGP re-settlers and how modes of integration associate with depressive symptoms. Using Latent Class Analysis, we analyzed survey data on 407 TGP re-settlers. We detected three integration patterns among these re-settlers: the fully integrated (68%), the culturally and economically integrated (21%) and the unintegrated (11%). We found that different integration types were linked to different levels of depressive symptoms. Unless fully integrated and experienced a warm feeling toward new community, re-settlers were vulnerable to elevated depressive symptoms. Our findings that culturally and economically integrated re-settlers had similar levels of depressive symptoms as the unintegrated re-settlers highlighted the importance of subjective dimension of integration and resettlement. We also found that rural re-settlers and those who move with the whole village were more likely to fall into the unintegrated category. Policy implications were discussed.

1. Introduction

In today's world, millions of refugees are forced to relocate due to wars, social conflicts, natural disasters, etc. Although not having drawn much attention of the global society, a large number of people are displaced by developmental projects such as dams, urban infrastructure projects, irrigation systems, mines, and urban renewal projects. A recent estimate indicates that about 15 million people around the world are displaced each year to make way for developmental projects (Oliver-Smith, 2009). Although factors that trigger their relocation are different, project-induced relocatees face the same challenges as resettled refugees face when they strive to establish themselves in the new community.

In what circumstance can a resettlement be considered as successful? Derived from the experiences of voluntary immigrants, assimilation and integration theories suggest that a resettlement can be considered as successful when an immigrant is fully integrated into the host society. Researchers argue that getting familiar with host society's extrinsic culture such as language and food is usually the first step of integration (Alba and Nee, 1997; Gordon, 1964). They then strive to achieve social and economic parity with the natives in job markets and educational systems (Alba and Nee, 1997). Diminished social distance, emotional attachment and sense of belonging are indicators for the last step of integration (Alba and Foner, 2014; Amit, 2011). Researchers have emphasized the subjective dimension of integration such as emotional attachment as it may not be the by-product of economic integration (Amit, 2011). Even if immigrants are comfortable with the local culture and have reached social economic parity with natives, they may not develop an emotional attachment to the host society (Amit, 2011). In this case, a successful re-settlement is not reached.

Informed by the assimilation and integration theories, in this study we focus on China's Three Gorges Project (TGP)-induced resettlement, the largest scale resettlement induced by a single development project. This study has two main goals. First, we aim to investigate different types of integration patterns among the TGP re-settlers and how modes of integration associate with the mental health of the re-settlers. Second, we examine if there exists vulnerable groups that are at the lowest level of integration. If there are such groups, what are the characteristics of members in these groups? As such, this study would contribute to the immigration literature by examining mental health implication of types of integration. It would also contribute to project-induced resettlement literature by identifying vulnerable groups so that resettlement policy can be better tailored to different subpopulations and

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resources can be allocated to the most in need.

2. The Three Gorges Project (TGP)

Among developing countries, China has experienced a stunning rapid development during the past few decades. In 1994, China began the construction of the Three-Gorges Project, the world's largest hydroelectric project located in the mid-section of China's Yangtze River. The stated purposes of the TGP is to control for recurring floods in one of China's most populated regions, to generate hydro power for economic expansion, and to facilitate development in China's interior by means of improved navigation. When completed in 2009, the TGP generated a reservoir about the size of Lake Superior in a mountainous area. Between 1992 and 2008, 1.27 million people who lived in the Three Gorges area at an altitude of 175 m or lower have been relocated (SCGPCCEO, 2009). Among the relocated, about 40% were rural residents. Due to limited amount of farmland, one third of rural residents were relocated out of the Three Gorges areas to places planting different crops and speaking different dialects (SCGPCCEO, 2009). Most rural re-settlers move to a destination arranged by the government, while some selected their own destination to be closer to their family, relatives or friends. Although most far-moving re-settlers moved with their co-villagers, they were often scattered in larger human ecological units in the receiving region because of limitation of farmland and logistic concern (Guo and Wang, 2010; Hwang et al., 2007). The reservoir totally or partially submerged 12 cities and 114 townships. By 2009, all their effected residents (i.e. urban re-settlers who accounted for 60% of the total displaced population) have moved to corresponding new cities and towns constructed at higher altitudes near the old sites (SCGPCCEO, 2009).

Learning from the past failure in resettlement practices, the Chinese government adopted a new development-oriented relocation policy to ensure economic development of the resettled (State Council, 2001). For example, the State Council has earmarked 40 billion-Yuan ($4.8billion) investment for resettlement, which accounts for about 45% of the total cost for the whole project (Wang, 2002). Resettlement areas were allowed to "share benefits" of the dam project by receiving a portion of the profits from power generation as development funds (State Council, 2001; Cernea, 2009). The TGP resettlement policy was praised by the World Bank as a model for other developing countries (Bartolome et al., 2000). Planners of the TGP confidently asserted that the resettlement was a development opportunity for the relocated (Heggelund, 2004; Jing, 2000; Wang, 2002). Empirical studies have found that re-settlers reported better housing and an increase in their earnings, although the amount of increase was not as large as that of the unmoved residents in their old communities whose houses were above the water line (Hwang et al., 2011). Furthermore, economic conditions of TGP re-settlers were uneven with some enjoying an improvement in their income, housing, and standard of living and others reporting a deterioration of their standard of living (Mcdonald et al., 2008; Heggelund, 2004; Li and Rees, 2000). However, with almost all the attention being paid to economic aspect of resettlement, not many studies have examined the subjective feeling re-settlers have towards their new communities and different patterns in their integration into the host society.

3. Social integration of re-settlers

In what circumstance can a project-induced resettlement be considered as successful? The literature on the integration of voluntary migrants into the host society can inform us in answering this question. Derived from the experiences of European immigrants entering the US around the turn of the 20th century, classical assimilation theory suggests that new comers first pick up language, food and other customs as part of their "culture assimilation" process. However, full assimilation only occurs when the social distance between new comers and the main stream diminishes as immigrants are accepted into primary groups of the host society's main stream, the so called "structural assimilation" (Gordon, 1964). Further development in assimilation theory includes economic assimilation, including such topics as earnings and education. In other words, integration happens when immigrants have the same life chances as the host society members and their social economic attainment is not affected by their immigrant or ethnic status (Alba and Nee, 1997). As suggested by Gordon (1964), cultural assimilation is inevitable, but structural assimilation is not. Even though immigrants have adopted the culture of their host society and economically assimilated into the main stream, some might never experience a diminished social distance and enter primary groups of members of the host society.

Classical assimilation theory was criticized because it assumes a one directional assimilation in that new comers or ethnic minorities always have to assimilate into the dominant group (Alba and Nee, 1997). The concept of integration does not maintain this assumption and the assimilation can be reciprocal between the new comers and the local community. However, integration theory still maintains that there are different dimensions of integration such as cultural integration, social-economic integration, and subjective aspects of integration. The latter usually involves sense of identity, emotional attachment, and sense of belonging to the new community (Alba and Foner, 2014). As argued by some researchers, even if immigrants obtain social economic parity with natives, they may not develop an emotional attachment to the host society (Looker, 2014; Renshon, 2008). In this case, a successful resettlement is not reached.

The integration theories derived from voluntary migrants contain some informative points that we can use to understand integration patterns of Three Gorges re-settlers. Integration is not unidimensional and re-settlers who have integrated into their host community in one dimension might not have integrated in other dimensions. As such, there can be different patterns/types of integration. We suspect that TGP re-settlers do not form a homogenous group with respect to their types of integration into the host society. Some may have integrated culturally. Some may also have integrated into the local job market and reached economic parity with host community members. Others may have reached the deepest level of integration, that is to say have developed an emotional attachment to the host society. We want to know whether or not there exist different clusters of re-settlers according to their types of integration. Is there a group of re-settlers that have reached the deepest level of integration by building some emotional attachment to their new community? Is there a group of re-settlers that are in a vulnerable position because they have not integrated culturally and/or economically?

4. Mental health

There is a consensus that a project-induced re-settlement is stressful. However, different researchers have different views on where the stress comes from. There are researchers who maintain that displacement itself does not necessarily lead to mental distress; rather, distress results from changes in life circumstances such as changes in employment, source of income, social network, quality of farm lands, and access to services (Desjarlais et al., 1995). As a result, once the income source, social network and other life circumstances of personal significance are restored, distress would disappear. In other words, once social economic integration is reached, re-settlers should not suffer from depressive symptoms

due to displacement.

On the other hand, other researchers believe that displacement experience itself plays a primary role in causing psychological distress because it usually consists of a subjective or emotional dimension of it such as "grieving for a lost home" and "anxiety about an uncertain future" (Colson, 1971; Scudder, 2005). Researchers argue that displacement disrupts routine culture and challenges primary questions of mental wellbeing, such as "where am I" and "where do I belong" (Downing and Garcia-Downing, 2009). Mentally healthy individuals usually maintain a level of mastery to their life and their environment, and a level of interpersonal relatedness to people in their community (Ryff, 2014). The breakdown of social-cultural-natural environment entailed by a project-induced displacement is a great challenge for mental wellbeing. Only when a new routine culture has been established and the individuals are comfortable in answering the primary questions, is mental health restored. In other words, unless fully integrated, a re-settler would still be vulnerable to depressive symptoms due to displacement.

Despite all these speculations, there are not many empirical studies that have examined the relationship between different types of integration and mental health. The question remains: How are different types of integration into the host society linked to mental health? This is the unanswered question that we seek to empirically explore.

5. Data

Data used in this study came from a prospective panel study involving a pre-migration and a post-migration survey spaced three years apart. The TGP migration provided a natural experiment-like research condition for migration studies. The construction of the dam and the reservoir required the relocation of all those who were in the way on a non-selective basis. This allowed us to measure migration consequences such as integration free of confounding selectivity. In addition, the TGP migration as a scheduled event permitted us to conduct pre- and post-relocation surveys. The prospective research design provided us pre-relocation data (the baseline data) without depending on re-settlers' memories which were usually distorted by their actual relocation experiences. As such, we could identify patterns of integration with the post-relocation data and then link them back to the pre-relocation data to determine the characteristics of re-settlers most likely to fall into each integration pattern.

The pre-migration sample consists of 975 designated migrants and 555 non-migrants recruited from three rural and two urban residential communities randomly selected from Wanxian Relocation and Development Region (WRDR) which was formerly a part of the Sichuan Province where 80% of Chinese designated for displacement resided (Weng, 1999). Face-to-face interviews were conducted in late 2002 and early 2003 by 29 sociology graduate students from two Chinese universities. The survey had a response rate of 99%, a high rate typical of face-to-face interviews in China (Feng, 2007). A follow-up survey was conducted in early 2006, in which we successfully traced and interviewed 1056 subjects, with a success rate of about 70 percent. Among those who were successfully traced, 350 respondents were non-migrants, 286 were designated migrants but had not moved, and 420 were designated migrants who had moved. This study focused on 420 re-settlers whom we were able to trace successfully. The exclusion of 350 non-migrants and the 286 designated migrants who had not moved by the time of the follow-up survey is necessary because integration into new community is relevant only to those who have resettled. We also excluded 13 respondents who have provided no information on integration variables. The actual sample size in the analysis is 407.

As indicated in Table 1, half of our respondents are female and the sample as a whole has an average age of 46 years and an average education attainment of 6.9 years. The apparent overrepresentation of older and less educated respondents reflects a region that is one of China's major exporters of migrant workers, where the younger and more educated disproportionately had already left the area (Solinger, 1999). A majority of the sample were married (86%). About 39% of the respondents were urban residents and 61% were rural residents at time 1. Re-settlers in our sample have been relocated for an average time of 22 months.

6. Measures

Integration was measured by 7 items: Do you have difficulties in communicating with local people? Do you think it is hard for you to establish here without learning local dialects? Do you think you are often at odds with local people because you are not familiar with their customs? Do you think that your working condition is worse than that of local people because you are a re-settler? Do you think that local people are not nice to you because you are a re-settler? Do you like your new community? Do you like your new neighbors? All 7 items are dichotomous (1 = yes; 0 = no).

Depressive symptoms were indicated by the 20-item CES-D scale (Radloff, 1977). While mental distress manifests itself in many forms, depression symptoms are the most common ones (Turner and Lloyd, 1999). The CES-D scale is a survey-based measure of depression which has known psychometric attributes and well-established reliability and validity (Vega and Rumbaut, 1991). The scale asks respondents if they have experienced any depressive symptoms from a list of 20 during the past week. The summary scores were used in the analysis. The same scale was used in both the pre-relocation ($\alpha = 0.87$) and the post-relocation surveys ($\alpha = 0.89$). Although cross-cultural applications of the CES-D have aroused concerns in the past, empirical evidence shows that the scale is appropriate for samples with different cultural backgrounds (Beiser, 2005; Lai, 1995; Lin, 1989; Vega and Rumbaut, 1991).

We collected baseline socioeconomic and demographic information on respondents in the pre-relocation survey. These include gender (female = 1; male = 0), age (years), educational attainment (years of schooling), marital status (currently married = 1; others = 0), per capita household income last year (Chinese Yuan), home ownership (1 = yes; 0 = no), having government officials among family or relatives (yes = 1; no = 0). We have also collected baseline health related information to see if poor physical health put individuals at risk of poor integration. Health related variables included self-rated health and presence of chronic diseases (1 = yes; 0 = no). Self-rated health was measured by a single survey question, "In general, how would you describe your health?" Responses range from very poor (1) to very good (5) with a larger score indicates better health. For relocation related variables, we collected information on the time since relocation (in months) and modes of relocation. There were three modes of relocation among TGP re-settlers: resettle with the whole village or community to a destination arranged by the government, resettle separately or in small units to a destination arranged by the government, and other modes of relocation including resettling to individual household's choice of destination or moving to join relatives or friends. Two dummy variables were created for destination types: "resettle with the whole village (1 = yes; 0 = no)" and "resettle separately (1 = yes; 0 = no)". Each individual variable had a low level of missing values (<1.5%). Missing values were addressed using full information maximum likelihood as implemented in Mplus version 6.

Table 1
Descriptive statistics for sample characterisitics (n = 407).

	Pre-relocation	Post-relocation
Mental health		
Mean CES-D (S.D.)	21.94 (10.25)	26.25 (10.21)
Integration items		
Have difficulties in talking to local people%		10.53
It is hard to establish here without learning local dialects%		7.19
Often at odds with local people due to different customs%		8.11
Working condition is worse for re-settler%		14.97
Local people are not nice to re-settlers%		8.61
Like the new community%		64.55
Like the new neighbors%		75.18
Socio-economic-demographics		
Female%	50.24	
Mean age, Years (S.D.)	46.17 (13.42)	
Urban residents %	38.57	
Married %	86.19	
Having government officials among family and relatives %	27.14	
Mean education, years (S.D)	6.89 (3.87)	
Mean per capita household income, Yuan (S.D)	3166 (6088)	
Home ownership %	86.19	
Health-related factors		
Mean self rated health (S.D.)	3.48 (0.98)	
Chronic diseases %	34.52	
Relocation related factors		
Mean time since relocation, months (S.D.)	22.14 (11.77)	
Moving with the whole village %	44.52	
Moving separately %	33.57	
Moving to self selected destination %	19.76	

7. Analytical strategy

Latent class analysis (LCA) is an analytic tool that allows researchers to identify unobserved subpopulation or clusters of individuals that respond similarly to a set of measured variables. We suspect the observed integration data are an unobserved "mixture" of two or more integration types with high homogeneity within each type and adequate separation among them. In this approach, individuals are classified into unobserved latent integration classes based on similar integration patterns. The latent class analysis can be considered as a model-based clustering analysis and is not sample dependent and can be replicated to other samples (Berlin et al., 2014; Raykov, 2015).

We started with one class, suggesting one integration type for all persons. Then successively more integration classes were added to determine the best-fitting model. Since LCAs and other mixture models are susceptible to converging on local, rather than global, solutions, we increased the number of random starting values to avoid local solutions (Raykov, 2015).

Model parameters and classes were estimated using the robust maximum likelihood (MLR) estimator in Mplus version 6. Mplus codes for the best fitting model were reported in Appendix. To determine which model best fit the data, we examined the Bayesian Information Criterion (BIC), sample size-adjusted BIC (ssaBIC), entropy, the Lo-Mendell-Rueben Test (LMRT), the Bootstrap Likelihood Ratio Test (BLRT), the proportion of respondents in each class, and the interpretability of the latent classes. Lower BIC values indicate better model fit. The LMR and BLRT test provide a p value, which indicates whether the model should be rejected in favor of the model with one less class. Entropy is a measure of the quality of classification with values closer to 1 indicating greater classification accuracy. A commonly used cutoff point is 0.8. Class proportions and conditional item probabilities were examined to aid class interpretation. Class interpretation should include practical knowledge to avoid reaching a solely statistical solution.

After the identification of the classes, persons were assigned to their most likely class based on model probability. We then compared post relocation depressive symptoms across the latent classes while considering uncertainty in class membership assignment (Asparouhov and Muthen, 2013). We used an OLS regression analysis to control for confounding baseline factors to clarify the relationship between identified integration types and depressive symptoms. Lastly, we compared the distribution of pre-relocation socioeconomic, demographic, and health characteristics, along with relocation related factors across the identified integration classes.

8. Results

Table 1 reports descriptive statistics for depressive symptoms, integration items, and other sample characteristics. With respect to depressive symptoms, the average CES-D for the overall sample was about 22 at baseline and 26 at the post-relocation survey. In literature, a CES-D score of 16 is often considered as the cutoff point for depressive symptoms with clinical significance (Radloff, 1977). With this in mind, even the pre-relocation CES-D score was considered high. After relocation, the average CES-D score elevated another 4 full points.

Assuming respondents were from one single integration type, a typical respondent would have less than 11% chance to have difficulties with new cultural, customs, and dialects; about 15% chance to report worse working conditions due to re-settler status; about 9% chance to complain that local people are not nice to her/him due to re-settler status. On the other hand, a typical respondent would have a relatively high chance to report that s/he liked the new community (65%) and the new neighbors (75%). Assuming one single integration pattern, this average pattern depicted a picture of somewhat successful integration with low difficulties in cultural and economic aspects and relatively strong positive feelings toward the new communities.

To evaluate whether the one integration type/class assumption was valid or not, we fitted a set of LCA models started with the one-class model and added one more class in each sequential models. We stopped adding classes when the BIC started to turn bigger and/

or LMRT and BLRT turned nonsignificant. If the one class assumption is true, the one class model should have better fit than other models. Table 2 reports the fit indices for the four models we have fitted. Comparing these models, all of them had high entropy. However, BIC went considerably down from the 1-class all the way to the 3-class model. It then made an upturn. The difference between the 3-class model and the 4-class model was 24 points. In literature, a 6-point decrease is considered as a clear improvement (Raykov, 2015). Given this, our 3-class model fitted the data much better than the 4-class one. The sample size adjusted BIC took similar values for the 3-class model and the 4-class model. With the general principle of parsimony, the 3-class model was still preferred to the 4-class model. Although the LMRT and the BLRT for the 4-class model were significant indicating adding the forth class had improved model fit, the additional class contained only 3 percent of the sample (14 individuals). Furthermore, the three integration types identified by the 3-class model (Fig. 1) made substantive sense as we would discuss in the next paragraph. Therefore, we decided on the 3-class model as the best model from our LCA analysis.

Based on the estimated probability that members of a class answer "yes" to a particular item in the 3-class model, Fig. 1 visually displays detected integration patterns among our data. The solid line indicates the "Fully Integrated" class. They have little or no difficulties with their host community's language and customs. Although there is a greater than zero probability that they felt their working conditions were worse than the local people, they still consider that they were treated warmly and had a 90% probability to like the new community and a 99% probability to like their new neighbors. The dashed line marked with squares represents the "Culturally and Economically Integrated" class. This group had similar patterns as the full integrated class on cultural and economic items, but they had a higher chance to complain that natives were not nice to them (14%) and had very low probabilities to say that they liked the new community (12%) and new neighbors (16%). The dashed line marked by triangles represents the "Unintegrated" type. They had a 99% chance to have communication problems due to languages hurdles. They were also likely to endorse that it was hard for them to establish a livelihood if they did not learn the local dialects (68%), that they couldn't fit in due to different customs (66%), that they had worse working conditions because they were re-settlers (66%). Although the probability of complaining that natives were not nice to them was only 32%, the probability of reporting that they like their new communities were equally low (32%). Interestingly, the probability that they like their new neighbors was relatively high (66%).

It was obvious that the three classes were qualitatively different from each other and they represent different types of integration situation. Because the 3-class model fitted data way better than the 1-class model, we could conclude that our population was not homogeneous with respect to integration type. Sixty-eight percent of respondents fell in the "Fully Integrated" category. Twenty-one percent fell in the "Culturally and Economically Integrated" category. Eleven percent fell in the "Unintegrated" category. The three

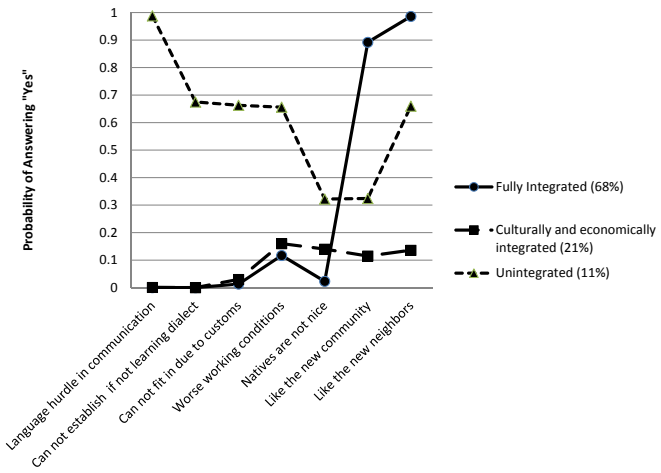

Fig. 1. Types of integration detected by the latent class analysis.

different integration patterns provided a much clearer picture for the population than the one depicted in Table 1, in which the three groups were mixed and unidentified.

Are types of integration linked with different levels of depressive symptoms? We compared mean post-relocation CES-D scores across integration classes in Table 3. The class membership was assigned to each individual based on his/her most likely class membership. The uncertainty associated with this assignment was accounted for by adjusting the classification uncertainty rates (Asparouhov and Muthen, 2013). The fully integrated class had a mean CES-D score 5 points lower than that for the culturally and economically integrated class and 7 points lower than that for the unintegrated class. The difference between the fully integrated class and the other two were statistically significant even after adjusting the inflated type I error due to multiple comparison tests. Although the mean CES-D sore for the culturally and economically integrated group was 2 points lower than that for the unintegrated class, the difference was not statistically significant.

The bivariate association reported in Table 3 might due to factors that linked to both integration and depressive symptoms. We used an OLS regression model to control for possible confounding factors. In Table 4, post-relocation CES-D was the dependent variable. We used two dummy variables to differentiate three integration classes with the fully integrated as the reference group. The high entropy score in the three-class LCA model allowed us to treat the assigned class membership as observed and ignored the uncertainty associated with this assignment. We controlled for baseline CES-D measured at the pre-relocation survey, pre-relocation socioeconomic and demographic characteristics, pre-relocation health, and relocation related factors. Controlling for all above mentioned factors, the culturally and economically integrated class had a CES-D score 4.74 points higher than that for the fully integrated class. The difference between the unintegrated and the fully integrated was 5.86 points. Both differences were statistically

Table 2
Comparing models: fit indice.

Number of classes	Loglikelihood	BIC	ssaBIC	Entropy	LMR		BLRT		Proportion in class			
					2LL	p	2LL	p	1	2	3	4
One class	−1154.41	2350.87	2328.66									
Two classes	−964.16	2018.44	1970.85	0.94	372.75	0.00	380.50	0.00	0.85	0.15		
Three classes	−888.77	1915.75	1842.77	0.88	147.69	0.00	150.76	0.00	0.68	0.21	0.11	
Four classes	−876.60	1939.47	1841.10	0.95	23.85	0.04	24.35	0.00	0.67	0.19	0.11	0.03

Table 3
Class differences in depressive symptoms using the 3-Step Method (n = 407).

	Mean post-relocation CES-D	S.E.	Class comparison[a]			
			With class 2		With class 3	
			Chi-Sq test	p	Chi-Sq test	p
Class 1: Fully integrated	24.56	0.63	14.77	0.00	18.11	0.00
Class 2: Culturally and economically integrated	29.58	1.07			1.08	0.30
Class 3: Unintegrated	31.50	1.50				

[a] The overall Chi-Sq test has a Chi-sq value of 26.94 and p = .000.

Table 4
Regression analysis of depressive symptoms on assigned class membership (n = 407).

	Coef.	SE
Intercept	23.36***	5.00
Assigned classes		
Fully integrated (reference group)		
Culturally and economically integrated	4.74***	1.21
Unintegrated	5.86***	1.56
Baseline mental health		
CES-D	0.26***	0.05
Baseline Socio-economic-demographics characteristics		
Female	1.43	0.98
Age	0.04	0.04
Urban residents	−2.23	1.54
Married	−0.16	1.37
Having government officials among relatives	0.33	1.31
Education	−0.12	0.15
Per capita household income (in 1000 Yuan)	−0.01	0.07
Home ownership	−0.16	1.40
Baseline health		
Self rated health	−0.75	0.58
Chronic diseases	−0.44	1.17
Relocation related factors		
Time since relocation	−0.11*	0.04
Moving with the whole village	1.82	1.34
Moving separately	0.63	1.31
Moving to self selected destination (reference group)		
Adj. R-sq	0.22	

Note: **p < 0.01; ***p < 0.001.

significant after accounting for the inflated type I error due to multiple comparison tests. Further comparisons between the culturally and economically integrated class and the unintegrated class did not find significant difference. Among the control variables, higher pre-relocation baseline CES-D and shorter time since relocation were linked to higher post-relocation CES-D. Other control variables did not have a statistically significant association with post-relocation CES-D.

Our analysis did detect groups that were not well-integrated into the host society and were vulnerable to depressive symptoms. Specifically, 11% of the sample were unintegrated and 21% of the sample were culturally and economically integrated but not emotionally integrated to the new community. What are the socioeconomic and demographic characteristics for these vulnerable groups? We compared group profiles in Table 5. Among the factors we examined, urban/rural residence, education, homeownership, self-rated health, and modes of relocation had statistically different distribution across integration groups. In addition, the cross class difference in time since relocation was marginally significant.

Specifically, only 9% of re-settlers among unintegrated class were urban re-settlers. In contrast, 62% of the culturally and economically integrated class were urban re-settlers. The percentage among the fully integrated was 37. With respect to educational attainment, the mean education level was the lowest for the unintegrated class and the highest for the culturally and economically integrated class. In addition, the global test for the percentage of home ownership was statistically significant. But none of the pairwise comparison tests was significant after considering inflated type I error.

The unintegrated class had an average self-rated health higher than the other two classes. The percentage of moving with the whole village/neighborhood to a destination arranged by the government was much higher in the unintegrated class than those for the other two classes. At the same time, the percentage of other types of moving, mainly moving to a self-selected destination was the highest in the fully integrated class. Although time since relocation was marginally significant by an F test, the differences among the classes were only a few months. Results reported in Table 5 were bivariate relationships. In a supplemental analysis, we used a multinomial regression to detect partial relationship between class membership and each variable in Table 5 while controlling for all other variables. Class differences in education, housing, and move time were explained away by rural/urban status. The effect of rural/urban, self-rated health and mode of relocation were still statistically significant.

9. Discussions and conclusions

"Development" is one of the main themes for global society, and projects that are labeled as developmental are common, especially in the developing world. Populations to be relocated involuntarily to make way for these projects are often social-economically disadvantaged. Many such projects in the past have brought catastrophic impacts on the displaced population. How to improve relocation outcome and help re-settlers successfully resettle in their new home has been hotly debated. In this debate, national states that plan most of these projects and financial institutions that fund these projects usually focus their attention on economic dimensions of a resettlement. Some common variables discussed are monetary compensation, infrastructure in the re-settled areas, and benefit sharing. Human livelihood, however, consists of much more than economic variables (Downing and Garcia-Downing, 2009). A successful resettlement means full integration. It involves the rebuilding of the bonding between individuals and their social-cultural-natural environment and the re-defining answers to primary questions such as "where do I belong?" Unfortunately, this subjective dimension of a resettlement has never been at the center of the discussion of project-induced resettlement.

In this study, we focused on detecting different integration patterns among the Three Gorgers Project re-settlers. We found that over two thirds of TGP re-settlers had been fully integrated into the new community a few years after relocation. However, over twenty percent of re-settlers had not developed a warm feeling toward their new community although they may have no problem with host communities' language and custom and have reached parity with their working conditions. Moreover, about eleven percent were struggling with their new culture and working conditions and a failure to integrate emotionally. We also found that

Table 5
Distribution of pre-relocation and relocation-related characteristics across the identified latent classes.

	Class description			Overall Chi-sq/F Test+	
	Class 1: Fully integrated	Class 2: Culturally and economically integrated	Class 3: Unintegrated	Chi-sq/F	p
n (%)	278 (68%)	85 (21%)	44 (11%)		
Socio-economic-demographics					
Female%	50.36	47.06	52.27	0.40	0.820
Mean age, Years (S.D.)	45.92(13.43)	47.08 (13.59)	45.89(13.17)	0.25	0.777
Urban residents %	37.05	62.35	9.09	36.35	0.000***a,b,c
Married %	87.77	78.82	88.64	4.61	0.099
Having government officials among relatives %	24.82	36.47	22.73	4.94	0.084
Mean education, years (S.D)	6.89 (3.89)	7.55(4.00)	5.73(2.95)	3.31	0.038*c
Mean per capita household income, Yuan (S.D)	3307(7253)	3029(2560)	2571(2865)	0.30	0.744
Home ownership %	87.41	78.82	93.18	6.04	0.048*
Health and mental health					
Mean self-rated health (S.D.)	3.45 (0.99)	3.33 (0.92)	3.89(0.94)	4.94	0.008**b,c
Mean CES-D (S.D.)	21.81 (9.94)	22.89(10.29)	22.11(12.45)	0.36	0.698
Chronic diseases (%)	35.97	30.59	34.09	0.84	0.657
Relocation related factors					
Mean time since relocation, months (S.D.)	21.37 (12.46)	24.70(12.28)	20.95(3.75)	2.76	0.064
Moving with the whole village %	40.29	44.71	68.18	11.99	0.002**b,c
Moving separately %	34.17	38.82	27.27	1.73	0.420
Moving to self selected destination %	24.46	12.94	4.55	12.72	0.002**b

Note: significant difference by class ($p < 0.05$ with bonferroni adjustment for multiple comparisons): a, class 1 vs class 2; b class 1 vs class3; c, class2 vs class 3.
+: Chi-sq test for categorical variables and F test for continuous variables.
*$p < 0.05$ for Chisq/F global test; **$p < 0.01$ for Chis1/F global test; ***$p < 0.001$ for Chisq/F global test.

different integration types were linked to different levels of depressive symptoms. Although all integration groups reported high levels of depressive symptoms after relocation, the fully integrated group fared much better than the other two groups. Further comparisons between the culturally and economically integrated class and the unintegrated class did not find significant difference. Although the causal direction was unclear for these cross-sectional effects, it was possible that cultural and economic integration was not enough to reduce depressive symptoms. Rather, the emotional attachment and warm feelings toward the host society were important. Without a warm feeling toward the new community, re-settlers might feel isolated and couldn't maintain good mental health in their new residence even if they did not have problems culturally and economically. Our findings that culturally and economically integrated re-settlers had similar levels of depressive symptoms as the unintegrated re-settlers highlighted the importance of subjective dimension of integration and resettlement.

A few other findings in this study were noteworthy. First, the culturally and economically integrated class had similar patterns as the full integrated class on cultural and economic items, but they had a higher chance to complain that natives were not nice to them and had very low probabilities to say that they liked the new community (12%) and new neighbors (16%). This is consistent with the literature that emotional attachment does not naturally come with cultural and economic integration.

Further, for members in the culturally and economically integrated class, the probability of reporting that they liked their new communities was even lower than that for the unintegrated class. Moreover, the probability that they liked their new neighbors was much lower compared to the unintegrated class. Maybe the reason was that members in the unintegrated class were still struggling in establishing themselves and needed more help from their neighbors. More contacts created stronger bonding given that they consider natives as nice. On the contrary, for those who were culturally and economically established, they might not need extra contacts with the local people if they did not want to and thus had less emotional attachment to their neighbors. We conducted sensitivity analysis on whether or not re-settlers contacted their neighbors during the past week. We found that the culturally and economically integrated group had the lowest probability to have contacts with their neighbors during the past week (61% for the culturally and economically integrated class, 83% for the fully integrated class, and 77% for the unintegrated class; not reported in the tables. The difference between former class and the latter two classes were statistically significant).

In addition, when we analyzed class profiles, we found that 91% of re-settlers in the unintegrated class were rural residents. It seemed that some rural re-settlers experienced more struggles in their integration process. On the contrary, the culturally and economically integrated class had the highest percentage of urban residents. The high percentage of urban re-settlers in the culturally and economically integrated class might indicate the lack of emotional interaction at the community level in urban area. With respect to educational attainment, the mean education level was the lowest for the unintegrated class and the highest for the culturally and economically integrated class. This might due to uneven distribution of educational resources between urban and rural areas. In China, rural residents usually have much less access to educational resources than urban residents and the unintegrated class contains mostly rural re-settlers.

Last, the percentage of moving with the whole village/neighborhood to a destination arranged by the government was much higher in the unintegrated class than those for the other two classes. At the same time, the percentage of moving to a self-selected destination was the highest in the fully integrated class. This makes sense. When the whole village was moved together, the chances that they interact with local people would be lower because of the in-group preference (Blau, 1977; Hwang and Xi, 2008). They would pick up dialects and customs at a slower pace. This might hinder their process of learning how to plant new crops and new ways of making a living. Although it is easier to arrange a relocation if the whole village was relocated together, this mode of relocation might not facilitate integration. When re-settlers have a chance to pick their place of destination, they usually chose to move to join their family or relatives, or move to a place that they can easily draw support from. It is not surprising that the percent of this model of relocation is the highest among the fully integrated.

Certain limitations warrant consideration when interpreting these findings. First, our integration data were collected shortly

after resettlement with an average length since relocation of 22 month. In other words, the patterns we detected were short-term integration patterns. Since integration is a long-term process, it would be informative to examine long-term patterns. Without longitudinal follow up data, we could not investigate individual changes in their integration status over time. In addition, the relationship between integration types and depressive symptoms was examined with cross-sectional data. Although we have controlled for the baseline depressive symptoms, controlling for the pre-relocation CES-D collected 3 years prior could not eliminate the possibility that participants with more depressive symptoms might be less likely to be fully integrated. This is particularly worth concerning because the primary distinguishing features between the fully integrated class and the other two classes were the three indicators on feelings such as natives are not nice, liking the new community or new neighbors. It could be that re-settlers who were more depressed after relocation were less likely to endorse positive feelings towards their new community. It was also possible that they were more likely to engaging in behaviors that did not facilitate positive relationships with new neighbors. As a result, the causal direction between integration types and depressive symptoms was unclear in this study. Lastly, to measure emotional integration, we depended on two items asking about a warm feeling toward the new community and new neighbors. In literature, emotional integration involves a sense of belonging which we did not have data one. Moreover, we only had one item measuring economic integration. Future studies should also include items on sense of belonging and items on different aspects of economic integration.

Recent literature has documented the physical health effects of social integration related measures such as the size of an individual's network, the quality of their social interactions, and number of social roles assumed by an individual, etc. (Martire and Franks, 2014). In additional analysis, we have examined the association between integration types and post-relocation physical health measures. Although the fully integrated class had the highest level of average self-rated health and the unintegrated class had the lowest level, the differences were not statistically significant ($p = 0.08$) at the conventional alpha level. The differences in chronic diseases across integration classes were not statistically significant, neither. The reason that we did not find a significant physical health effect in our analysis might due to the lack of refined physical health measures. The two health measures used in this study was self-rated health (1 = very poor and 5 = very good) and presence of chronic diseases (1 = yes, 0 = no). The lack of a precise health measure limited our ability to quantify and evaluate physical health differences among the three integration classes.

Despite these limitations, this study has implications for resettlement and integration policies for project-induced resettlement. With latent class analysis, our findings provide a much clearer picture of integration patterns of re-settlers than traditional methods assuming one average integration pattern. After identifying different patterns of integration, we further studied characteristics of re-settlers falling in different integration patterns. We found that rural residence and moving with the whole village or neighborhood were important indicators for poor integration at all dimensions. We also found that urban residence was associated with poor emotional integration but not poor cultural and economic integration. Our findings can inform policy makers to tailor policy and allocate resources in a more efficient way. For example, rural re-settlers who move with the whole village may need more help in adjustment in culture, working conditions, and constructive interaction with local communities. Special measures should be developed to help urban residents bond with neighbors and their new community. Moving to a destination chosen by re-settler themselves was associated with better integration results. In our sample, only 20 percent were of this type. Our finding indicated that this mode of relocation should be expanded.

Project-induced re-settlement shares a lot of similarity with refugee resettlement. In this study, culturally and economically integrated re-settlers were found suffering from a similar level of depressive symptoms as unintegrated re-settlers. Resettlement is a process that transplants lives. People are not robots. They have feelings and emotions which are very important for them to navigate through their daily life. A warm feeling towards the host community is important for re-settlers to settle down and develop their new livelihood. It is also important for their mental well-being. This finding can be informative for refugee re-settlement. With large amount of Mideast refugees rush through the boarder of European countries, an important issue is how to integrate them into the host society. Our study highlights the importance of the subjective dimension of integration. Because culturally and economically integrated re-settlers were still vulnerable to higher levels of depressive symptoms if they were not emotionally integrated, attention should be paid and resources should be directed to enhance the emotional attachment and shrink social distance between refugees and the host society.

Appendix. Mplus code for the three-class model with distal outcome

```
Title:     Latent Class Analysis on TGP data;
Data: File="C:\Users\jx\Desktop\integrat.txt";
Variable:  names= Y1-Y7 cesdw2;
           usevar=Y1-Y7 cesdw2;
           cate=Y-Y7;
           missing=. ;
           Classes=c(3);
           Auxiliary=cesdw2(DU3STEP);
Analysis:  type=mixture;
           starts= 1000 100;
           stiterations=50;
Output: SAMPSTAT Tech11 Tech14;
```

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