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Living Arrangements, Intergenerational Dynamics, and Psychological Well-being of Elders: An Examination of Predictors of Elder Depression in Retired Persons in Yancheng, Jiangsu, China

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Living Arrangements, Intergenerational Dynamics, and Psychological Well-being of Elders: *An Examination of Predictors of Elder Depression in Retired Persons in Yancheng, Jiangsu, China*

A Thesis submitted to the Yale University School of Medicine in Partial Fulfillment of the Requirements for the Degree of Doctor of Medicine

By

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LIVING ARRANGEMENT, INTERGENERATIONAL DYNAMICS, AND PSYCHOLOGICAL WELLBEING: AN EXAMINATION OF DEPRESSION IN RETIRED PERSONS IN YANCHENG, CHINA

Ying Wang, Lillian Yau, Paul Kirwin

This study explores the relationship between living arrangement and psychological wellbeing in retired elderly individuals living in Yancheng, Jiangsu (PR China). Data on mode of residence, socio-economic background, daily activities, and intergenerational dynamics were collected from 200 subjects, and their potential correlations with depression (assessed via the Geriatric Depression Scale Short Version) were analyzed. Univariate as well as logistic regression confirmed mode of residence as a significant predictor of depression in this group. The following depression odds ratios associated with each mode of residence were derived via logistic regression: 1) nuclear household, i.e. living with a spouse only – 1 [reference category], 2) multigenerational households in which a spouse is **not** present – 4.341, 3) multigenerational households in which a spouse **is** present – 0.781, and 4) living alone – 3.018. Based on these ratios, we conclude that the traditional model of intergenerational coresidence is not, in itself, associated with less depression. Rather, it is the presence of a sharing spousal in a household (whether single or multigenerational) that protects against elderly depression. Other predictors of depression identified in backward logistic regression included presence of a chronic illness and self assessed wealth status. Additionally, a number of psychosocial variables were identified as independently correlated with depression, but were subsequently selected out by multivariate analysis. These included: educational background, religious affiliation, membership in an organization, attitude toward aging,

and family status. Based on this study, we believe that efforts to promote mental wellbeing among today's Chinese elders should be directed toward psychosocial factors that are modifiable (education, building supportive social networks etc.) rather than insisting on the traditional ideal of multigenerational living and dependence on filial piety.

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MD Thesis Depositor's Declaration

Introduction

Depression Among the Elderly

Recognized as the most common psychiatric disorder among the elderly, depression not only causes distress and suffering, but also impairs physical, social and mental functioning [1]. With increased life expectancy and improved medical care, elderly depression is also becoming a wide spread problem that is expected to affect a large percentage of the population. It is estimated that persons over 65 years of age will more than double between the years 2000-2050, making up 16.4% of the total world population, an increase from the current 6.9% [2]. Yet despite the severity and prevalence of elderly depression, it remains an under recognized and under diagnosed problem with substantial proportion of older patients receiving no treatment or inadequate treatment for their depression in the primary care setting [1].

The economic toll associated with elder depression is striking – while depression as a whole for all age groups is one of the most costly disorders in the United States, the US Surgeon General's Report on Mental Health states that "late-life depression is particularly costly because of the excess disability that it causes and its deleterious interaction with physical health." Specifically, older patients with depression tend to visit doctors and emergency rooms more frequently, use more medications, and incur higher outpatient charges and stay longer at hospitals. For example, having depressive symptoms was associated with a 19% increase in the number of outpatient encounters and a 30% increase in total outpatient charges in a Minnesota health maintenance

organization. Given the scale and the severity of the problem, it is indeed concerning that elderly depression remains extremely under-recognized and under-treated [2].

Perhaps contributing to the under-diagnosis and treatment of depression is the false popular notion that depression is a natural part of the aging process. Depressive disorder at any age is a serious illness, but the elderly may be particularly susceptible to the resulting serious health and functional deficits because in addition to its own set of morbidity, depression often complicates the course and outcome of other illnesses among older adults. Interestingly, depression among community dwelling older adults have been shown to be less prevalent than among young community residents. According to data from the National Health and Nutrition Examination Survey[1], in any two week period, 5.4% of Americans 12 years of age and older experienced depression. The prevalence for depressive symptoms among those 60 and older is 4%, compared with 7.3% among those aged 40-59 (Figure I). Despite the lower prevalence among elderly individuals, however, late life depression poses a significant health risk and is increasingly recognized as an important public health concern. Studies have shown that depressive disorders are strong predictors of suicide among the elderly, who, despite a lower overall prevalence of depression, have higher suicide rates than any other age group [3].

Depression in the elderly may also present significant diagnostic difficulties because symptoms are frequently masked and may initially appear as cognitive impairment or early sign of neuroendocrine and related chronic disorders [4]. Additionally, most elderly individuals with symptoms of depression do not meet the full

[1] NHANES is a continuous cross-sectional survey of the civilian, noninstitutionalized U.S. population designed to assess the health and nutrition of Americans.

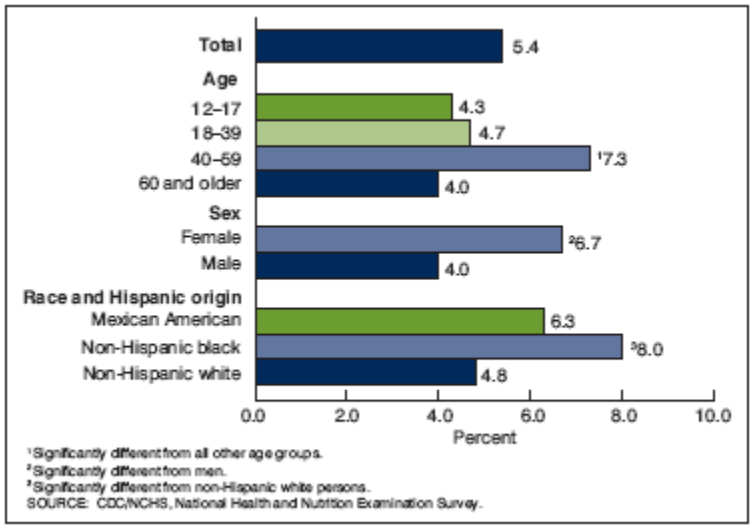
diagnostic criteria for major depression as outlined in DSM IV (table I) [5]. While the new diagnostic entity known as "minor depression" has been proposed to characterize patients with subsyndromal form of depression, it is not currently recognized as an official disorder. Importantly, while the prevalence of major depression declines with age, the reverse is true for the prevalence of depressive symptoms, which have been identified in 8 to 20 percent of older community residents [1] and 17 to 35 percent of older primary care patients [6]. This apparent contradiction may, in fact, suggest that the standard criteria for depression may be more difficult to apply to elderly patients.

Table I: DSM IV-TR Criteria for major Depression

The diagnosis of major depression can be made if a patient has five or more of the following symptoms during the same 2-week interval with at least one of the symptoms being either depressed mood or loss of interest or pleasure in activities that were previously pleasurable.

- Depressed mood
- Loss of interest or pleasure in previously pleasurable activities
- Significant weight gain or loss
- Insomnia or hypersomnia
- Psychomotor agitation or retardation
- Fatigue
- Feelings or worthlessness or inappropriate guilt
- Impaired concentration
- Recurrent thoughts of death

Figure One: % of Persons 12 and Older with Depression in US Households (2006)



Elder Depression in Developing Nations

While cultural differences exist in its expression and prevalence, depression occurs in all cultures [7], and depression among the elderly is now recognized as one of the most pressing public health concerns in developing nations. According to the Global Burden of Disease study, by 2020, depression will be the single leading cause of disability adjusted life years in the developing world [8]. With about 60% of the 580 million older people in the world today living in developing countries [2], elder depression in developing nations calls for special attention. This paper focuses, in particular, on Chinese elderly individuals, who account for over 1/5 of the world's elderly population. Understanding cultural specific manifestations and perceptions of depression among Chinese elderly will not only facilitate more effective care for elders residing in China, it is also an important in addressing the mental health needs of the growing number of elderly Chinese immigrants in the US, who despite higher rates of suicide in comparison to White Americans [9], lag significantly behind in utilization of mental health services [10, 11].

Chinese Elders

For thousands of years, the family has been central to the social organization of Chinese societies. Confucian ideals designate filial piety the highest of all virtues, therefore, Chinese elders traditionally live with and are looked after by the young with minimal state interventions [12, 13]. However, modernization has brought some fundamental changes; most notably, the one-child-policy implemented in 1979 has now produced a generation of adults who will confront the 4:2:1 problem in the near future. This very name indicates that a married couple will be simultaneously caring for 4

parents and 1 child with no siblings to share the burden – a significant challenge that is becoming a collective concern for the Chinese society [14]. Furthermore, with the younger generations stepping away from traditional Confucius ideologies and embracing more westernized values, parent-children dynamics have become increasingly more "egalitarian", placing time-honored traditions and expectations in doubt.

Nevertheless, the tradition of filial piety is deeply ingrained in the collective conscious even as modernization rapidly changes the way of life for most urban Chinese. A recent study conducted by the Chinese Academy of Medical Science examined the perception of long-term care held by Beijing residents. The study showed that while nearly everyone perceives long-term care facilities to be the much needed solution to China's growing elder care concern, the majority of facility residents themselves preferred to live with their children, even when facilities are adequate in meeting their needs and when their children are too busy to care for them [15].

To further complicate the picture, the Chinese population is aging at a remarkable rate because longer life expectancies and as a result of the single child policy – the percentage of elderly is projected to triple from 8% to 24% of the total population between 2006 and 2050 [16]. This unique time in Chinese society raises questions regarding how changing social and economic landscape may affect traditional family dynamics, and the psychological well-being of a rapidly growing senior population, most of who are not prepared for the 4:2:1 problem.

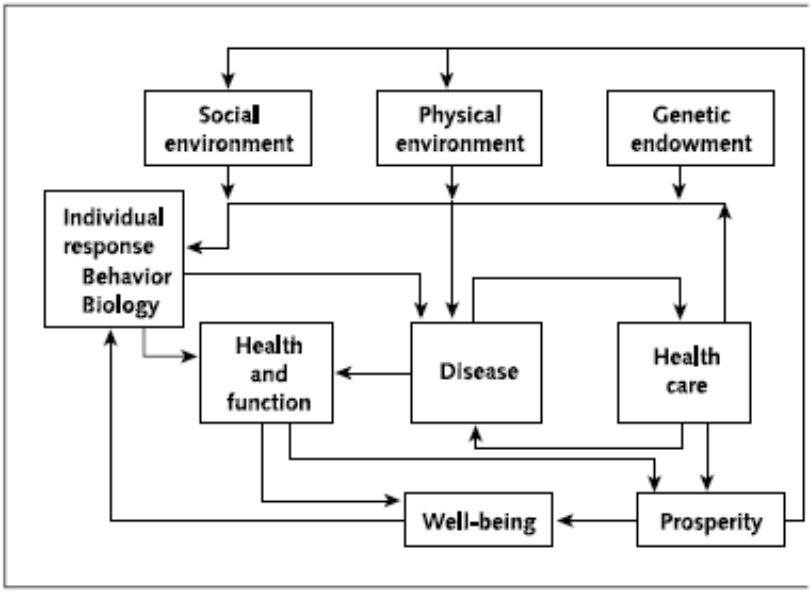
Predictors of Depression in the Elderly in the US

A number of psychosocial factors are known to be independent risk factors for late-life depression, as well as exerting significant influence on the course and outcome

of cases with clear underlying biological etiologies. Bruce et al report that the most important and best studied psychosocial risk factors in late-life depression among American elderly individuals include bereavement, caregiver strain, social isolation, disability from medical illness and need for rehabilitation [17]. Additional oft cited predictors of depression include gender (higher prevalence among females) and socioeconomic status (limit access to care, thus delaying or preventing diagnosis and or treatment) [18].

A complete understanding of late-life depression requires appreciation of interrelatedness of biological and psychosocial variables. Using the following flowchart diagram (Figure Two), Innui attempted to capture the "determinants of health model" as described by Evans and Stobbard [19]. This flowchart effectively captures the intricate interconnections among various psychosocial and biological factors, all of which ultimately feed into mental wellbeing.

Figure II: Naturalistic Understanding of the Determinants of Health [19]



While certain psychosocial variables are not susceptible to intervention (i.e. illness, socioeconomic status, death of loved ones, etc.), others may be modified through public health efforts as well as individual coping strategies. Identifying modifiable psychosocial risk factors therefore, is an emerging area of research that may affect the long term outlook of mental health of the aging population.

One psychosocial variable of specific interest to the authors of this study is the living environment, i.e. one's daily surroundings that directly affect his/her level of socialization, access to family support, and ability to obtain care. The importance of living environment has been demonstrated in a number of studies which show that rates of depression among medically ill older patients vary drastically depending on where they live and whom they live with.

Studies have shown that living alone can lead to more depression because of increased risk of social isolation [20]. The 1992-94 National Long-Term Care Channeling Demonstration database found that despite having fewer physical, cognitive and functional impairments, elders who lived alone had markedly higher rates of depression and lower levels of satisfaction with life in comparison to study counterparts who lived with others [21].

While nursing homes provide assistance with activities of daily living in a safe, and to a limited extent, social environment, prevalence of depression among nursing home residents are generally much higher than that of community dwelling elders. Studies in the 80s and 90s showed a nursing home depression prevalence of 9.7% -12.6% [17], while the most recent large scale study of 3710 nursing home medical records revealed depression prevalence to be a notable 20.3% [22]. In comparison, Bruce's 2002

study looking at 539 homecare patients newly admitted to a large, traditional visiting nurse agency over 2 years found that 13.5% met DSM-IV criteria for major depression [17]. These rates exceed the overall 1-year prevalence of all community dwelling older individuals, estimated to be approximately 0.9% by the Epidemiologic Catchment Area Study (ECA), which used diagnostic criteria for depressive disorder and assessed 187,161 adults aged 65 years or older in five geographically distinct sites, and the 6.5%-9.0% in primary care patients [17]. The proposed explanations for the higher prevalence of nursing home residents are multifaceted. Higher prevalence of medical co-morbidity, physical disability and cognitive impairment among nursing home residents all independently predispose to depression. Just as importantly, the sense of social disengagement and loneliness elders experience upon entering a long term care facility, and the subsequent sense of loss (i.e. loss of independence and loss of familial support) may lead to depression [23, 24].

While nursing home placement of elderly is an accepted (albeit reluctantly so) form of elder care in the US and in many other parts of the world, in China, where Confucian ideal places elder care responsibility with the offspring, nursing home placement is associated with tremendous shame both for the elders involved and their children. Traditionally, most Chinese elders live in multigenerational households with their children (usually the oldest son) and grandchildren. Though it would appear that the Chinese model of intergenerational co-residence addresses some of the pressing concerns (i.e. social isolation and the loss of familial support) confronted by older persons, it remains to be seen whether this model truly benefits the psychological well-being of Chinese seniors, particularly when other factors unrelated to filial piety, such as

community involvement and living conditions also mitigate social isolation. Further, modern household dynamics have evolved such that multigenerational living no longer guarantees adequate support or resources for the elderly. Therefore, knowing the answer to this question will allow us to understand the real impact of China's 4:2:1 problem and evaluate possible social solutions as the traditional residence model, and indeed, the traditional way of life, become a thing of the past as China races towards the future.

Statement of Purpose

Given the preponderance of literature demonstrating that living alone is closely associated with depression among the elderly, this study investigates whether the traditional Chinese model of intergenerational co-residence is beneficial to the mental wellbeing of elderly in modern China. A number of other psychosocial factors that may play a role in mental wellbeing are analyzed along with mode of residence in an effort to identify predictors of depression amongst retired community dwelling elders in China.

We hypothesize that living arrangement is significantly correlated with depression outcomes in retired urban Chinese population. In particular, we propose that multigenerational living is associated with less elder depression by supplying a close source of social and financial support.

By examining the relationship between traditional multigenerational living and depression outcomes in China, we can begin to understand the impact of social changes and evolving household dynamics on the mental wellbeing of Chinese elders. Additionally, by identifying predictors of depression, we can begin to formulate individual and systemic interventions that may prevent elder depression.

Methods

Study Site

This study was conducted among 200 individuals aged between 65-80 in Yancheng, a prefecture-level[2] city in Northeastern Jiangsu Province, People's Republic of China. With a population of around 8 million and recent influx of heavy foreign investment mainly in the automobile industry, the city is at or slightly above national average in terms of financial capability [25].

Of the 200 individuals studied, 100 were interviewed in the hospital setting. These included patients on the inpatient floors of the internal medicine unit and those in the waiting rooms at the Outpatient Consult Suite (专家门诊) at Yancheng Number Three People's hospital. The remaining 100 were interviewed in the community setting, including those interviewed at community parks, inside homes, at churches, and at senior club houses. Individuals were approached with an explanation of the purpose and design of this project; their participation was then requested. We did not collect refusal rate, although it is estimated by the interviewers to be around 30%.

Study Design

A preliminary screening survey (table II) was used in order to minimize confounders and select the most comparable group. We limited our sample group to retired, community dwelling individuals between 65-80, without life-threatening illnesses, are able to complete activities of daily living independently, and have health insurance.

[2] In Modern China, prefecture-level refers to the second level in the administrative hierarchy of the Chinese government. It is the division between province and county levels.

The interview itself consisted of an1-hour standardized survey including the Chinese version of the Geriatric Depression Scale Short Form (GDS-S). The interview is meant to

1. Collect background information on subjects' health, economic condition, living arrangement, family dynamics, education and religious affiliation. These comprise our independent variables and represent possible predictors of depression.
2. Assess subjects' mental wellbeing using
    a. Subject's own rating of life satisfaction as a part of the standardized survey
    b. Chinese version of the GDS-S. For the purpose of our analysis, a score of 5 is used as a cut-off point for depression.

Five interviewers were recruited to administer the survey. Four out of the 5 interviewers were nurses working at the internal medicine unit of Yancheng Number Three People's Hospital who were recommended by the Chief of the internal medicine ward on the basis of their past participation in healthcare surveys and outstanding work performance. The 5th interviewer is a graduate student enrolled in Yancheng Teacher's College. All five were individually interviewed and trained by this author. After each interviewer completed 5 interviews satisfactorily in the presence of the author, they proceeded to complete surveys independently with ongoing weekly quality assurance measures taken by the author.

The Questionnaire

The questionnaire consisted of two sections. The first section comprised of socio-demographic information and the second assessed for depression using the Chinese version of the short version of the Geriatric Depression Scale. The complete Geriatric Depression Scale has 30 questions with yes/no answers, and has been clinically validated to be applicable among Chinese elderly [26]. Developed to reduce fatigue and compensate for declining concentration in older adults, the GDS-S consists of 15 questions [27]. With a total score of >=5 considered to be indicative of depression, results of the GDS-S were shown to have high correlation with those on the original form [28]. Likewise, results of the Chinese version of the GDS-S (version used in our study) have been shown to be internally consistent with those of the original form [29].

The questionnaire was first written in English and subsequently translated into Chinese. Upon completion of the questionnaire, it was pilot-tested in 10 subjects to screen for potential problems. No major issues were encountered although slight modifications in wording were implemented for language clarity. The results of the pilot versions were discarded.

In addition to receiving instruction on the administration of the GDS-S, interviewers were trained on survey technique to minimize interview bias and variability. Each interviewer received a total of 5 hours of pre-survey training, as well as 2 hours of weekly quality assessment sessions throughout the data collection process.

Table II

Screening Form (English)

Question	**Answer**
1) Are you over 65 & under 80?	Y N

2) Do you have health insurance?	Y	N
3) Are you retired?	Y	N
4) Have you ever been employed?	Y	N
5) Are you able to move independently with or without walking assistance?	Y	N
6) Are you currently experiencing significant pain or discomfort due to a disease?	Y	N
7) Do you suffer from any terminal illnesses?	Y	N
8) Can you complete more than 4 out of the following without assistance? a. Eating b. Washing c. Showering / bathing d. Getting dressed e. Preparing basic food items f. Shopping for groceries	Y	N

* Individual only eligible if s/he answers Y to all of these 8 questions.

Data Analyses

First we examined the descriptive statistics of the variables in the study. All the variables with the exception of *age* were of nominal and ordinal data types. The main outcome variable in this study is the depression level among the elderly, which is

assessed using the Chinese version of the Geriatric Depression Scale – Short Form (GDS-S). Scores of 0–4 are considered normal, 5-8 indicate likelihood of depression and scores above 8 indicate definite depression. No subjects in our study obtained scores above 8. The distribution of GDS scores is, by definition, not normally distributed. Consequently all analyses were conducted using non-parametric tests. Non-parametric comparisons were performed using Chi-square and Fisher's exact test. Logistic regression was used to determine the predictors of depression defined as GDS-S greater than or equal to 5, and the corresponding likelihood odds ratio. Some surveys contained missing data for certain variables and these were excluded at the variable level in the analysis; therefore, sample sizes may vary slightly from test to test. All analyses were performed using the SPSS 17.0 statistical package. The statistical significance level was set at an alpha level of 0.05 for all tests except for those with multiple comparisons in which case a post-hoc Bonferroni correction was made. All tests were 2-tailed.

Results

Demographic characteristics

There were 201 subjects who participated in the survey, all of whom completed the short version of the Geriatric Depression Scale. The mean age of the subjects were 71.1 (S.D. = 5.8) years (range: 58–84) and 134 of the subjects (66.7%) were male. Of the 201 subjects 178 (88.6%) were considered not depressed while 23 subjects (11.4%) were considered likely to be depressed. Table III & IV characterize basic demographic information, and household dynamics of our respondents, respectively.

Table III: Demographic Information

Category	Variables	N	% Depressed
Survey Location	Hospital	100	21.0%
	Park	35	2.9%
	Club	44	0.0%
	Home	21	4.8%
Gender	Male	134	9.0%
	Female	66	16.7%
Education	Illiterate and Elementary	81	18.5%
	Jr. and Senior High	74	10.8%
	Technical, College and Above	45	0.0%
# Years Retired	<= 5 years	19	5%
	6-10 years	36	8%
	>10 years	140	14%
Religion	One of the Major Religions	40	23%
	Others	2	0%
	None	158	9%
Self Assessment of Wealth	Rich	3	0%
	Above Average	31	3%
	Average	119	8%
	Below Average	37	22%
	Poor	7	43%
Org. Involvement	None	73	19%
	Involved in at least one org.	127	7%
Presence of Chronic Disease	Yes	171	13%
	No	27	0%

Table IV: Household Dynamics

Category	Variables	N	% Depressed
Head of Household Status	Head_of_Family	115	7%
	Non_Head	84	18%
Living w/	Spouse	92	9%
	Children	16	31%
Home Ownership	Owned by self or spouse	142	11%
	Others (children, rent, others)	58	12%
Grandchil Care	Yes	85	9%
	Used to	63	14%
	No	48	13%
Fin. Relation w/ Children	No Financial Relationship with Children	102	10%
	There is a a financial relationship with children	97	12%
Fin. Relation w/ Children	I help and manage children's finances	66	11%
	My children help and manage my finances	31	16%
Individual Financial Contrib To Family	Main Contributor	84	7%
	Some Contribution	102	14%
	No Contribution	14	21%

Notable Characteristics of Respondents

A few general characteristics of our respondents are notable. *First above all, the majority declared themselves to be atheists (158/200).* This is actually fairly typical of

this generation of mainlanders. Though there is no official sanction against religion in China today, elderly Chinese who have weathered the political turmoil of Cultural Revolution typically deny any religious affiliation either out of the fear that they might be perceived as "superstitious" and "counter-revolutionary", or as a result of the influence of early Communist propaganda that were decidedly anti-religion. *Secondly, we have about twice the number of male respondents as female respondents*. This diverges from the pattern seen in the US, where female respondents tend to outnumber males. We believe that the male predominance may in part be cultural. Among this age group, females tend to be less well educated and, therefore, more apprehensive about participating in a rather lengthy survey. Chinese females also tend to be more reserved in comparison to their male counterparts, and thus, more reluctant to participate in surveys that may require prolonged conversation and potential disclosure of personal information. Finally, females may have less time availability as they are typically responsible for preparing family meals (not a trivial endeavor especially in a multigenerational household). We need to keep in mind that past studies have demonstrated female gender to be associated with depression. Therefore, it is possible that we are underestimating the prevalence of depression because of the skewed gender ratio. *Thirdly, a little under 50% of our respondents declared that they have a financial relationship with their children. Of these individuals, 68% (66/97) stated that they help their children monetarily, while only 32% (31/97) are recipients of direct financial assistance from their children.* While this appears to be the opposite of what one would expect given the Chinese tradition of filial piety and the general belief that the aged should be supported by their children, we feel

this reversal of assistance is a subtle reflection of the gradual changes in family dynamics and social values in modern China.

When asked how he felt about his financial relationship with his son, a 67-year old retiree gave a telling response that is a mix of the following: a matter-of-fact sense of personal responsibility for the wellbeing of his grown son, the expectation that his son will reciprocate the care in the future, and a subtle uncertainty over whether his son feels the same way. In fact, his response captures the sentiment of many elderly whom we interviewed:

"Of course I need to help out my son. He is under such pressure. He needs money to purchase the apartment that his family has been living in, and he needs to spend endless amounts of money on my grandson to ensure the best education for his only child. Down the road, when my grandson gets married, he will naturally be looking to his father for support… my son will have to save up for that. We will do our best to help too… we can't let our only grandson lose face. The young folks… they are all only children… they compete with each other with regard to everything. We old folks don't need much luxury. We are easily satisfied. We have our pension and health coverage. What's the point of hoarding money for ourselves? Our hopes lie with future generations. But of course, when I am no longer able to do basic things for myself, my son will need to take care of me. At least I think he should. It is his responsibility. But who knows what will happen when that day comes? I don't think he will dare to neglect my needs, but the society keeps on changing."

Finally, our respondents tend to be an active group with the majority (88%) leaving their place of residence for at least 15 minutes everyday and 64% seeing their friends on a daily basis. As we explain in the discussion section (under subsection "Social Context"), this level of socialization is actually not surprising for Yancheng elders given the local culture. The following table summarizes the frequency of outings for our respondents.

Table V: Socialization Pattern

	Daily	Few x / wk	1x/wk	2x/mon	1x/ mon	Other
Outings	176	12	4	2	3	4
See friends	129	30	11	2	20	2
See relatives*	6	8	15	7	44	117

* Relatives other than children

Univarite and Multivariate Regression

Consistent with published literature on predictors of depression in the US, univariate analysis (chi square) confirmed that living alone is correlated with depression (*p=0.035)* among our group. Additionally, living with children only (and no spouse) is also significantly correlated with depression with a p value of 0.009. Psychosocial factors other than mode of residence that are correlated with depression by univariate analysis include: level of education (above high school versus below), self rated family status (a valued member of the household vs. an unimportant member of the family), self assessment of wealth (above vs. below average), membership in a local organization, religious affiliation, perception/attitude towards aging (positive vs. negative), and presence of chronic disease. We did not, however, find age, gender, marital status, presence or absence of financial relationship with children, daily outings, and average income to be significantly correlated with depression.

Table VI : Demographic and Psychosocial Variables broken down by depression status. Results are reported as number of subjects or as mean ± SD.

	Not Depressed (n=178)	Depressed (n=23)	Statistic	p-value *
Age	70.9 ? 5.8	70.9 ? 5.8	$F = 0.697$	0.089
Gender				
Male	122	12	$\chi^2 = 2.455$	0.117
Female	56	11	-	-
Marriage				
w/Spouse	159	18	$\chi^2 = 2.372$	0.124
No Spouse	19	5	-	-
Education				
Above High Sch	64	3	$\chi^2 = 4.811$	**0.028**
Below High Sch	114	20		
Self Assessed Wealth				
Above Average	142	11	$\chi^2 = 10.482$	**0.001**
Below Average	34	11		
Financial relationship w/ Chil				
Present	85	12	$\chi^2 = 0.362$	0.548
Absent	93	10		
Organizational Affiliation				
Yes	119	9	$\chi^2 = 6.769$	**0.009**
No	59	14		
Family Status				
Positive	174	20	$\chi^2 = 9.009$	**0.021****
Negative	3	3		
Chronic Illness				
Present	148	23	$\chi^2 = 4.556$	**0.033**
Absent	30	0		
Religious Affiliation				
Present	34	9	$\chi^2 = 4.859$	**0.028**
Absent	144	14		
Average Income				
> 40,000 yuan	60	12	$\chi^2 = 3.613$	0.057
< 40,000 yuan	117	10		
Satisfaction with Life				
Satisfied	176	22	$\chi^2 = 1.440$	0.307**
Not satisfied	2	1		
Attitude toward Aging				
Positive	109	8	$\chi^2 = 6.022$	**0.014**
Negative	68	15		
Daily Outings				
Yes	157	19	$\chi^2 = 0.585$	0.444
No	21	4		

* P-value calculated based on chi-square

** P-value calculated based on Fisher's Exact Test

Subsequent to the univariate analysis, we proceeded to test the variables using the backward logistic regression model to identify the variables that remain significant predictors of depression when multiple factors are taken into consideration. Variables tested in the model were *mode of residence, education, religion, self assessment of wealth, organizational affiliation, presence of chronic disease, attitude toward aging, and family status*. These variables were chosen for the regression model as they were found to be significantly correlated with depression (as measured by GDS-S) using chi square and Fisher's Exact tests. See Table 2 below for results of the backward logistic regression.

Table VII: Results of Backward Logistic Regression with GDS-S as Dependent Variable

Independent Variables	B	S.E.	Df	p-value	Odds Ratio	95.0% C.I. for Odds Ratio	
						Lower	Upper
Self assessment of wealth (1= above average, 0=below average)	-1.170	0.488	1	0.016	0.310	0.119	0.807
Chronic Illness (1= present, 0=absent)	19.318	6968.531	1	0.998	2.05E8	0.000	-
Living – (w/Spouse)	--	--	3	0.059	1	-	-
Living – (w/Children)	1.468	0.682	1	0.031	4.341	1.141	16.519
Living – (Spouse & Chil)	-0.248	0.595	1	0.677	0.781	0.243	2.503
Living – (Alone)	1.134	0.801	1	0.157	3.108	0.647	14.939

When various psychosocial factors are considered together in a backward logistic regression model, a number of factors previously found to be significant using univariate analysis were selected out. The three factors that remain in the model are: *self assessment of wealth, presence of chronic illness, and mode of residence*. Notably, compared with co-residing with a spouse, co-residing with children (and no spouse) results in higher risk for depression with an odds ratio of 4.34 (95% confidence 1.14 – 16. 52, p-value of 0.031); living alone, likewise, increases the risk for depression with an odds ratio of

3.108, although the p-value associated is not significant (95% confidence interval of 0.647-14.939, p-value of 0.157). Interestingly, the traditional model of intergenerational household with both a spouse and children, as it turns out, does have a slightly protective effect with an odds ratio of 0.781, although the associated p-value is again not significant (p=0.157, 95% confidence interval 0.647-14.939). Self assessment of wealth was found to be a significantly correlated with depression. With an odds ratio of 0.310 and a p value of 0.016, having a self assessed wealth status of above average appears to impart a protective effect on mental wellbeing. Finally, the multivariate model shows that having a chronic illness significantly increases risk of depression (2.05E8), although the associated p-value was not significant.

Discussion

Social Context

Of the 100 individuals surveyed outside of the hospital setting, 35% were interviewed in Yancheng public parks, 44% interviewed in senior clubs, and 21% were interviewed at people's homes. Most of these individuals appeared to be active seniors with an overwhelmingly positive outlook on life. Given that a substantial percentage of individuals were interviewed in community parks and "senior clubs houses", a brief discussion on the social context of Chinese parks and senior club houses is in order.

Community parks are well utilized public resources found in most urban settings in China. To most seniors, these serve as the hub for daily exercise and social activities. In Yancheng, parks typically fill up from sunrise till around 9 am. Park goers use these free, safe, and typically pleasantly situated public spaces to exercise either alone, or more frequently, in groups of 10 to 15. Others use the park simply as a place for a leisurely

stroll and greet friends along the way. During the 2.5 months in which I conducted the interviews, I have seen groups (both long-standing and ad hoc) formed around Taiji, sword fighting, amateur Peking Opera performance, political debates, and swing dancing in the parks. While people of any age can utilize park space, retired individuals make up the majority of those who regularly congregate in the parks (Figure II).

Figure II: Scenes from Community Parks

Elderly couple taking a leisurely morning stroll

Weekly Peking Opera Performance by local retirees

Retired school teacher demonstrates how to work Yo-zi

Tai-ji group amid morning routine.

What we referred to as "senior clubhouses" are actually a unique type of senior organization known in China as "Late-Life University" (老年大学). These places

provide on-going education in various disciplines to retired individuals and occasionally furnish college certificates upon graduation (although these certificates are not used as official documentation of educational achievement). Courses offered through these institutions include Chinese calligraphy, traditional Chinese medicine, painting, philosophy, aerobics, taichi, among others. These organizations are set up on a semester system and organized like an academic institutions with exams and official grades. In reality, older individuals who attend these institutions view them more as a "clubhouse" where they can socialize with friends and share common interests in a relaxed and educational setting.

Co-residence and Multigenerational Households

Numerous studies have shown that an elderly individual's living situation is significantly correlated with depression. This is particularly evident if one considers the much higher prevalence of depression among nursing home residents in comparison to community dwelling individuals, even when illness has been accounted for [20].

Ideally, the larger size of a multigenerational household provides a close network of support for an elderly individual who may otherwise experience social disengagement and isolation. One must not forget, however, that it is not the size of the support network, but the perceived satisfaction with family help that is associated with less depression [31]. Therefore, whether or not multigenerational living is truly protective against depression becomes a more complicated issue in today's China with its evolving social values and changing power dynamics within the family unit.

In China, it is traditionally the duty of the oldest son to reside with his parents and take over the responsibility of elder care. Our survey showed that the tradition of

residing in a multigenerational household still holds strong with 48.8% of respondents sharing a household their children. It is also becoming apparent, however, that a significant percentage of respondents are living in independent households. 45.8% of respondents live with a spouse only and 4.5% individuals live by themselves.

While our data confirmed that living arrangement of the elderly individual is significantly correlated with presence of depression both independently and when considered in combination with other psychosocial factors, simply living in a multigenerational household does not automatically correspond to reduced risk of depression. In fact, compared to a nuclear household (co-residing with a spouse only), multigenerational household residence with children but no spouse actually corresponds to an odds ratio for depression of 4.341, which is the highest odds ratio of all residence models considered. The mode of residence with the lowest odds ratio for depression also occurs, interestingly, in the multigenerational household, one in which both the spouse and children are present (odds ratio of 0.781). Finally, living alone (no spouse, no children) corresponds to a depression odds ratio of 3.108. Based on these numbers, multigenerational living without a spouse confers no protective benefits against depression, while having a spouse in the same household does appear to protect against depression.

Table VIII: Mode of Residence Breakdown

	Depressed	Non-depressed	Total	Ex (B) *
Alone	3	6	9	3.108
w/ Spouse only	8	90	98	1
w/ Children only	5	11	16	4.341
Spouse & Chil	5	71	76	0.781
Other	0	2	2	-

→ Multigenerational Households

* Odds ratio per multivariate regression model

Our data highlights an important issue of evolving family dynamics in a multigenerational household: the traditional Chinese ideal of filial piety revolves around

the dynamic between children and elders. In today's China, it is possible that husband-wife dynamic plays a bigger role in mental wellbeing of Chinese elderly individuals. In fact, when a spouse is not present, multigenerational living is associated with a depression odds ratio similar to that of living alone. One can speculate that the greater likelihood of depression among these individuals is a result of bereavement from losing their spouse (known predictor for depression). Also to consider, is the potential impact of rearrangement of household hierarchy and power dynamics when a spouse is no longer present. China's Single-Child Policy may have led to a shift in family values and resources from caring for the old to raising the only-child. Thus, in a multigenerational household where resources are scarce and tension may be high, elderly individuals may feel neglected and disenfranchised, especially when a sharing spouse is no longer by their side to act as an advocate. While our study did not delve into issues of elderly abuse and neglect in a multigenerational household, a study conducted by Dong et al among 412 patients at a major urban medical center in Nanjing showed that 35% of the participants experienced elderly neglect and abuse [30]. Elderly abuse and negligence should not be tolerated in any culture or ethnic group, but the statistic unveiled by this particular study is particularly disturbing in light of China's tradition of filial piety and the general perception that Chinese elders are generally well taken care.

Chronic Disease

Studies in various countries and across a number of ethnicities have confirmed a correlation between chronic disease and depression [32]. While this study does not differentiate between different types of chronic disease, past empirical studies have

identified cardiovascular disease, stroke, and hip fracture to be predictive of depression in urban community dwelling elderly individuals [32].

86% of our respondents answered "yes" to having a chronic disease of some type. Of those who identified themselves as having chronic disease, 13% had scores indicative of depression. None of those who answered "no" to chronic illness scored in the depression range. Both univariate and multivariate analysis of the current study confirm the correlation between chronic illness and depression, although in the regression model, the p-value associated with chronic illness did not reach a level of significance.

The relationship between depression and chronic illness is complex and multi-dimensional. Chronic conditions not only can predispose to depression, but can also adversely influence the outcome of depression [2]. Conversely, depression has been cited as an independent risk factor for certain chronic conditions, such as heart failure among elderly women and decreased bone mineral density in people aged 65 years or older [23, 33, 34]. Even though our sample population is relatively healthy given our exclusion criteria, over 80% of our respondents admitted to having a chronic condition. This shows that the high prevalence of chronic illness even in healthy and functional adults. While the presence of a chronic illness is often not a readily modifiable factor, health professionals and caretakers' knowledge of the complex association and frequent co-presentation between somatic illness and depression can alert them to early intervention.

Self Assessed Wealth

A number of studies have shown lower socioeconomic status to be correlated with depression. Of the socioeconomic parameters that we examined, self assessment of wealth was the only one that appeared to be significantly correlated to depression (other

socioeconomic parameters tested included average income, value and size of house/apartment, and apartment/house ownership). In the survey, we asked respondents to rate their own wealth into the following categories: 1 - wealthiest, 2 - above average, 3 - average, 4- below average, and 5 - poorest. In both univariate and multivariate analyses, we simplified the categories into above average (1) and below average (0). In the final regression outcome, above average wealth was negatively associated with depression (beta value of -1.17, an odds ratio of 0.31, p-value of 0.016).

Wealth status can certainly facilitate or prohibit one from obtaining resources needed in maintaining optimal physical and mental wellbeing. Nevertheless, we found that it was the *self rated wealth*, rather than any of the objective measures of wealth (i.e. average income, value of house, etc.) used that was significantly correlated with depression outcome. Since our exclusion criteria ensured that all our respondents have adequate healthcare coverage (national health insurance), access to care as a result of socioeconomic barrier is less of a concern in this group. Therefore, it is possible that this self assessment may be more reflective of an individual's state of mind (glass half empty versus half full) rather than his / her real financial status.

Education

While educational level was not found to be a significant predictor of depression outcome in our regression model, significant correlation was found using univariate analysis. Therefore, we felt it merited some attention in the discussion.

One could speculate that higher levels of education attained facilitated better jobs and higher standard of living, and thus, more satisfaction with life, and less propensity towards depression. Responses for this variable were divided into four categories in our

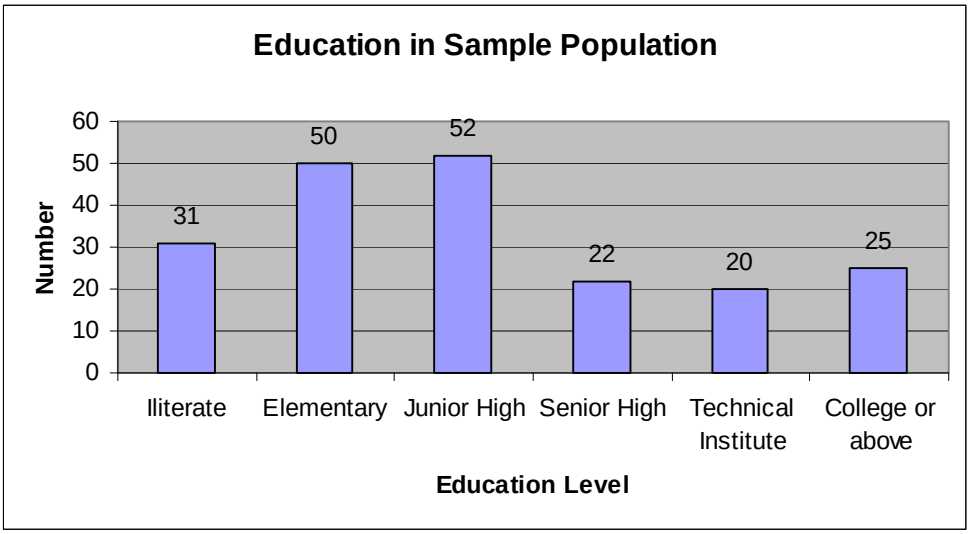
survey. Respondents either answered illiterate, primary education, junior/senior high school, or technical college and above. Only 20% of respondents answered technical college or above, while 37% answered junior or senior high school, and 40% were primary level or illiterate (Figure III). It is worth noting that people of this age group lived through China's most dramatic political and economic turmoil of the 20th century, times when secondary education is a luxury reserved mostly for those from privileged background. As a result, the correlation between educational status and depression outcomes (identified in univariate analysis) in our group may simply reflect the higher socio-economic standing of the more highly educated.

An old Chinese saying goes, 活到老，学到老 (learn as you live your years). While learning has always been seen as a virtue in Chinese culture, recent years in China have seen an increase in popularity of continuing education for elderly individuals. As alluded to earlier, many Yancheng retirees choose to spend their days attending late-life universities (老年大学), where they can learn while socializing with peers in a relaxed and educational setting. Interestingly, those who choose to attend these institutions are, in general, more educated and politically connected. Popularizing these institutions and facilitating easier access to those who are less socially/politically connected may be called for in the future.

While the majority of the elders surveyed in the current study are not well educated by current day standards, China's future generations are becoming an increasingly more sophisticated and well educated group. Under the single child policy, families often view education of the only child as the single most important path to success for the entire family. It remains to be seen how this increased level of education

and increased emphasis on education will impact the mental wellbeing of future generations of Chinese elderly individuals.

Figure III. Education in Sample Population



Social Interconnectedness

The exact level of social connectedness is difficult to capture in a numerical manner. We indirectly assessed this variable by asking our interviewees about their affiliation with an organization and by asking the frequency with which they leave their homes for a "social event".

Organizational Affiliation included: Communist party, Women's Association, Neighborhood Volunteers, Senior College, etc.. More than half of the respondents identified themselves as a member of an organization (128/201).

Frequency of Outings: Eligible outings included meeting with friends / relatives, attending an event at a club house, shopping, seeing a movie, and anything else that requires leaving the home for at least 15 minutes. Responses were captured under four categories: *daily*, *a few times per week*, *once a week*, and *others*. Of the 200 respondents, 90% reported that they leave their homes on a daily basis for at least 15 minutes. While

this number may seem surprisingly high for the western reader, it is actually to be expected in city like Yancheng. Modernization in China has led to a number of drastic changes in people's lives; nevertheless, Yancheng has managed to maintain some of the small town ("small" is relative here) traditions that are now rarely seen in larger commercial centers like Shanghai. For example, while large western style grocery stores with carts and shopping baskets have become popular in Yancheng, most elderly individuals' lives are still punctuated by daily visits to open markets where farmers from surrounding villages peddle fresh produce. This is especially true for retirees who have the luxury of time and enjoy buying from an open market with the opportunity to bargain for a good deal while meeting their friends along the way. I was informed by those that I interviewed in community parks that a typical daily schedule for a retired person involves a few hours of socializing and exercising in the park in the morning, followed with a group breakfast at a nearby teahouse, after which time they would rush off to the open market in order to get the freshest produce in time to prepare lunch. Those who have grandchildren are often given the responsibility of picking up their grandchildren from school before noon and taking them home to be fed. As one can see, the life of a retired individual is far from idle. In fact, while administering the survey, one of the most frequent questions I encountered was, "How much more time would this take? I need to rush off to pick up my grandchild!"

While we felt that both of these parameters (daily social outings and organizational affiliation) reflect the extent to which the individual is actively engaged, only organizational affiliation appeared to be significantly correlated with depression with a p value of 0.009 (calculated using chi square). One interpretation of this finding is

that level of activity is less important in comparison to the extent to which an individual is connected socially. Alternatively, daily outing may simply be a necessity among elderly in Yancheng given the social context (need to go to the market, need to pick up grandchildren, etc.), whereas affiliation with an organization represents an elective decision, a self initiated action to be actively engaged in a network outside of one's family.

Limitations

Functional disability: The prevalence of depression among our subjects appears to be significantly lower than those reported by previous studies (only 2 of our respondents scored an 8 or above, which is the cut off for definitive depression). Our assessments were conducted based on a cut off of 5 on the GDS-S. The lower prevalence is perhaps most influenced by our screening process, which excluded individuals with functional disability. Studies have shown that disability and limitations in self care significantly affects mental wellbeing of elderly individuals. In fact, it is said that the most consistent predictor of depression is functional disability [32]. Our very screening process limited our subjects to those who are able to perform ADLs. While this limited cofounding factors so that we can psychosocial variables of our interest, it also skewed our sample population to those who are relatively healthy and active and thereby, less generalizable.

Urban population: We limited our study to urban community dwelling individuals, as a number of rural-urban differences exist in present day China, and these differences may confound our analysis. By the same token, given that 57% of the Chinese population lives in rural settings [35], our study of only urban individuals is less

generalizable to the whole off Chinese population.

Conclusions

This study has enabled us to examine the relationship between multigenerational living and depression outcome among a group of Chinese community dwelling individuals. While our findings may not be directly generalizable to all of China's aging population given our exclusion criteria and the geographical limitations, they do offer some insight into the mental wellbeing of elderly individuals amid China's rapid socioeconomic changes. Specifically, our data has allowed us to address the following questions:

1. *Does living alone increase risk of depression?*

   Consistent with past studies, our data shows that living alone is associated with higher rates of depression (odds ratio of 3.108) when compared to those living with a spouse (odds ratio of 1) and those who live in a multigenerational household with both spouse and children (odds ratio of 0.781).

2. *Do multigenerational households reduce risks of depression for the elderly?*

   While living arrangement is correlated with depression outcomes, residing in a multigenerational household by itself does not necessarily protect against depression. In fact, depending on whether the spouse is present in the household, multigenerational living can be associated with either the highest or lowest risk for depression. When a spouse is present, the odds ratio of depression in a multigenerational household is 0.781 (odds ratio set at 1 for living in a nuclear household with only one's spouse); on the other hand, without a sharing spouse, living in a multigenerational household corresponds to an odds ratio of 4.341.

3. *Why is multigenerational living not protective against depression when a spouse is not present?*

   Our current study does not directly answer this question. However, we did find that having a spouse in the household is associated with a more positive perception of self status within the family unit (p value of 0.008 when chi square is calculated using variables "family status" and "present/absence of a spouse"). Family status is, in turn, independently correlated with depression outcome. In addition to the obvious benefits of having an advocate and a life time partner with years, if not decades of shared memories and experience, having a spouse in a multigenerational household helps to maintain the traditional family structure, with the elderly individual at the top of the hierarchy. When the spouse is absent, an elderly individual may feel like an "extra" person in the household that is dominated by the younger generations. This places doubt on whether multigenerational living, in itself, is truly beneficial for elder mental health in today's China.

4. *What is the future of elder care in China?*

   While traditional model of intergenerational co-residence is still holding strong with a little under 50% of our respondents sharing a household with their children and grandchildren, intergenerational dynamics are changing in a direction that places emphasis on supporting the young. In fact, amongst our respondents who have a financial relationship with their children, 68% said that they helped their children monetarily while 32% said that they are on the recipient end of the monetary assistance. We propose that this observed "reversal of care" (elderly

helping their adult children when there is an ongoing financial relationship) is directly related to the single child policy which encourages families to place limited resources in a multigenerational household on the needs of the young, leaving the elderly to potentially feel neglected and disenfranchised. There is growing uncertainty toward the future of elder care. The current challenge is to build a comprehensive system of care for older adults – the traditional dependence on children to care for their parents under the same roof may not be sustainable as China continues to evolve. In fact, the traditional model may not be optimal for elderly mental health as family resources are increasingly shifted toward the younger generations. While a rarity at the present, many feel that *nursing home care may become inevitable care model for frail older adults in China in the near future [36]*. If so, senior care facilities will face similar challenges as their western counterparts, namely, how to maximize social ties amongst elderly individuals and promote active lives, critical to mitigate against social isolation and the erosion of mental well being of Chinese elders.

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