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Course of Late-Life Depression in China is Chronic and Unremitting

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Abstract

Objective—The world's largest aging population resides in China. Depressive disorders represent a public health problem among older adults in China, however little is known about course and natural outcomes with routine treatment in primary care.

Methods—We examined the one-year naturalistic course of depressive symptoms in older adult Chinese primary care patients (Hangzhou, China).

Findings—We found slight improvement among most older adults who initially presented with mild or subsyndromal depressive symptoms, but marked increase in severity in one group of initially mildly depressed older adults; and a lack of improvement among all older adults with severe initial presentations. Greater physical illness burden, lower functional capacity, and lower family support were associated with greater initial depressive symptom severity and lack of improvement over time.

Conclusion—The naturalistic course of depressive illness in older adult primary care patients in urban China is typically chronic and unremitting for those with severe symptoms and slowly improving for those with milder symptoms. Because access to specialty mental health care is limited, treatments for late life depression need to be developed that can be effectively and feasibly implemented in Chinese primary care practices.

Keywords

Depression; China; geriatrics; primary care

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The world's largest aging population resides in China (1). Depressive disorders represent a significant public health problem among older adults in China, where they are more prevalent and severe than among middle-age or young adults (2) and contribute to the high suicide rate among older Chinese adults (3). While research is accumulating that documents the prevalence of depressive disorders and associated disability among Chinese older adults (2, 4–7), very little is known about course and natural outcomes. Access to mental health specialty services is limited in China (8) where, as in the West, older adults are more likely to present to a primary care provider than a mental health specialist (9), and to ascribe their distress to physical rather than psychological factors (10). Primary care providers receive little training in the diagnosis and management of common mental disorders, however, and have limited access to mental health consultation or referral (8). Better equipping primary care to manage chronic diseases, including depression, is a priority of the Chinese government (11). Information on the naturalistic course of depressive symptoms in later life could inform the creation of stepped care treatment models in which resources are allocated to those patients most likely to respond at a given level of intervention intensity (12, 13) and could identify those at risk for developing clinically significant depression to guide preventive interventions.

Investigations of naturalistic trajectories of change in depressive symptomatology among older primary care patients in the Netherlands (14) and the United States (15) converge on the finding that depressive symptoms are most often stable over several years. However, some older adults show improvement. In the Netherlands, 35% of older adults evidenced remission from a major depressive episode over one year (14). In the United States, a subset of older adults with depression severity scores suggestive of Minor Depression were found to improve over two years (15). These findings indicate heterogeneity in the course of depressive symptoms. To investigate this heterogeneity, Cui and colleagues (15) used longitudinal cluster analysis with weekly depression severity ratings over two years to examine patterns of naturalistic change. They found six distinct trajectories of change. Physical illness burden and lower perceived social support were predictors of poorer prognosis.

In an initial investigation of the prevalence and correlates of depression among urban-dwelling older adult Chinese primary care patients, we found a point prevalence of Major Depressive Disorder (MDD) of 11.3% (16). Further, we found that 71 of 97 patients who initially met criteria for MDD remained depressed over one year, and during that interval only 3 out of 97 patients with MDD at baseline had received depression-specific treatment during the follow-up period. Low rates of mental health treatment have been documented throughout China (2).

These results suggest that clinically significant depression is common among Chinese older adults seeking primary care services and that the naturalistic course, under conditions in which treatment is the rare exception, is likely chronic and unremitting. However, our model with three groups based on initial severity level might mask heterogeneity in course, such that some groups of patients do evidence improvement in depression symptom severity despite lack of treatment. Thus, we sought to examine further the naturalistic course of depressive symptoms in this population by examining heterogeneity in trajectories of change

in depression symptom severity scores (i.e., Patient Health Questionnaire-9 (PHQ-9)(17) over one year. Given that few older adults with depression receive treatment in China, information on naturalistic course is essential to inform the development of preventive interventions and the allocation of limited resources.

Method

Sample

This sample consists of 262 primary care patients, all aged 60 years or older, in Hangzhou City, China. The prevalence and correlates of depression in this sample have been described elsewhere (16), however the current hypotheses and associated analyses are novel. Patients aged 60 or older who saw their primary care doctor at the study site during the data collection period (i.e., January through June 2009) and presented without significant cognitive impairment that would preclude completion of informed consent were invited to complete the PHQ-9. To ensure a sample with a range of depression severity, all subjects with PHQ-9 scores of 10 or above were invited to participate in the next stage of the study, which involved repeated administration of the PHQ-9 at 3, 6, 9, and 12 months. In addition, 50% of participants with PHQ-9 scores in the 5–9 range were randomly selected for follow-up, along with 5% of those with PHQ-9 total scores of 0–4, yielding a sample of 262 older adult subjects. Regarding missing data, 1 subject did not complete the PHQ-9 at the 3-month follow-up; 16 were missing at 6 months; 27 were missing at 9 months; and 34 were missing at one year. There were no differences between subjects with incomplete follow-up data and those with complete data on any of the study's outcome measures.

Procedures

Assessments were completed in person at baseline and 12 months and via telephone at 3, 6, and 9 months. Subjects provided written informed consent, according to procedures approved by the Human Study Committee of Zhejiang University. Additional information about procedures can be found in Chen et al. (14).

Measures

The *Patient Health Questionnaire (PHQ-9)*(17) measures DSM-IV depression symptoms over the prior two weeks. Items are scored from 0 (“not at all”) to 3 (“nearly everyday”), with total scores ranging from 0 to 27. A PHQ-9 score of 10 or more represents at least a moderate degree of depression severity and has high sensitivity and specificity for detecting major depression (17). Further, PHQ-9 scores have been found to be sensitive to change over time (Lowe et al., 2004). Meta-analyses indicate the following cut-points: scores of 5, 10 and 15 represent mild, moderate and severe symptom levels, respectively (Kroenke et al., 2010). Importantly, the Chinese version of the PHQ has been shown to have acceptable psychometric properties among primary care patients (18). Further, a cut off score of 10 or above has been shown to yield high sensitivity and specificity in the detection of Major Depressive Disorder among Chinese primary care patients (16).

The total number of *Instrumental Activities of Daily Living (IADL)*(19) capabilities was used to assess daily functioning; higher scores indicate greater functional capacity. The Chinese

version of the scale has been validated in Hong Kong, and scores derived from it shown to be reliable for assessing an older person's ability to live independently in the community (19). The *Lubben Social Network Scale (LSNS)* was used to assess social support from family (20); greater scores indicate greater support. The Chinese version of the LSNS has been validated in Hong Kong (21, 22). The *Cumulative Illness Rating Scale (CIRS)*(23), which quantifies the amount of pathology in each organ system, was used to assess medical health, with higher scores indicating greater illness burden. The item on psychiatric illness was not included so as not to conflate our measure of medical health with depressive symptom severity.

Data Analysis

A latent class growth analysis (LCGA) was conducted using the Mixture Modeling procedure in Mplus version 5.1. Recommended procedures (24–26) were followed. PHQ-9 scores at baseline, 3-months, 6-months, 9-months, and 12-months were indicators of class membership. In line with Cui et al., we hypothesized that a 6-class model would best fit the data. A series of nested models up to 6 classes were compared. Models were compared with a series of fit statistics. For the AIC, Bayes Information Criterion (BIC), and the sample-size adjusted BIC (ABIC), lower values indicate better fit. For the Lo-Mendell-Rubin adjusted likelihood ratio test (LMRALRT) and the Bootstrapped Likelihood Ratio Test (BLRT), the test statistic indicates the probability that data have been generated by the model with one less class. All available data were used using the robust maximum likelihood estimator (MLR). Finally, medical burden, and social support have been associated with depression outcomes (Cui et al). We therefore examined physical illness burden, functional capacity, and social support as correlates of class membership.

Results

We first conducted a single class latent growth analysis to determine whether significant variability in change over time was evident, thereby suggesting the presence of more than one trajectory of change in PHQ scores. The mean for the slope factor was non-significant ($-0.08, p = ns$), while the slope variance was significant ($0.43, p < .001$), indicating that, when using only a single linear slope, there did not appear to be significant change in PHQ scores over time, but that there was significant variability in the degree to which change occurred. These results suggest that the assumption of a single growth parameter did not hold, warranting the investigation of a multiple class structure in change over time.

Model fit statistics are presented in Table 1. The 6-class model was retained for these reasons: the AIC, BIC, and ABIC values were lowest, the BLRT is inconsistent with the addition of another class, entropy for the 6th class was sufficiently high, and a six-class structure was predicted *a priori*. Given issues with model convergence in latent class growth modeling, we followed recommendations of Jung and colleagues and examined the reliability of our estimates using the OPTSEED option in Mplus; the estimates were replicated, suggesting that our results are not due to local solutions.

Results from the 6-class model—estimates for the means of the intercept and slope factors by class—are presented in Table 2. The estimated PHQ-9 means for each class over the five

time points are depicted graphically in Figure 1. These data indicate that for the three classes with the highest levels of depressive symptomatology at baseline (i.e., the highest intercepts, Classes 1, 2, and 4), there was no significant change over time (i.e., non-significant slope factors). For the three classes with lower levels of depressive symptomatology at baseline (i.e., Classes 3, 5, and 6), significant change was evident, with decreasing levels of symptomatology for Classes 5 and 6, and a significantly increasing level of symptomatology for Class 3. Class 3 was the smallest ($n=8$; 3%), but it is also the case that individuals with lower PHQ scores at baseline were under-sampled compared to those with higher scores; thus, the numbers of individuals in each class are not intended to be representative of how large or common this class is among the population.

To characterize our classes further, we used Pearson Chi-Square (for categorical variables) and Between-Subjects Analysis of Variance (for continuous variables) analyses to examine the baseline characteristics of our subjects to see if these characteristics differed across classes. Analyses demonstrated that, at baseline, classes did not significantly differ in terms of age ($F(5, 256) = 1.51, p > .05$), gender ($\chi^2 = 6.73, df = 5, p > .05$), nor level of education ($\chi^2 = 24.52, df = 20, p > .05$). Classes did significantly differ at baseline, however, in terms of medical burden ($F(5, 256) = 17.06, p < .001$), level of functional impairment in IADLs ($F(5, 256) = 7.046, p < .01$), and subjective level of social support from family members ($F(5, 256) = 4.13, p < .01$).

In order to understand which classes differed in terms of medical burden, IADLs, and family support at baseline, we conducted post hoc Scheffe multiple comparisons. The three right-most columns in Table 2 present means and standard deviations for each of the six classes for medical burden, functional capacity on IADLs, and family support. In terms of medical burden, results indicated that individuals in the class with minimal symptoms at baseline—Class 6 (i.e., the “minimal/improves” class)—had significantly lower levels of medical illness burden at baseline (i.e., $M=7.59, SD=3.85$) than individuals in the classes that began with the highest symptoms at baseline (i.e., Classes 1, 2, 4). Individuals in Class 5 (i.e., the “mild/improves” class) had significantly lower levels of medical illness burden at baseline ($M = 8.60, SD=3.32$) than individuals in either Class 1 (i.e., $M = 12.76, SD = 3.13$) or Class 2 (i.e., $M = 12.09, SD = 2.47$). In terms of levels of functional impairment in IADLs, individuals in Class 1 had significantly lower functional capacity ($M=19.95, SD = 8.53$) than individuals in Class 6 ($M = 26.30, SD = 3.72$) and Class 5 ($M = 25.45, SD = 3.82$); and individuals in Class 2 ($M = 22.62, SD = 6.72$) had significantly lower functional capacity than individuals in Class 6. Regarding family support, individuals in Class 1 had significantly lower family support ($M = 7.76, SD = 4.69$) than individuals in Class 6 ($M = 12.30, SD = 4.89$).

Discussion

Given that clinically significant depression is present in a significant proportion of older adult Chinese primary care patients, a greater understanding of naturalistic course is needed to inform prevention and treatment efforts. In a prior investigation that considered 12-month course as a function of patients' depression severity at baseline (16), we found only slight improvement among those with severe depression at baseline (i.e., approximately a 3 point

drop on the PHQ-9 total score) and no significant change among those with less severe initial presentations. These data suggest a poor prognosis for depressed older adults seen in Chinese primary care settings. However, given the presence of some groups of patients who improve in samples from the U.S., and the Netherlands, we sought to investigate if our model with three groups based on initial level of severity might be masking heterogeneity in course, such that a subset of the patients might demonstrate clinically significant improvement in depression even in the absence of depression-specific treatment.

Thus, we set out to empirically investigate and derive groupings of patients based on their initial depression severity and patterns of change in severity over 12 months. We conducted a latent class growth analysis, and in line with results from the U.S., we found that a six-class solution provided good fit to the data. Classes with initial depression severity in the range understood to indicate clinical significance (i.e., PHQ-9 score ≥ 10 ; our classes 1 and 2) demonstrated stability in depressive symptoms, indicating low likelihood of improvement. We also found a smaller class of older adults with subsyndromal symptoms at baseline who worsened over time to clinically significant levels (Class 3), as well as a class with mild symptom levels at baseline that evidenced some improvement over time (Class 5). Thus, similar to primary care samples in other parts of the world, some heterogeneity in course was seen among older adults with mild or subsyndromal initial presentations, but a lack of heterogeneity and lack of improvement among all older adults who initially presented with symptoms that ordinarily warrant assessment and treatment. Finally, greater physical illness burden, lower functional capacity, and lower family support were largely associated with severity of initial presentation and lack of improvement over time. These variables did not differentiate between the two classes that began at comparably low severity levels at baseline but diverged in terms of course (i.e., one improving, one worsening). Thus, although there was a signal in the data for some heterogeneity—and thus natural recovery—in course, our data did not identify accurate predictors of this variability, thus could not clearly delineate whom among those with subsyndromal levels of depression to target for intervention.

While we have highlighted similarities between the depression trajectories found in our sample and those of the U.S. sample of Cui et al. (15), it is important to note one important difference: the subjects in the U.S. sample were more likely to be offered and to receive antidepressant treatment. Only 3 subjects in our sample with Major Depression at baseline subsequently received treatment with antidepressants, even though their primary care providers were made aware of their illness. Although Cui et al. note that most of the patients in their sample were un- or under-treated with antidepressants, antidepressant treatment was much more available and utilized among their subjects than our Chinese sample, and yet the trajectories of depression symptoms over time were strikingly similar. The most reliable cultural difference in the expression of depression between Chinese and Western cultural groups has been that Chinese individuals are, on average, more likely to describe depression in somatic terms (10). Given that this is also the case for Western older adults, it may be that cultural differences in expression of depression between Chinese and Western individuals are attenuated in later life, thus accounting for similar presentations over time. However, this explanation does not address why, despite large differences in depression care availability, trajectories of change in Chinese and U.S. older adults are largely the same.

Our results should be considered in light of several limitations. First, only the PHQ-9 was repeated over time. Thus, we were unable to examine time-variant covariates, such as *changes* in family support or *changes* in illness/functional capacity that might have predicted divergent depression courses. Further, it is possible that unmeasured factors might have accounted for the worsening depression among the third class, such as family discord, losses/bereavement, or onset/worsening of a medical condition. Second, some classes had small numbers of class members and, given the sampling frame of the study that oversampled those with clinically significant depressive symptoms, the size of each class cannot be taken as representative of its size in the population. Finally, our sample is an urban sample and it is unclear the degree to which these findings generalize to rural Chinese communities.

The study's findings suggest directions for future research and implications for practice. Studies should seek to identify those factors that predict improvement in depression over time, thereby illuminating potential sources of resilience. Our study included only one potential protective factor, family social support, which was not a significant predictor of class membership characterized by depression improvement. Future studies could seek to examine factors such as providing social support to others, religiosity, meaning in life, and engagement in community activities as potential sources of heterogeneity in course, as well as possible targets for preventive interventions and treatment. Future research is needed to investigate mechanisms whereby physical illness burden and functional impairment operate to yield a poor prognosis for depression outcome, and whether these processes are similar to those examined in western samples. Future research is also needed to establish the willingness of older adults identified as depressed by screening tools to participate in interventions targeting depression, and how best to equip primary care practitioners to engage and maintain older adult patients in treatment. Research is also needed to examine what type of intervention (e.g., medications, psychotherapy, peer support, etc.) is most acceptable and effective for this population.

Regarding implications for practice, as the first study of natural outcomes of late-life depression among Chinese primary care patients, results of this study can be used to inform the development of interventions. As we reported previously (16), less than 1% of the patients in our primary care sample with clinically significant depression received depression-specific treatments. The primary care system in China is evolving, and in coming years will be the primary setting for chronic disease management, including depression care and treatment. Our results suggest that those older adults who present with moderate to severe depression symptoms should be prioritized in terms of access to mental health assessment and depression care because they are not likely to improve without treatment. Further, individuals with milder depressive symptoms should be monitored for one year, as most of these individuals will improve somewhat (although slowly), while others may experience marked increases in depression severity, and will likely then require treatment. These findings, combined with the limited resources and access to mental health care in China currently, and the priority of primary care system in China, indicate that integrated care models that incorporate mental health care into the primary care system are particularly suited to the challenges of late-life depression (11). The heterogeneous trajectories of change

found here also allow us to consider the most suitable approach for different patient groups with different naturalistic course.

In particular a stepped approach to care may be useful given heterogeneous trajectories of change, combined with inadequate resources and access to depression care in China currently. Based on what has been shown to be effective in Western cultures, this treatment could involve care coordination by a primary care-based provider and use of decision support tools and evidence-based depression care algorithms that include antidepressant medications and/or brief psychotherapy. Problem Solving Therapy (PST), for example, has been implemented in late life depression collaborative care models in primary care (27) and has been adapted for use with Chinese older adults in the U.S. (28). Further, PST can help older adults address a range of factors contributing to depression in later life, including functional impairment, lack of social support, family conflict, and physical pain. Our data also suggest that targeting such factors as functional impairment and lack of family support could have antidepressant properties as well, potentially identifying a role for social services interventions in the treatment of depression in China, and necessitating their coordination with primary care. Treatments need to be adapted for effective and feasible implementation in Chinese primary care settings in order to ameliorate the suffering, morbidity, and mortality associated with depression in older adult patients.

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Figure 1.

Estimated PHQ-9 Means Across All Time Points for Each Latent Class

Note: * indicates a significant slope (i.e., significant change over time). Sample sizes of the classes are as follows: Class 1=21, Class 2=47, Class 3=8, Class 4=48, Class 5=62, Class 6=76

Table 1

Model Fit Statistics

	1 class	2 classes	3 classes	4 classes	5 classes	6 classes
Ho	-3167.421	-3274.634	-3169.618	-3148.387	-3135.320	-3119.494
AIC	6354.842	6569.267	6365.236	6328.774	6308.640	6282.987
BIC	6390.526	6604.951	6411.624	6385.867	6376.438	6361.491
ABIC	6358.821	6573.246	6370.408	6335.140	6316.200	6291.741
ENTROPY	0.922		0.898	0.851	0.784	0.811
LMRALRT		730,000, $p < .001$	198,169, $p < .001$	40,064, $p > .05$	24,658, $p > .05$	29,864, $p > .05$
BLRT		Not all draws converged	-3274.634, $p < .001$	-3169.618, $p < .001$	-3148.387, $p < .001$	-3135.320, $p < .001$
N per class	N=262	174, 88	126, 71, 65	33, 66, 115, 48	49, 30, 61, 47, 75	21, 47, 8, 48, 62, 76

Table 2

Estimated Means for Intercepts and Slopes for Each Latent Class

	Intercept			Slope		P value	Medical Burden Mean (SD)	Func. Impair.		Family Support	
	Estimate	Standard Error	P value	Estimate	Standard Error			Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Class 1	14.417	0.948	0.000	0.631	0.471	0.800	12.762 (3.480)	19.95 (8.53)	7.76 (4.69)		
Class 2	12.666	0.649	0.000	0.200	0.141	0.156	12.085 (2.474)	22.62 (6.72)	9.72 (5.25)		
Class 3	5.849	0.939	0.000	1.988	0.435	0.000	8.250 (2.765)	23.38 (4.96)	11.38 (7.05)		
Class 4	9.464	0.493	0.000	-0.375	0.191	0.050	10.875 (3.480)	23.48 (5.28)	10.10 (4.56)		
Class 5	6.445	0.743	0.000	-0.404	0.133	0.002	8.597 (3.316)	25.45 (3.82)	11.85 (4.94)		
Class 6	3.859	0.314	0.000	-0.323	0.080	0.000	7.592 (3.848)	26.31 (3.73)	12.30 (4.89)		