Original Article

Cognitive functionality of older men in St. Catherine, Jamaica

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Abstract

Background: The scientific literature is replete with factors that influence the cognitive functionality of older men but no such study has been done in Jamaica. **Aims**: In this study we report our findings on the cognitive functionality of three cohorts of older men in a rural area. This is the first data published on the cognitive functionality of older men from Jamaica. **Material and Method**: The investigation was carried out with the administration of a 132-item questionnaire. The measure includes items on demographics, retirement and health status, the seeking and avoidance of medical care, health treatment, medication use, childhood illness, happiness and the mini-mental status examination. The measure was given to 2,000 men 55 years and older who were randomly selected from St. Catherine. **Results**: The multivariate analysis of the model revealed three significant determinants of cognitive functionality: Age (OR = 0.346, 95% CI = 0.206, 0.582), social support (OR = 0.683, 95% CI = 0.443, 1.053) and having children (OR = 2.42, 95% CI = 1.130, 5.183). There is a negative relationship between age and cognitive functionality and a positive relationship between having children and cognitive functionality. **Conclusions**: Our main conclusions are that the two significant determinants of cognitive functionality of older men (age and having children) in Jamaica are unique given the many determinants of cognitive functioning cited in the scientific literature. The plethora of factors points to the need for further research to understand the range of factors that influence the cognitive functionality of older Jamaicans.

Keywords: Mini-mental status examination, cognitive functioning, older men, social determinants, health status, St. Catherine, Jamaica.

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Introduction

The cognitive functioning of older men is an under-researched area in Jamaica. It is important to understand the cognitive functioning of these men as they progress into later life because declining cognitive functions affect their quality of life and their ability to care for themselves [1-18]. There are many inter-related factors that affect the cognitive functioning of older men. One such set of factors is genes. Genetic factors in twin pairs of older men accounted for 30 % of the variance in cognitive scores while shared environmental effects accounted for 16-29% of the variance [1]. Therefore, the complexity of the environment is an important factor that should be taken into account with genetic factors [2]. It is important to note that hormones do not mediate the cognition-age relationship, because when salient factors are considered the direct effects of hormones on cognition are not significant [3]. Also, older men with higher free

testosterone levels may be able to achieve and sustain visuo-spatial processing speed and visuo-spatial ability possibly at the expense of some inhibitory functioning [4].

Older men, as compared to younger men, showed impaired executive functions, declarative verbal memory, attention working memory and psychomotor speed. There is a nonlinear relationship between executive function and age and a linear relationship between age and verbal memory. These relationships mean that age selectively impacts executive functions. Increasing age is not necessarily the most influential determinant in cognitive performance, because the level of education and positive and negative affect are also important determinants [5-6]. There is a significant association between depression and memory, psychomotor speed and cognitive mental status. Psychological wellbeing was the most robust determinant of cognitive function. These findings suggest that there may be a link between the maintenance of cognitive function and positive affect [7]. Personality, like affect, is also relevant because these are attributes that continue to evolve from middle to old age. Negative and positive affect fluctuates over time, unlike locus of control which remains stable. There are inverse relationships between external locus of control and cognitive functioning, and an absence of positive affect and enduring negative affect [8].

Other important factors play a role, such as chronic insomnia which is an independent determinant of incident cognitive decline in older men [9]. Older men who had instrumental self efficacy beliefs performed better on memory and abstraction tests than a similar cohort of women. Also, depression and optimism are independent determinants of the men's functional status [10-11]. As mentioned earlier, level of education is an important factor in cognitive functioning because men with a higher level of education performed better on cognitive tasks than men with a lower level of education. Men also performed worse on verbal memory compared to women. Therefore, education and gender are important factors in older adults' cognitive performance [12]. Marital status and living situation also influence cognitive functions because older men who were unmarried, lost a partner or lived alone had greater cognitive decline compared to men who were married, just started living with a partner or lived with a partner [13].

Older men who continued working after retirement were healthy and psychologically committed to work and therefore had a dislike for retirement. There was a positive relationship between the probability of continued employment and level of education and being married to a wife who was working. Continued employment was negatively correlated with age and one's level of income without a job [14]. The complexity of a medication regimen and the direct effects of cognition were significant determinants of the capacity of older adults to manage their use of medication [15]. The parental status of older men influences their subjective wellbeing in terms of happiness, satisfaction with life and depression. There were significant differences in subjective wellbeing

between those who were distant parents and those who were close to their children, and between those who were childless by circumstances and those who were close to their children [16]. The social supports older men receive also influence their cognitive functioning. Among this cohort, the relationship between social support and cognition is determined by their early childhood experiences which continue into late adulthood [17]. Geographical location is also important because older men in rural areas were more concerned about their physical health, rated their health worse, stated that they had more impairment and had a negative outlook on life compared to older men in urban areas [18].

The aim of this research article is to understand the cognitive functionality of a cohort of older men in St. Catherine, Jamaica, and how this cognitive functioning affects their lives. Cognitive decline affects the personal autonomy of older men, their quality of life and their ability to care for themselves at this critical stage of the life course. We now turn to the method and measures we used.

Materials and Methods

The study used primary cross-sectional survey data on men 55 years and older from the parish of St. Catherine in 2007 (Figs. 1 & 2). The survey was submitted and approved by the University of the West Indies Medical Faculty's Ethics Committee. Stratified multistage probability sampling technique was used to draw the sample (2,000 respondents). A 132-item questionnaire was used to collect the data. The instrument was sub-divided into general demographic profile of the sample; past and current health status, health-seeking behavior, retirement status, social and functional status. The overall response rate for the survey was 99% (n=1,983). Data were stored, retrieved and analyzed, using SPSS for Windows, version 16.0.

The Statistical Institute of Jamaica (STATIN) maintains a list of enumeration districts (ED) or census tracts. The parish of St. Catherine was chosen as previous data and surveys by STATIN suggest that it has a mix of demographic characteristics (urban, rural and age-composition) which is similar to Jamaica. The parish of St. Catherine is divided into a number of electoral constituencies made up of a number of enumeration districts (ED).The one hundred and sixty-two enumeration districts in the parish of St. Catherine provided the sampling frame. The enumeration districts were listed and numbered sequentially and selection of clusters was arrived at by the use of a sampling interval. Forty enumeration districts (clusters) were subsequently selected with the probability of selection being proportional to population size. Advised by the Statistical Institute of Jamaica (STATIN) and utilizing the C-Survey computer software, it was determined that 50 older men in each enumeration district would be interviewed yielding a sample size of 2,000.

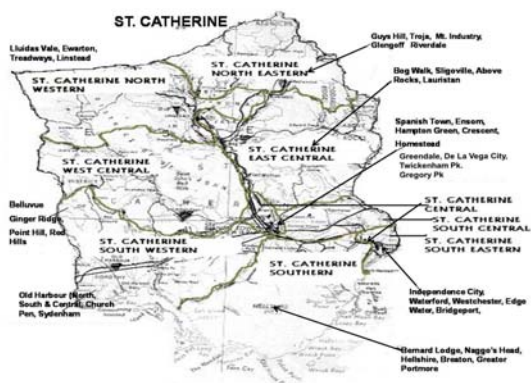**Fig. 1** Map of Jamaica showing St. Catherine and other parishes

Fig. 2 Map of St. Catherine, Jamaica.

The enumeration districts in the parish of St. Catherine provided the sampling frame and the sample size was determined with the help of the Statistical Institute of Jamaica (STATIN). The enumeration districts were listed and single-stage cluster sampling was used to select the sample. The enumeration districts were numbered sequentially and selection of clusters was arrived at by calculating a sampling interval. From a randomly selected starting point, forty enumeration districts (clusters) were subsequently selected with the probability of selection being proportional to population size.

The parish of St. Catherine had approximately 233,052 males, (preliminary census data 2001) of which number 33,674 males were 55+ years (Table 1). STATIN maintains maps with enumeration districts or census tracts which include the selected EDs and access routes and have references to the selected site of a starting point household within each ED. The starting point was determined by randomly selecting a household with a man 55 years and over from the list of persons in the ED. The requisite number of interviews for each ED was completed.

Where the selected household was found to be subsequently devoid of an older man (due to out-migration or death), an adjacent household was canvassed. Where households had a man 55+ years as a resident and he was not at home, the interviewer would return within two days. In households where there was more than one man 55 years old and over, then all were included in the survey.

For the current study descriptive status was employed to provide background information on the sample, and chi-square was used to examine non-metric variables. A p-value less than 5% (2-tailed) was used to indicate statistical significance, and there were two exclusion criteria. One, in the event a variable has more than 20% of the cases missing; and two, collinearity. In addressing collinearity, the aim was to independently enter variables in the model to determine which one should be retained during the final model construction. To retain or exclude a variable from the model, this was based on the variables' contribution to the predictive power of the model and its goodness of fit.

Table 1 Proportion of survey (Sample) vs. proportion of population

Group	Survey		2001 Census (St. Catherine)		2001 Census (Jamaica)	
(Yrs).	n	%	n	%	n	%
55-59	469	23.45	6577	26.7	38645	23.9
60-64	413	20.6	5179	21.1	31828	19.7
65-69	374	18.7	4391	17.8	28901	17.9
70-74	345	17.2	3594	14.6	24856	15.4
75-79	189	9.45	2402	9.78	17711	11.0
80+	210	10.5	2399	9.77	19552	12.1

Measure
Several questions were used to measure the health literacy variable. These questions dealt with health treatment, involvement in physical exercise, retirement plan for health care, taking of medication, knowledge of the prescribed medication, factors responsible for health status, meaning of good health status, medical care seeking behavior, avoidance of medical complications, reasons for not seeking medical care, length of time before seeking medical care, reason for mother's death and smoking behavior. Health communication constitutes a number of different questions on particular health issues. These include (1) were you diagnosed with an illness; (2) do you understand the explanations of doctors, nurses, community health aides, pharmacists; (3) were you advised on smoking, physical exercise, diet, prostate cancer; (4) when were you diagnosed with the ailment - 1-6 months, 7 – 12 months, 2-5 years, 6-10 years, 11-20 years, 21-30 years, or 30+ years ago. Happiness: This is measured based on people's self-report on their happiness. It is a Likert scale question, which ranges from always to rarely happy. Health Status: This variable is measured using people's self-rate of their overall health status, which ranges from excellent to poor health status. The question was 'How would you rate your health today?' (1) Excellent; (2) Good; (3) Fair and (4) Poor. Education: What is [your] highest level of [education] attained? The options were (1) no formal education; (2) basic school; (3) primary school/all age; (4) secondary/high/technical school; (5) vocational (i.e. apprenticeship/trade); (6) diploma; (7) undergraduate degree; (8) post-graduate degree. Physical Exercise: 'Do you take time out for regular exercise?' (1) yes and (2) no.

Type of physical exercise: 'What do you do in terms of exercise?' Childhood illness: 'Were you seriously ill as [a] child? (1) yes, (2) no. And, were you frequently ill as a child? (1) yes, (2) no. If the response to either question was yes, this was coded as poor childhood health status and if the response was no in both cases it was coded a good health status in childhood. Age group is a categorized into three sub-groups. These are (1) ages 55 to 64 years; (2) ages 65 to 74 years; and (3) ages 75 years and older (i.e. 75+ years).

Mini- Mental Status Examination (MMSE)
The MMSE, which is a promising tool in the early detection of Alzheimer's disease, was used to assess the cognitive functional status of older men. A modified version of the MMSE was used in this study to reflect the Jamaican situation. For example, the item on national independence was changed to the date of the Queen's Birthday. The domains of primary interest that were measured were: orientation to time and the domain of registration of three words. One point was assigned to each right answer and zero for each wrong answer (Appendix 1). This was a 7-item scale, with the reliability of the items being moderately high, $\alpha = 0.620$. The MMSE Index ranges from 0 to 7, where higher scores indicate greater cognitive functional status of the older person. Cohen and Holliday stated that correlation can be low/weak (0–0.39); moderate (0.4–0.69), or strong (0.7–1) [19]. Hence, low cognitive functionality ranges from 0 to 2.7; moderate cognitive functionality is from 2.8 to 4.8 and high cognitive functionality ranges from 4.9 to 7 1.

Appendix 1 Mental status examination

	Questions	0	1
01.	What year is this?	[ ] 1	[ ] 2
02.	What month is this?	[ ] 1	[ ] 2
03.	What day of the week is today?	[ ] 1	[ ] 2
04.	How old are you?	[ ] 1	[ ] 2
05.	What is the name of the Prime Minister of Jamaica?	[ ] 1	[ ] 2
06.	What year was Independence?	[ ] 1	[ ] 2

There are three items I want you to remember:
I will ask you what they were later in this interview.
Here are the three items, **Bed, Chair, Window**

07. **Items**	Can you tell me what the three items are? Bed 1 [ ] 2 [ ] Chair 1 [ ] 2[ ]	Window 2 [ ] 1 [ ]
	TOTAL	

Correct answer should be given a score of one (1) and incorrect answers should be given a score of zero.

Model
In order to examine the effect of many variables on a single dependent variable, the researcher used multivariate analysis to test a single model. The current study investigates the correlates of ADL of older Jamaicans within the context of the available data. The proposed model that this research seeks to evaluate is displayed (Eqn1):

$$MMSE_i = f(H_{ti}, HAPP_i, LS_i, C_i, AR_i, A_i, SS_i, CA_i, ED_i, HH_i, MS_i, P_i, HA_i, EM_i, D_i, TM; AM_i, \varepsilon_i) \dots\dots\dots\dots(1)$$

Where $MMSE_i$ (or cognitive functionality) is a function of some current health status, H_t; happiness, $HAPP_i$; life satisfaction, LS_i; have children, C_i; area of residence, AR_i; age group of respondent, A_i; social support, SS_i; church attendance, CA_i; educational level, ED_i; head of household, HH_i; marital status, MS_i; number of persons in household, P_i; health status in childhood, HA_i; employment status, EM_i; depression, D_i; taking medication, TM_i; health advise, HA_i.

All the variables were identified from the literature. Using the principle of parsimony, only those explanatory variables that are statistically significant ($p < 0.05$) were used in the final model to determine MMSE (i.e. cognitive functionality) of older men in Jamaica. This final model identified the correlates of MMSE of older men in Jamaica (Eqn2):

$$MMSE_i = f (A_i, C_i, SS_i \varepsilon_i) \dots\dots\dots\dots\dots\dots\dots (2)$$

Statistical Analysis
The predictive power of the model was tested using the 'omnibus test of model' and Hosmer and Lemeshow's technique was used to examine the model's goodness of fit. The correlation matrix was examined in order to ascertain whether autocorrelation or multi-collinearity existed between variables. As noted earlier, correlation can be low/weak (0–0.39); moderate (0.4–0.69), or strong (0.7–1) [19]. This was used in the present study to exclude (or allow) a variable. Finally, Wald statistics were used to determine the magnitude or contribution of each statistically significant variable in comparison with the others, and the odds ratio (OR) for interpreting each of the significant variables. We present the descriptive results next.

Results

Demographic Characteristics of Sample
Of the sample of respondents (n = 2,000), the majority had high cognitive functionality (94.1%); good health status (55.4%); satisfied with life (67.1%); good health status in childhood (82.5%); retired (53.9%); and 83.3% had primary or elementary level education (Table 2). Fifty one percent lived in rural villages and the remainder in rural towns; 59.1% had some form of social networking; 42.6% were aged 55 to 64 years and 44.7% were married, while 34.3% were single (including common-law).

One half of the sample indicated that they spent JA. $100 (USD1.45) monthly for medical expenditure; 34% of the respondents bought their prescribed medication; 17.1% reported that they had been hospitalized since their sixth birthday and 65.8% reported that they took no medication. Of those who mentioned that they were ill during childhood (17.5%, n = 350), 34.9% said that the illness

was measles or chicken pox, 26.3% mentioned asthma, 10.0% pneumonic fever, 8.9% polio, 6.6% accident, 4.6% jaundice, 1.7% hernia, and 5.1% indicated gastroenteritis. Twenty four percent of elderly men indicated that they were rarely happy, 40.5% said sometimes, 31.0% mentioned often and only 4.5% reported always. Furthermore, 17.7% of the sample reported that they were seriously ill as children. We report the rest of the results below.

Table 2 Demographic characteristics of sample

Variable	Frequency	Percent
Cognitive functionality		
Low	19	1.0
Moderate	99	5.0
High	1882	94.1
Marital status		
Single	686	34.3
Married	894	44.7
Separated	112	5.6
Common law	136	6.8
Widowed	172	8.6
Age group		
55- 64 years	851	42.6
65 – 74 years	712	35.6
75 years and older	437	21.9
Employment status		
Employed	511	25.6
Unemployed	412	20.6
Retired	1077	53.9
Education		
No Formal Education	200	10.0
Primary and basic	1661	83.0
Secondary	102	5.1
Tertiary	37	1.9
Self-rated health Status		
Excellent	357	19.0
Good	1038	55.4
Fair	480	25.6
Social networking		
Yes	817	59.1
No	1183	40.9
Life satisfaction		
Rarely satisfied	658	32.9
Sometimes	1,272	63.6
Most	70	3.5
Childhood health status		
Good	1650	82.5
Poor	350	17.5
Area of residence		
Rural town	981	49.0
Rural village	1019	51.0

Multivariate Analysis

The model (Eqn. (2)) is a good predictive one of cognitive functionality of older men in Jamaica (Hosmer and Lemeshow goodness of fit χ^2=3.996, *P* = 0.858). On examination of the classification, 94.3% of the data were correctly classified: Correct classification of cases of low to moderate cognitive functionality = 90.0% and correct classification of cases of high functionality = 100.0% (N = 1768) (Table 3). There was no multi-collinearity among variables because the correlation matrix had correlations of less than 0.6. The correlation between depression and life satisfaction (r = 0.131); depression and social support

(r = -0.101); current health status and health status in childhood (r = 0.128); elderly (ages 75 years and older) and employment status (r = 0.183), elderly (ages 75 years and older) and married (r = 0.161).

Three factors can be used to predict the cognitive functionality of elderly men in Jamaica (χ^2 (17) = 40.94, *P* < 0.001; -2 Log likelihood = 779.63). These are age (ages 75 years and older) (OR=0.35, 95%CI: 0.21, 0.58) with reference to elderly (ages 55 to 64 years), social support (OR = 0.68, 95% CI = 0.44, 1.05) and having children (OR=2.42, 95%CI: 1.13, 5.18) (Table 3).

Discussion

Very little or no research has been done on the cognitive functionality of older men in Jamaica. This is the first study that has addressed this important medical and psychological issue in Jamaica. The findings reveal that the overwhelming majority of older men in our study, some 94.1% of the participants, have high cognitive functionality; at least good health status (74.4%); are satisfied with life (67.1%) and had good health status during childhood (82.5%). Of the 14 variables identified from the literature review that were present in the current dataset, 3 emerged as determinants of cognitive functionality of older men in St. Catherine, Jamaica – age, social support and having children. These significant determinants of cognitive functionality in our sample are in keeping with past research findings in the literature which give a much broader range of factors that influence the cognitive functioning of older men.

The 55-64 age cohort is the youngest of the three age cohorts in our sample, the other two being men 65-74 and 75 years and older. The finding that age is a significant determinant reveals that there is a negative relationship between age and cognitive functionality, where as the men get older there is a decline in their cognitive functioning. This finding corroborates some of the research findings of Silver and colleagues and Lauren [5-6]. These authors find that older men compared to younger men have impaired psychomotor functions, declarative verbal memory, executive functions and attention working memory. The authors also note that age is not necessarily the most influential determinant, because level of education among other factors is important. Older men with a higher level of education perform better on cognitive tasks than older men with a lower level of education. However, in our sample, level of education is not an important factor influencing cognitive functioning, because with the majority of the participants, some 83.3% only have elementary school education, and a small minority (1.9%) has college education. It is possible that this difference in finding between our study and the literature may be due to the difference in the level of socio-economic development, since the findings of the studies reported in the literature were mostly conducted in developed countries (where there is greater access to formal schooling) and our study was conducted in a developing country. It is also possible that the difference in finding may be explained by the

communal nature of Jamaican culture, which offers more social support to cognitive functioning compared to the more individualistic cultures of developed societies.

Social support is a determinant of cognitive functionality in our sample, but the relationship is a negative one, where as cognitive functionality increases social support decreases. The relationship between social support and cognitive functionality is not in the expected direction. This counterintuitive finding suggests that older men in St. Catherine who have high cognitive functionality receive less social support because they do not really need it. The men who really need and receive the social support are those men who are experiencing cognitive decline. This unexpected finding still underscores the importance of social support in cognitive functionality. As the findings by Bourne and colleagues show for social support influences the cognition of older men. This relationship is determined by early childhood experience which continues into the latter part of the life course [17].

Since the oldest cohort of men (75 years and older) have greater cognitive deficits than the two younger cohorts (65-74 and 55-64 years), it is possible that the majority of men who are rarely satisfied with life (32.9%) are in the oldest cohort, whereas the majority of men who are sometimes satisfied with life (63.6%) and those who are most satisfied (3.5%) are in the two younger cohorts. There is a link between positive affect and cognitive functioning, and such positive emotions are associated with cognitive performance and hence life satisfaction [5-6]. Research done by Connidis and McMullin shows that the subjective wellbeing of older men, such as their satisfaction with life and their happiness and experience with depression, are influenced by their parental status [16]. The importance of parental status highlighted by Connidis and McMullin corroborates the third significant determinant of cognitive functionality in our study, which is having children. There is a positive relationship between having children and cognitive functioning in our study, where older men with children have higher cognitive functionality than older men without children. However, our data did not address the findings by Connidis and McMullin, that the closeness of the relationship older men have with their children and whether these men are childless by choice are important influences on their life satisfaction.

There are a couple of limitations in this research. The findings cannot be generalized to the national cohort of older men since we conducted the research only in one parish. Also, there is the possibility of social desirability bias in which the participants told the interviewers what they wanted to hear to get their approval. However, this paper has contributed to the literature by highlighting the fact that in St. Catherine, Jamaica, the cognitive functionality of older men is only predicted by age, social support and parental status while the research literature abounds with significant factors that influence cognitive functionality. This unique finding in Jamaica calls for more research. As such, future researchers should look at

cognitive functionality of older Jamaicans using stratified random sampling based on level of education, gender and social class, and not just parental status, but on the quality of the relationship these elderly parents have with their children. It is also important to move beyond rural village versus rural towns to rural areas versus urban areas where there are cities with large populations that offer many services. Future researchers should also identify the kinds and amount of social network and support that these elderly people use, and the frequency of use, rather than just recording that these elderly Jamaicans have social networks and support.

Conclusion

The current study has found that the health status, happiness, life satisfaction and cognitive functionality of older men in St. Catherine are relatively good, high or excellent. Generally, some people believe that the cognitive functionality of older people is low and is the first to go with ageing, which is clearly not the case for this sample. Organisms age naturally, which explains biological ageing and the perception of lowered cognitive functionality. This research is not arguing that cognitive functionality does not decline with ageing, but dispels the myth of the exponential reduction that some people hold on cognitive functioning and ageing. Concurrently, the literature shows many determinants of cognitive functionality of older people, but this study has only found three that correlate with the cognitive functioning of this cohort. This finding emphasises the rationale of not widely assuming that what obtains in another geo-political jurisdiction works in or for another. The findings of only three significant determinants of cognitive functionality in St. Catherine, Jamaica are unique because the scientific literature is replete with factors that influence the cognitive functioning of older men.

In summary, among the ironies of this study is the fact that depression was not correlated with cognitive functionality. In spite of the afore-mentioned issue, older men in St. Catherine were experiencing excellent cognitive functionality; they were happy and satisfied with life and indicated good health status. These findings suggest that there is a need for more research on the cognitive functionality of older persons in Jamaica, using stratified random sampling that takes into account education, gender, the rural-urban dichotomy, social class, intimate partner relationship status, the quality of parental relationship and the type and amount of social support and social networks and their frequency of use.

Acknowledgement

Table 3 Logistic regression of cognitive functionality and some variables of older men in Jamaica.

Variable	Coefficient	Std Error	Odds Ratio	95.0% C.I.
Dummy health advise (1=yes)	0.034	0.214	1.04	0.68 - 1.57
Dummy education (1=tertiary)	0.762	0.528	2.14	0.76 - 6.03
Dummy purchased medication	-0.173	0.212	0.84	0.56 - 1.28
Dummy depression (1=yes)	0.308	0.214	1.36	0.90 - 2.07
Dummy have children	0.884	0.389	2.42	1.13 - 5.18[*]
Life satisfaction (1=moderate-to-excellent)	0.328	0.249	1.34	0.85 - 2.26
Health status in childhood (1=moderate-to-excellent)	0.052	0.244	1.05	0.65 - 1.70
Urban area	-0.271	0.205	0.76	0.51 - 1.14
Elderly (ages 65 to 74 years)	-0.203	0.262	0.82	0.49 - 1.37
Elderly (ages 75 years and older)	-1.060	0.265	0.35	0.21 - 0.58[**]
†Elderly (ages 55 to 64 years)			1.00	
Social support	-0.382	0.221	0.68	0.44 - 1.05[**]
Separated, divorced or widowed	0.052	0.311	1.05	0.57 - 1.94
Married	0.106	0.231	1.11	0.71 - 1.75
Never married			1.00	
Happiness (1=moderate-to-excellent)	-0.356	0.236	0.70	0.44 - 1.11
Household head	-0.404	0.337	0.67	0.35 - 1.29
Employment status (1=employed)	0.259	0.255	1.30	0.79 - 2.14

χ^2 (17) =40.938, $P < 0.001$; n = 1875, -2 Log likelihood = 779.633, Hosmer and Lemeshow goodness of fit χ^2=3.996, P = 0.858, Nagelkerke R^2=0.061,
†Reference group, *Significance at the 99% level, **significance at 95% level and ***significance at the 90% level

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