Original Article

Association of Socioeconomic Status (SES) and Social Support with Depressive Symptoms among the Elderly in Singapore

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Abstract

   Introduction: Depression in the elderly is a major public health issue. Socioeconomic status (SES) and social support are strong risk factors for depression. This study aimed to investigate the influence of SES and social support in elderly depression, and the modifying effect of social support on the relationship between SES and depression. Materials and Methods: A community-based survey was conducted on residents ≥60 years old. Depressive symptoms were determined with scores ≥5 using the 15-item Geriatric Depression Scale (GDS). Multivariable logistic regression was performed to determine the odds ratio (OR) of depressive symptoms with respect to SES and social support, and interaction terms between the two variables. Results: Of 2447 responses analysed, 188 (7.8%) respondents had depressive symptoms. Living in 2-room housing, living alone/with a domestic helper, infrequent leisure time with children/grandchildren or being childless, and feeling socially isolated were independently associated with depressive symptoms. Relative to residents living with spouse and children in 4-/5-room housing, the highest ORs for depressive symptoms were those living with spouse and children in 2-room (OR: 3.06, P <0.05), followed by living with children only in 3-room (OR: 2.98, P <0.05), and living alone/with a domestic helper in 4-/5-room (OR: 2.73, P <0.05). Living with spouse only appears to buffer against depressive symptoms across socioeconomic classes, although the effect was not statistically significant. Conclusion: Low social support and low SES significantly increased the odds of depressive symptoms. The moderating effect of social support on depression was however not consistent across SES groups. Specific interventions need to target different SES groups to better help older adults at risk of developing depression.

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Key words: Asia, Depression, Older adults, Social factors

Introduction

   Depression in the elderly is a major public health issue. Associated morbidities such as higher risk of impairment in physical, mental and social functioning can be substantial,[1] with the most serious complication being suicide. In the elderly, depression can often be undiagnosed and untreated because it may be related to various factors commonly associated with aging, such as comorbid diseases, loss of independence and function, and bereavement.[2] In Singapore, population-based surveys have found that about 6% of community-dwelling older adults have depression, while 13% of them have depressive symptoms.[3,4] Depression is also the second leading cause of disability.[5]

   Depression in the elderly is often a function of many contributing factors, which include biological, psychosocial, or environmental characteristics.[6,7] Reflecting the impact of social structures on an individual's mental health, socioeconomic status (SES) has consistently been found to be associated with depression in elderly populations.[6-9] The theoretical framework of Gallo and Matthews explains that low SES reduces individuals' capacity to manage stress, and thereby increase one's vulnerability to negative emotions and cognitions.[10] Furthermore, as individuals age, the accumulated exposure to social stressors may result in a higher prevalence of depressive symptoms among those in the lower social strata.[11]

   Low social support is a strong risk factor for depression in older adults. Social support can be defined as "support accessible to an individual through social ties to other

individuals, groups, and the larger community".[12] Some forms of social support related to depression in the elderly include living arrangements, contact time with relatives, and perceived social isolation. Research has often found that elderly living alone were more likely to be depressed than those living with family or others.[13-15] Older adults who perceive themselves to be socially isolated also tend to rate their mental health poorly.[16] Additionally, having infrequent contacts with relatives increased the risk for depressive symptomatology in older adults.[17]

The unequal distribution of social support across socioeconomic classes has been reported in many studies.[18-20] Individuals from the lower socioeconomic groups were found to have smaller social networks, and less organisational involvement.[21] Therefore, the lack of social support reinforces the negative impact on mental health for individuals from lower socioeconomic groups. Social support may also moderate the impact of SES on health.[22,23] The mediating effect of social support on the relationship between SES and depression has been examined in literature. A prospective longitudinal study of Finnish adolescents found low level of social support to have a greater impact on depression among lower SES individuals.[24] However, this relationship varied depending on the domain of social support, life stage and gender. Other studies reported minimal impact of social support on psychological health across socioeconomic groups.[25]

Several studies in Singapore have examined the association of drug use, biological factors, and chronic diseases with depressive symptoms.[3,26-30] Studies that focused on psychosocial risk factors examined the association of loneliness, living arrangements and social networks with depressive symptoms in elderly persons.[13,31] In this study, we investigated SES differences in elderly depression and the influence of social support. As local evidence regarding the association between social relations and health across SES groups is unclear, we also studied the modifying effect of social support on the relationship between SES and depression.

Materials and Methods

Study Setting

Singapore has a multiethnic resident population of 3.8 million, of which 74% are Chinese, 13% Malay, 9% Indian, and 3% others. Presently, 14% of the population is aged 60 years and older.[32] A majority of the elderly population (81%) reside in high-rise public housing units, with 86% living with their spouse or children.[33]

Marine Parade Elderly Needs Survey 2011

The Marine Parade Elderly Needs Survey was conducted in 2011 by the Marine Parade Grassroots Organisation, in collaboration with the Ministry of Community Development, Youth and Sports (MCYS), the Ministry of Health (MOH), the Ministry of National Development (MND), the Health Promotion Board (HPB), Agency for Integrated Care (AIC), and the Centre for Enabled Living (CEL). The objective of the survey was to facilitate a better understanding of the needs of community-dwelling elderly persons. Survey domains included in the questionnaire were developed using the major determinants of the Active Ageing policy framework documented by the World Health Organisation (WHO).[34] The questions in the survey were subjected to cognitive testing, and were translated and back-translated from English to Mandarin and Malay.

The population of community-dwelling adults aged 60 years and older living in 2- to 5-room public housing in the Marine Parade estate was stratified by 4 age groups (60 to 64, 65 to 74, 75 to 84, and 85+ years). The sample size was then computed based on the following criteria: (a) 0.5%, 1.0%, 3.0% and 4.5% margin of error for the 4 age groups respectively; (b) 2.0%, 5.0%, 10.0% and 25.0% impairment in at least one Activity of Daily Living (ADL) for the 4 age groups respectively.[35] Assuming a 60% response rate, a random sample of 4200 adults was drawn from the national database of dwellings from the Housing Development Board (HDB). Adults aged 60 to 64 and 85+ years were oversampled.

Residents were invited to participate in the study through mail. A team of trained interviewers administered the survey from April to May 2011 through face-to-face interviews with residents in their homes. Residents who refused to participate, and who were not contactable after 3 household visits were considered non-respondents. Proxy interviews were conducted with family members or caregivers for residents who were cognitively challenged or uncommunicative. These were excluded from the subsequent analysis as depressive symptoms, perception of the quality of familial relationships, and sense of social isolation, which required self-reporting, were not assessed through the proxy.

Outcome Variable: Depressive Symptoms

The presence of depressive symptoms was determined using the 15-item Geriatric Depression Scale (GDS-15). A widely used and reliable index, the GDS-15 has been validated locally[36,37] and is the recommended tool to screen for depression among the elderly according to Singapore's clinical practice guidelines.[38] Each item in the scale allows for a dichotomous response ("yes/no"), and is scored depending on how the respondent felt over the past week. The scores range from 0 to 15, and scores ≥5 were suggestive of depression.[38]

Measurement of Socioeconomic Status (SES)

We have measured SES by the respondent's education level (primary and lower, secondary and higher), and housing type (2-room, 3-room, 4-/5-room) (Appendix 1). In Singapore, housing type is positively correlated with household income and is often used as a surrogate of income status. The median monthly household income by type of dwelling was S$1492 (US$1147) for 2-room; S$4169 (US$3205) for 3-room; and S$6133 to S$8788 (US$4715 to US$6756) for 4-/5-room.[39] Self-reported monthly income was collected but excluded from the current analysis because data was missing for 20% of the sample.

Measurement of Social Support

Social support was measured using living arrangement, frequency of contact with family members, and the perception of being socially isolated (Appendix 1). Respondents were grouped into 5 mutually exclusive living arrangement categories: (a) living with spouse and children/grandchildren; (b) living with spouse only; (c) living with children/grandchildren only; (d) living alone (or with domestic helper), and (e) living with others (person other than spouse or child, e.g. relatives, friends, tenant, etc.). The frequency of spending leisure time with children/grandchildren was grouped according to: (a) at least once a month; (b) less than once a month; and (c) no children and grandchildren (childless). Respondents were also asked, "How often do you feel left out or isolated from others?" with their responses grouped as: (a) never or rarely, and (b) occasionally or often.

Confounding Variables: Chronic Diseases, Functional Status, Pain and Cognition

Besides age, gender and ethnicity, the analysis was adjusted for chronic diseases, functional status, pain and cognition. Chronic diseases included diabetes, high blood pressure, heart attack or failure, stroke, weak or failing kidneys. Functional status was determined as requiring assistance in 6 basic ADL (feeding, dressing and undressing, getting in and out of bed/chair, taking a shower, using the toilet, and mobility) and 7 instrumental ADL (using the telephone, getting to places that were not within walking distance, shopping for groceries/clothes, preparing meals, doing housework, taking medications, and handling money). Other functional disabilities included urinary incontinence, vision impairment, and hearing loss.

Pain was determined using the pain/discomfort dimension (moderate or extreme pain or discomfort) of the EQ-5D, which is a standardised measure of health status developed by the EuroQol Group.[40] Cognitive impairment was measured using the Abbreviated Mental Test (AMT), a 10-item cognitive screening instrument that assesses memory, concentration and orientation.[41] The Singapore version of the AMT[42] was validated in an earlier study, and a score of ≤ 7 was found to optimally identify cognitive impairment.[43]

Statistical Analysis

General descriptive analyses were performed to compare respondents with and without depressive symptoms. For all variables, 2-way tabulations calculating a Pearson chi-square statistic, corrected for complex survey design or stratified sample, were used. The adjusted odds ratio (OR) of having depressive symptoms with respect to SES and social support was determined using a multivariable logistic regression, adjusting for confounding variables. The modifying effect of social support on the relationship between SES and depression was studied by including interaction terms between SES and social support variables.

Sampling weights based on the total population of Marine Parade by age were used in all analyses to provide accurate estimates that could be generalised to the broader population in Marine Parade. The sampling weights accounted for the unequal probabilities of selection as a result of the planned oversampling of certain age groups.[44] The reported percentages of respondents given in the results section incorporated these sampling weights and thus reflect overall population estimates. However, the numbers given are the actual number of respondents to the survey, and are not the product of the percentages and the total population. All statistical analyses were performed using the Stata Statistical Software, version 12.0 (Stata Corp., College Station, Texas).

Approval for this study was obtained from the Institutional Review Board of the National Healthcare Group, Singapore.

Results

Sample Description

From the random sample of 4200 elderly residents from 58 blocks of dwellings in Marine Parade, a total of 3752 residents were eligible for inclusion in the study (210 moved out, 136 institutionalised, 58 died, 30 not contactable as houses were vacant, 14 non-Singapore citizens or permanent residents). Among these, 791 (21.1%) refused participation, 387 (10.3%) were not contactable after 3 household visits, and 16 (0.4%) were unable to participate due to various reasons such as language barriers. A total of 2558 residents were interviewed, giving an overall response rate of 68.2%. Of these, only 2447 respondents were included in the analysis after excluding proxies.

Sociodemographic Characteristics

A total of 188 respondents (7.8%) reported depressive symptoms (GDS scores ≥5). Table 1 summarises the characteristics of respondents. Compared to respondents without depressive symptoms, a greater proportion of those with depressive symptoms were respondents with primary and lower education (63.3%), living in 2-room housing (33.0%), living alone (22.9%), who spent less than once a month leisure time with their children/grandchildren (22.3%) or who were childless (23.4%), and who occasionally or often felt socially isolated (29.8%). Additionally, a higher proportion of those with depressive symptoms were aged 85 and above (9.6%), of Malay (17.0%) and Indian ethnicity (6.4%), have diabetes (36.7%), high blood pressure (63.3%), heart attack or failure (12.8%), stroke (12.2%), weak or failing kidneys (7.4%), required assistance in 3 or more basic (12.2%) and instrumental ADL (27.7%), have urinary incontinence (23.4%), vision impairment (18.6%), hearing loss (22.3%), pain or discomfort (49.5%), and cognitive impairment (22.3%).

Effects of SES and Social Support on Depressive Symptoms

Table 2 shows the multivariable logistic regression analysis of the effects of SES and social support on depressive symptoms in the elderly. The odds of depression for residents living in lower income housing (2-room) was 3-times that of those living in 4-/5-room housing. Strong social support as indicated by frequent leisure time spent with children/grandchildren (Adj OR: 0.74, 95% CI, 0.31 to 1.77) were found to have a protective effect against depression, although the results did not reach statistical significance (Table 2). In terms of living arrangements, residents who lived alone or with a domestic helper had 1.7 times higher odds of reporting depressive symptoms than those who lived with their spouses and children/grandchildren (Adj OR: 2.73, 95% CI, 1.31 to 5.69, P = 0.007). Furthermore, the elderly who occasionally or often felt socially isolated were 7 times as likely to have depressive symptoms as those who never or rarely felt so (Adj OR: 7.12, 95% CI, 4.87 to 10.40, P <0.001).

Modifying Effect of Social Support on Relationship between SES and Depression

Table 3 presents the adjusted OR of the interaction between social support measured by living arrangement and SES measured by housing type. Reflecting the highest extent of social support and SES, residents living with their spouse and children/grandchildren in 4-/5-room housing defined the reference group. In comparison, elderly residents living in 2-room housing with the same extended family structure had the highest odds of depression (Adj OR: 3.06, 95% CI,

1.52 to 6.16, P <0.05). Individuals living with their children only in 3-room housing (Adj OR: 2.98, 95% CI, 1.10 to 8.11, P <0.05), and those living alone or with a domestic helper in 4-/5-room housing (Adj OR: 2.73, 95% CI, 1.31 to 5.69, P <0.05) also exhibited higher odds of depression.

Conversely, elderly residents living with others (relatives, friends and tenant) in 2-room housing were 70% less likely to have depressive symptoms than those living in 4-/5-room housing with spouse and children/grandchildren (Adj OR: 0.29, 95% CI, 0.09 to 0.93, P <0.05). Living with spouse only appears to buffer against depressive symptoms across socioeconomic classes, although the effect was not statistically significant.

Discussion

The overall prevalence of depressive symptoms in our study sample of elderly aged 60 years and older was 7.8%, which was consistent with previous population-based surveys in Singapore that found 5.5% to 13.3% of community-dwelling older adults to have depression and depressive symptoms.[3,4]

This study examined the association of SES and social support with depressive symptoms, and the modifying effect of social support on SES and depression among the elderly in Singapore. The results suggested that elderly residents who were of lower SES were more likely to have depressive symptoms. A similar finding was seen among residents who received lesser social support. Additional results indicated that the effect of SES on depressive symptoms varied by living arrangements within the household.

SES and Depression

Using education and housing type as measures of SES, we found that education was not strongly associated with depressive symptoms as other studies have found.[8,17,45] Housing type was found to be a stronger factor in this study, which is unique to Singapore as housing type is often used as a surrogate of income status and is positively correlated with household income. The elderly living in smaller housing (lower income) were more likely to report depressive symptoms. This finding corroborates with studies that revealed positive associations between poor economic conditions or financial strain with depression among elderly persons in Hong Kong[46] and Taiwan.[47] Further, it has been suggested that lower income may be related to poor access to health and mental health services, which can influence the diagnosis and treatment of depression, as patients are unlikely to have their health care needs attended to on a regular basis, and are even more unlikely to be screened for depressive disorders.[6] Although Singapore has a health service system that provides patients with easy

Table 1. Characteristics of Respondents with and without Depressive Symptoms

| | | GDS-15 | | | |
| | n (2447) | With Depressive Symptoms (n = 188) | | Without Depressive Symptoms (n = 2259) | |
		No.	%	No.	%
Socioeconomic Status					
Highest education level					
Secondary and higher	1295	69	36.7%	1226	54.3%
Primary and lower	1152	119	63.3%	1033	45.7%
Housing type					
4-/5-room	1226	65	34.6%	1161	51.4%
3-room	829	61	32.4%	768	34.0%
2-room	392	62	33.0%	330	14.6%
Social Support					
Living arrangement					
Spouse with child(ren)/grandchild(ren)	847	38	20.2%	809	35.8%
Spouse only	683	46	24.5%	637	28.2%
Child(ren)/grandchild(ren) only	396	40	21.3%	356	15.8%
Alone or with domestic helper	304	43	22.9%	261	11.6%
Others (relatives, friends, tenant)	217	21	11.1%	196	8.6%
Frequency of leisure time spent					
At least once a month	1744	102	54.3%	1642	72.7%
Less than once a month	333	42	22.3%	291	12.9%
Childless	370	44	23.4%	326	14.4%
Social isolation					
Never or rarely	2317	132	70.2%	2185	96.7%
Occasionally or often	130	56	29.8%	74	3.3%
Covariates					
Age					
85+	113	18	9.6%	95	4.2%
75 – 84	341	18	9.6%	323	14.3%
65 – 74	1184	92	48.9%	1092	48.3%
60 – 64	809	60	31.9%	749	33.2%
Gender					
Female	1399	112	59.6%	1287	57.0%
Male	1048	76	40.4%	972	43.0%
Ethnic group					
Chinese	1934	135	71.8%	1799	79.6%
Indian	114	12	6.4%	102	4.5%
Malay	300	32	17.0%	268	11.9%
Others	99	9	4.8%	90	4.0%
Diabetes					
No	1887	119	63.3%	1768	78.3%
Yes	560	69	36.7%	491	21.7%
High blood pressure					
No	1048	69	36.7%	979	43.3%
Yes	1399	119	63.3%	1280	56.7%
Heart attack/failure					
No	2285	164	87.2%	2121	93.9%
Yes	162	24	12.8%	138	6.1%

GDS-15: 15-item Geriatric Depression Scale; BADL: Basic activities of daily living; IADL: Instrumental activities of daily living

Table 1. Characteristics of Respondents with and without Depressive Symptoms (Con't)

	n (2447)	With Depressive Symptoms (n = 188)		Without Depressive Symptoms (n = 2259)	
		No.	%	No.	%
Stroke					
No	2365	165	87.8%	2200	97.4%
Yes	82	23	12.2%	59	2.6%
Weak/failing kidneys					
No	2386	174	92.6%	2212	97.9%
Yes	61	14	7.4%	47	2.1%
Assistance in no. of BADL					
≤ 2	2409	165	87.8%	2244	99.3%
3+	38	23	12.2%	15	0.7%
Assistance in no. of IADL					
≤ 2	2291	136	72.3%	2155	95.4%
3+	156	52	27.7%	104	4.6%
Urinary incontinence					
No	2139	144	76.6%	1995	88.3%
Yes	308	44	23.4%	264	11.7%
Vision impairment					
No	2271	153	81.4%	2118	93.8%
Yes	176	35	18.6%	141	6.2%
Hearing loss					
No	2135	146	77.7%	1989	88.0%
Yes	312	42	22.3%	270	12.0%
Pain/discomfort					
None	1941	95	50.5%	1846	81.7%
Moderate & extreme	506	93	49.5%	413	18.3%
Cognitive impairment					
Ok	2261	146	77.7%	2115	93.6%
Suggestive	186	42	22.3%	144	6.4%

GDS-15: 15-item Geriatric Depression Scale; BADL: Basic activities of daily living; IADL: Instrumental activities of daily living

Table 2. Multivariable Analysis of the Effects of Socioeconomic Status and Social Support on Depressive Symptoms in the Elderly

	Adjusted Odds Ratio†	95% CI	*P* Value
Socioeconomic Status			
Highest education level			
Secondary and higher*	1.00		
Primary and lower	1.29	0.94 – 1.77	0.112
Housing type			
4-/5-room*	1.00		
3-room	1.10	0.61 – 1.98	0.755
2-room	3.06	1.52 – 6.16	0.002
Social Support			
Living arrangement			
Spouse with child(ren)/grandchild(ren)*	1.00		
Spouse only	1.05	0.57 – 1.93	0.879
Child(ren)/grandchild(ren) only	0.74	0.31 – 1.77	0.494
Alone or with domestic helper	2.73	1.31 – 5.69	0.007
Others (relatives, friends, tenant)	1.82	0.78 – 4.24	0.166
Frequency of leisure time spent			
At least once a month*	1.00		
Less than once a month	1.51	1.04 – 2.19	0.028
Childless	1.73	1.14 – 2.60	0.009
Social isolation			
Never or rarely*	1.00		
Occasionally or often	7.12	4.87 – 10.40	<0.001

*Reference group
†Adjusted for age, gender, ethnic group, diabetes, high blood pressure, heart attack/failure, stroke, weak/failing kidneys, assistance in no. of basic activities of daily living (BADL), assistance in no. of instrumental activities of daily living (IADL), urinary incontinence, vision impairment, hearing loss, pain/discomfort, and cognitive impairment

Table 3. Adjusted Odds Ratio† (95% CI) of Interactions between Social Support and Socioeconomic Status

		Social Support				
		Alone or with Domestic Helper	Others (Relatives, Friends and Tenant)	Child(ren)/ Grandchild(ren) Only	Spouse Only	Spouse and Child(ren)/ Grandchild(ren)
Socioeconomic status	2-room	0.47	0.29*	0.93	1.06	3.06*
		(0.18 – 1.25)	(0.09 – 0.93)	(0.28 – 3.16)	(0.42 – 2.68)	(1.52 – 6.16)
	3-room	0.54	0.39	2.98*	1.00	1.10
		(0.21 – 1.37)	(0.11 – 1.34)	(1.10 – 8.11)	(0.42 – 2.39)	(0.61 – 1.98)
	4-/5-room	2.73*	1.82	0.74	1.05	1.00 (ref)
		(1.31 – 5.69)	(0.78 – 4.24)	(0.31 – 1.77)	(0.57 – 1.93)	

*P <0.05
†Adjusted for age, gender, ethnic group, diabetes, high blood pressure, heart attack/failure, stroke, weak/failing kidneys, assistance in no. of basic activities of daily living (BADL), assistance in no. of instrumental activities of daily living (IADL), urinary incontinence, vision impairment, hearing loss, pain/discomfort, and cognitive impairment

access to affordable primary care or subsidised specialist care for mental health services, it was found that elderly Singaporeans who reported financial resource limitations for medical care were less likely to use mental health service.[48]

Social Support and Depression

Poor social support (living alone or with domestic helper, infrequent leisure time with children/grandchildren or being childless, and feeling socially isolated occasionally and often) was another factor that was found to be associated with depressive symptoms.

Living arrangements affect the amount of social support that elderly residents receive from their family, and living alone is often an indication of low access to social support.[13,14,31] Like other Asian societies, Singapore values family unity where co-residence of older parents and children are highly encouraged. Currently, about 67.0% of elderly individuals live with their children.[33] As such, living alone could have a negative effect on the psychological well-being of the elderly, as supported by evidence that older adults living alone had significantly higher depressive symptoms.[13,31]

A study on the relationship between social support and depressive symptoms among Chinese elderly in Hong Kong also found that social support from family members was more important than support from friends.[49] The frequency of quality time spent with children/grandchildren is a reflection of the relationship and the amount of social and emotional support that elderly residents have with and receive from their family members. Given the high proportion of elderly in Singapore living with their children/grandchildren, frequency of quality time spent is expected to be high due to the daily contact. However, even for those who were not living with their children/grandchildren, intergenerational ties remained strong with 90.8% of older residents receiving visits or visiting their married children at least once a month to have meals, exchange suggestions and advice about personal problems, and going on outings.[50] It was therefore not surprising that older adults who spent infrequent leisure time (less than once a month) with their children/grandchildren were more likely to have depressive symptoms, and that this effect was even more pronounced in childless older adults. Adult children are important sources of social and financial support to parents. In Singapore, 62.8% of elderly residents depend on their children's allowances as their main source of financial support.[33] For older adults without children, work is often the first source of income, which suggests that childless older persons have to continue work in old age.[51] Hence, childlessness can be a predisposing factor for elderly depression.[9]

Perceived social isolation is the subjective experience of

the absence of social support in an individual's life.[52] For older adults who are more likely to need social support in their later years due to bereavement and increasing health problems, social isolation can be particularly detrimental.[53] In a study that investigated the extent of social isolation among Chinese Singaporeans aged 65 years and older, 63.0% of the respondents were forced to live alone because they outlived their family networks, never had children, or were estranged from their children.[54] In a society that champions family ties and filial eldercare, this physical isolation makes elderly living alone more susceptible to social isolation. The isolation is also further exacerbated by Singapore's swift modernisation, leaving many older adults feeling disconnected from their social milieu. The elderly in Singapore tend to use colloquial terms for certain places unknown to majority of Singaporeans, which can make communicating with people on the street an awkward and embarrassing experience. The lack of education further alienates the elderly from middle-aged and younger generations, and with little ability or finances for contemporary lifestyles, the elderly can become increasingly isolated.[54] Older adults who experience social isolation have been found to be at greater risk of depression.[31,55]

Social Support Moderates Relationship between SES and Depression

While our study examined the main effect of SES on depressive symptoms, further results suggested that the association was modified by living arrangements within the household. We observed that among elderly residents living in 4-/5-room housing (high SES), those who were living alone or with a domestic helper (low social support) had higher (OR) for depressive symptoms compared to those who were living with their spouse and children/grandchildren. However, the results were reversed for persons living in 2-room housing. Stronger social support indicated by larger family size was associated with higher odds of depression. Our results point out that social support had a non-linear moderating effect on the relationship between SES and depression.

This phenomenon may reflect the differential impact of income and social support on mental health across SES groups. Diener and Biswas-Diener suggested that the impact of increased income in improving subjective well-being is limited only to the point where basic material needs are satisfied.[56] After which, income becomes less important to mental health. Additionally, for low-income families who may be facing financial strain, literature has found that family social support may do little to moderate the impact on depression.[57]

Limitations

This study is not without limitations. Firstly, the findings were derived from cross-sectional data, and therefore unable to determine causality. Secondly, the use of GDS scores ≥ 5 only identified respondents who were indicative of depression, which did not equate to a clinical diagnosis of depression. Thirdly, the measures of SES were restricted to using educational level and housing type as a proxy for income, as a substantial proportion of self-reported monthly income was missing. Social support was also derived from non-standardised questions on living arrangements, frequency of time spent with children/grandchildren, and perceived social isolation, which may not adequately reflect the actual and perceived family support that respondents received. Lastly, the study lacked information on the marital status and lifestyle habits (alcohol consumption and smoking) of respondents, which may influence the magnitude and direction of the observed associations. However, the study also has strengths in that the sample size was large, and the response rate of 68.2% was considerably higher than the usual response rate for surveys conducted among older adults.

Conclusion

Our results showed that low social support and low SES significantly increased the odds of depressive symptoms. The moderating effect of social support as measured by living arrangements, on depression was however not consistent across the SES groups. Depression interventions for the elderly in Singapore should take a holistic approach to attend to the financial and social needs of older adults.[6,17] In addition, specific interventions need to target different SES groups to better help older adults who may be at risk of developing depression. In the design of preventive programmes, it is important to pay special focus on social support resources for individuals in higher SES groups since living alone or with domestic helper was a significant risk factor. However, for low SES groups, the availability of social support in the form of an extended family was not a protective factor. Strategies to improve the financial situation of these households may need to be considered.

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Appendix 1
Questions on Socioeconomic Status (SES) and Social Support

Q1. Highest Education Level Attained	
a) No formal qualifications	1 ☐
b) Primary (PSLE)	2 ☐
c) Secondary ('O'/'N' levels)	3 ☐
d) Junior college ('A' levels)	4 ☐
e) Diploma/other professional qualification	5 ☐
f) Degree and higher	6 ☐

Q2. Housing Type	Current residence	Other property (if any)
a) 1-/2-room flat	1 ☐	1 ☐
b) 3-room flat	2 ☐	2 ☐
c) 4-room flat	3 ☐	3 ☐
d) 5-room flat	4 ☐	4 ☐
e) Others: _____	5 ☐	5 ☐

Q3. Do you live alone?	
a) Yes	1 ☐
b) No	2 ☐

Q4. Currently staying with:	
a) Spouse	1 ☐
b) Children/grandchildren	2 ☐
c) Relatives	3 ☐
d) Friends	4 ☐
e) Tenant	5 ☐
f) Maid	6 ☐
g) Others: _____	7 ☐

Q5. Please think of the grandchild(ren)/child(ren) you see most often, regardless of whether they are staying with you, and tell us how often do you interact (talking, having meals, doing recreational activities) with them?	Have meals together	Spend leisure time together (eg. chat, outings, recreational activities, others)
a) Everyday	1 ☐	1 ☐
b) 4 to 6 times a week	2 ☐	2 ☐
c) 2 to 3 times a week	3 ☐	3 ☐
d) Once a week	4 ☐	4 ☐
e) 2 to 3 times a month	5 ☐	5 ☐
f) Once a month	6 ☐	6 ☐
g) <Once a month	7 ☐	7 ☐
h) NA (no child(ren) AND grandchild(ren))	99 ☐	99 ☐
Q6. How often do you feel left out/isolated from others?		
a) Never		1 ☐
b) Rarely		2 ☐
c) Occasionally		3 ☐
d) Often		4 ☐