

Research Brief Series : 11

Self-rated Health and
Depressive Symptomatology
at Older-Midlife in
Singapore:
Findings from a
National Study

Abhijit Visaria and Bridget Seng

CARE Research Areas:
Healthy Ageing
Retirement
Ageing in Place
Caregiving
Intergenerational
Solidarity
Neurocognitive /
Sensory Disorders

General Editor:
Abhijit Visaria

CARE research briefs
present policy-oriented
summaries of
published peer
reviewed documents
or a body of
published

© CARE December 2021

Self-rated Health and Depressive Symptomatology at Older- Midlife in Singapore: Findings from a National Study

Abhijit Visaria and **Bridget Seng**

Key Findings:

- Overall, among older-midlife adults aged 50-59 years, about 71% reported being in good, very good, or excellent health. About 29% reported that they were in fair or poor health. About one in four older-midlife adults in the study had clinically relevant depressive symptoms.
- Females compared to males were more likely to report being in fair or poor health compared to good health. Females were less likely to have clinically relevant depressive symptoms compared to males.
- Malays were more likely than the Chinese to report being in good health compared to either fair/poor or excellent/very good health. They were more likely than the Chinese to have clinically relevant depressive symptoms.
- Perceived income inadequacy was associated with worse self-rated health and with a greater likelihood of clinically relevant depressive symptoms.
- Formal volunteering was associated with excellent or very good self-rated health.

Introduction

Midlife is an important stage in the life course. It is the period that bridges youth and old age [1]. For most adults, these midlife years are where they are at their prime, excelling in many areas of their lives such as career, family, community, and self-development [2, 3]. Midlife is also a period where many key bio-psycho-social changes and developments occur. In particular, the 'older-midlife' decade of 50-59 years is the time when adults are beginning the transition to their golden years. During these years, there are likely to be a number of life transitions related to employment, for example exiting from the workforce particularly among women due to an increase in caregiving responsibilities, changes in household composition such as children setting up their own homes or migrating for education or employment, and evolving family roles, for example having to take on caregiving responsibilities for own parents. For many older-midlife Singaporeans, the transition to older ages means preparing for the final years of formal employment, balancing responsibilities between children and ageing parents, and an increasing attention paid to their own health. From a longitudinal perspective, Lachman, Teshale, and Agrigoroaei (2015) postulate that midlife has the potential to shape the health and wellbeing of later years: better physical health at midlife is associated with better cognitive health at older ages, and at the same time, psychological distress at midlife is associated with lower physical function at older ages [2].

While there has been considerable research on older adults aged 60 years and above in Singapore, there are few sources of data and studies on the health of older-midlife Singaporeans. The age-group of 50-59 years constituted about 10% of the resident population of Singapore in 2010, and has increased to nearly 15% in 2020 [4, 5]. Over the next decade, individuals at these ages will transition to older ages, and their trajectories as they age will be influenced to a large extent by their health and wellbeing at older-midlife. In this research brief, we seek to shed light on the health and wellbeing of older-midlife Singaporeans by studying their general health in terms of self-rated health, and mental health or wellbeing measured in terms of depressive symptoms.

We acknowledge that an individual's health status is complex to measure and study from the perspective of a single comprehensive indicator. Narrowly viewed, health is merely the absence of disease. However, as is well established, health necessarily involves multiple dimensions, and relates to wellbeing in the physical, psychological, and social domains of life [6, 7]. In terms of an overall or general health measure, a number of previous studies have found that self-rated health (SRH) is an accurate indicator of current health and predictor of future health, specifically functional status, cognitive decline, overall morbidity, and mortality [8-11].

An important measure of mental wellbeing is depressive symptomatology, defined as the "grouping of symptoms that categorize depression, including low mood and loss of pleasure in everyday activities that is beyond negative emotions that an individual would experience" [12]. It is important to study mental health at older-midlife in particular since individuals at these ages often face stressors in context of the transitions mentioned earlier; some studies have found that across the life course, depression peaks at midlife, and this is often related to the conflict between demands of familial and work-related roles [1].

In this brief, we present the distribution of the measures of SRH and depressive symptomatology in a national study of older-midlife adults in Singapore, as well as present the correlates of both in terms of socioeconomic status, physical health, psychological traits, and social engagement. Studies of midlife individuals have found correlations between SRH and gender, marital status, employment status, social support, psychological well-being and the development of chronic conditions [13-19]. In the literature studying psychological wellbeing at midlife, depressive symptoms have been associated with being single compared to being married, lower educational attainment, physical multimorbidity, increased loneliness and social isolation, and weaker social support and networks [20-24].

We aim therefore to understand which of these patterns can be found among older-midlife individuals in Singapore. The identification of the correlates of SRH and depressive symptomatology at older-midlife in Singapore can enable recognising background characteristics or specific factors associated with an increased risk of poor health or depression, and potentially formulate interventions and design programmes to ameliorate these risks.

DATA

Data for this analysis comes from the Panel on Ageing and Transitions in Health Survey (PATHS), a survey of 1654 older-midlife Singapore citizens and permanent residents aged 50-59 years, that was conducted in 2016-2017 by Centre for Ageing Research and Education (CARE) at Duke-NUS Medical School, Singapore. A random sample of 1940 Singaporeans, stratified by gender, ethnicity, and age (two age-groups of 50-54 years and 55-59 years) according to the estimated 2015 population distribution, was drawn from the National Database on Dwellings. Malays and Indians were oversampled by a factor of two to ensure a sufficient number in these sub-groups for analysis. In the event that an index respondent was not available despite multiple attempts to contact him/her, or refused participation in the study, a nearest neighbour – matched on gender, ethnicity, and age group of the index respondent – was approached to respond. The study was approved by the Institutional Review Board of National University of Singapore (NUS IRB).

MEASURE OF GENERAL HEALTH: Self-rated Health (SRH)

To assess SRH, participants were asked “In general, would [they] describe [their] state of health as excellent, very good, good, fair or poor?” In order to be able to compare ‘good’ with better and worse health status, we coded the original variable into three categories based on the responses of “excellent or very good”, “good”, and “fair or poor”.

MEASURE OF MENTAL WELLBEING: Depressive Symptomatology

We used an abbreviated version of the Center for Epidemiologic Studies-Depression (CES-D) scale, using eleven items from the scale to assess symptoms associated with depression [25]. Respondents were asked to respond to what extent were statements pertaining to poor appetite, restless sleep, feeling sad, lonely, being disliked by others, feeling happy, enjoying life, etc. true for them in the week preceding the survey. Response options included none/rarely (corresponding to a score of 0), sometimes (1) and often (2). The total scores can thus range from 0 to 22, with higher scores indicating a higher level of depressive symptoms. A score of 7 and above is used as a cut-off and indicates clinically relevant depressive symptoms [26]. The internal consistency of the CES-D was acceptable (Cronbach's alpha=0.72).

POTENTIAL CORRELATES

We study the association between self-rated health and clinically relevant depressive symptoms, and a range of demographic, socioeconomic status, health, psychological, and social engagement factors.

Demographic Characteristics: The demographic factors considered were age (in terms of two five-year age-groups: 50-54 and 55-59 years), sex, ethnic group (Chinese, Malay, Indian), marital status (married, divorced/widowed/separated, and never married), and number of living children.

Socioeconomic Status: We measured socioeconomic status in terms of educational attainment (no formal education, primary, secondary, or tertiary), housing type (1-2 room Housing Development Board [HDB] flats, 3-, 4-, and 5-room HDB flats, and privately purchased housing [condominiums, landed property etc.]) perceived income adequacy, and employment status. Housing type, particularly when stratified in terms of the size of the apartments, and government-built (HDB) and private housing, is indicative of the household socioeconomic status [27]. Perceived income adequacy was measured by asking respondents if they felt they had adequate income to meet their monthly expenses. Respondents chose from the response options of enough money with some left over, just enough money with no difficulty, some difficulty and much difficulty in meeting expenses. We categorised these into three options indicating more than adequate income, adequate income, and perceived income inadequacy.

Physical Health: Physical health status of respondents was measured in terms of any chronic physical ailment, any health-related difficulties with basic activities of daily living (ADL) and any health-related difficulties in performing instrumental activities of daily living (IADL). The chronic physical ailments considered in this analysis were based on respondents reporting that they have been diagnosed by a medical professional in the past year with any heart ailment, cancer, cerebrovascular disease, hypertension, high blood sugar or diabetes, chronic respiratory illness, digestive ailments, ailments of the kidney, urinary tract, liver, or gallbladder, joint pain, arthritis, rheumatism or nerve pain, chronic back pain, osteoporosis, fractures, cataract, or glaucoma. The ADLs that respondents were asked about were: bathing or

showering, dressing, eating, standing up from a bed/chair or sitting down on a chair, walking around the house, or using a sitting toilet, without the assistance of a person or assistive device. The IADLs considered were preparing their own meals, leaving the home to purchase necessary items or medication, taking care of financial matters such as paying bills, using the phone, dusting, cleaning and other light housework, taking public transport to leave home, and taking medication as prescribed.

Psychological Traits: We included psychological resilience in our analysis of both SRH and depressive symptoms. Psychological resilience was measured using the 10-item Connor-Davidson Resilience Scale (CD-RISC-10), which presented respondents with statements about their self-assessed ability to adapt to changes, ability to handle sadness, fear, and anger, not being discouraged by failure, bouncing back from illness, injury or other hardships, etc. [27, 28]. Respondents answered in terms of how much they agreed with the statements in their own context over the past month: not true at all, rarely-, sometimes-, or often true, and true nearly all the time. The scores for each individual item were summated to form a total score ranging from 0 to 40 with higher scores indicating higher psychological resilience.

Social Engagement: The social engagement factors that were considered were friends- and family-based social networks, and participation in any formal or informal volunteering. Social networks were assessed using the Lubben Social Network Scale – Revised (LSNS-R), which asked respondents about the number and frequency of close contact with non-cohabiting friends and relatives [29]. Scores for the friends and family sub-scales of the LSNS-R ranged from 0 to 30 each, with higher scores indicating more extensive friends- and family-based social networks. Formal volunteering was measured in terms of any volunteering in the 12 months prior to the survey in an organizational setup such as raising funds, participation in committees, organizing activities or events, education, teaching or coaching, administrative work, campaigning, etc. Informal volunteering was measured in terms of the provision in the 12 months prior to the survey of unpaid help to friends, neighbours and other non-relatives, such as helping individuals who had physical mobility difficulties, doing shopping or helping with financial matters, babysitting, help with household chores or repairs, personal care, transporting or escorting others, etc.

ANALYSIS

We conduct two types of analyses in this brief. First, we present a distribution of the two measures of interest - the SRH responses and presence of clinically relevant depressive symptoms - by the potential correlates considered in this study. For ease of interpreting the distribution of the SRH responses, we present the bivariate relationship only for the categorical variable correlates. Second, we conduct multivariable regression analysis to study the association between the two measures and potential correlates.

In the regression analysis of self-rated health, we use 'good' as the reference category. Using multinomial logistic regression, we estimate the relative risk ratios of being in "excellent or very good" health compared to "good" health, and the relative risk ratios of being in "fair or

poor” health compared to “good” health. In addition to the potential correlates noted above, we also include a variable for whether or not a respondent had clinically relevant depressive symptoms in the analysis.

In the analysis of depressive symptoms, we conduct logistic regression models and estimate the odds ratios of having clinically relevant depressive symptoms. We include the three-category variable of SRH in the analysis in addition to the potential correlates discussed above.

In the total sample of 1654 respondents in PATHS, questions on depressive symptoms were not asked from a proxy respondent (n=8) who answered questions on behalf of an index older-midlife adult who was unable to respond to the questionnaire directly due to health reasons. Due to the relatively small sample size of respondents from the ‘Others’ ethnic group (n=11), we omitted them from the analysis. We further allowed for listwise deletion of ‘don’t know’ and ‘refused’ responses (n=31) in the potential correlate variables. We thus had a final analysis sample of 1604 respondents, about 97% of the total sample.

RESULTS: Self-rated Health

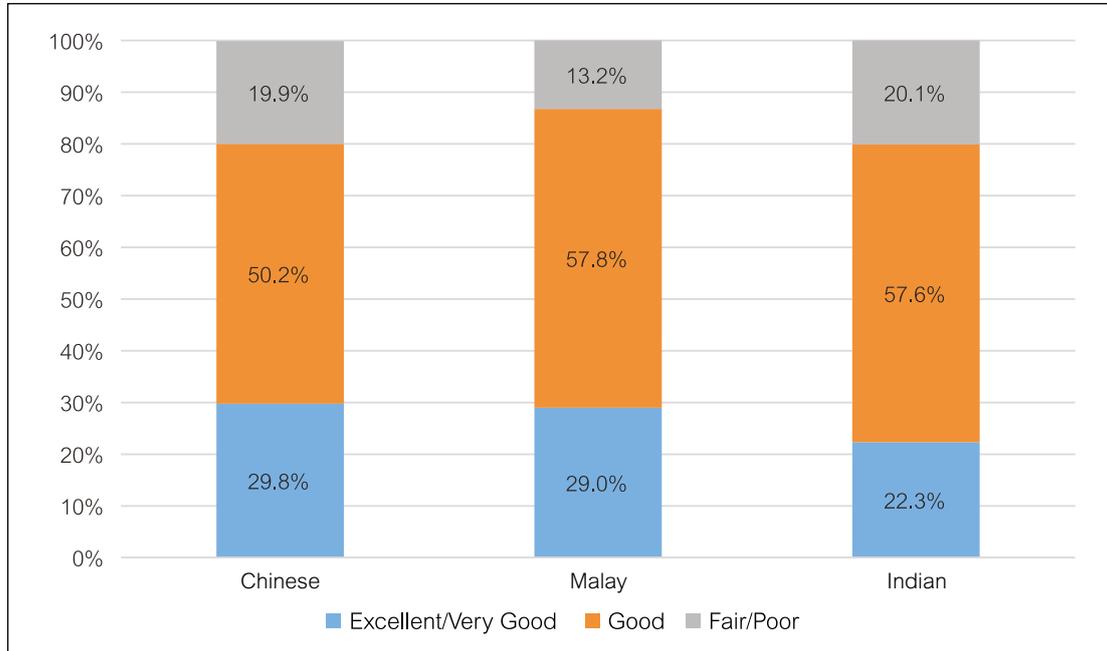
We first present results of the analysis of self-rated health.

Table 1: Distribution of self-rated health overall, and by age-group and gender

	N	Excellent or very good	Good	Fair or poor
Overall	1604	18.7	52.6	28.7
Age-group				
50-54 years	769	20.2	54.1	25.8
55-59 years	835	17.4	51.3	31.4
Gender				
Females	832	17.2	49.3	33.5
Males	772	20.3	56.2	23.5

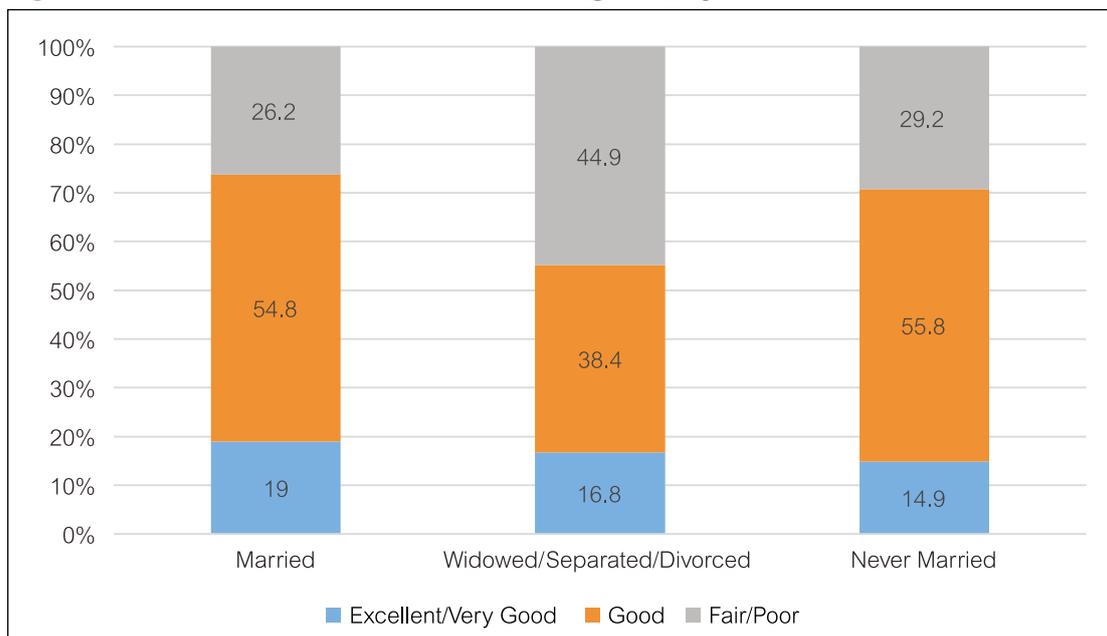
As seen in **Table 1**, a little over a majority (53%) reported being in good health. About 19% reported being in excellent or very good health, and about 29% reported being in either fair or poor health. Compared to those aged 50-54 years, a lower proportion of those aged 55-59 years reported excellent or very good health, and a higher proportion reported fair or poor health. In terms of gender, a lower proportion of females compared to males reported excellent or very good SRH, and a higher proportion in fair or poor SRH.

Figure 1: Distribution of self-rated health categories, by ethnic group



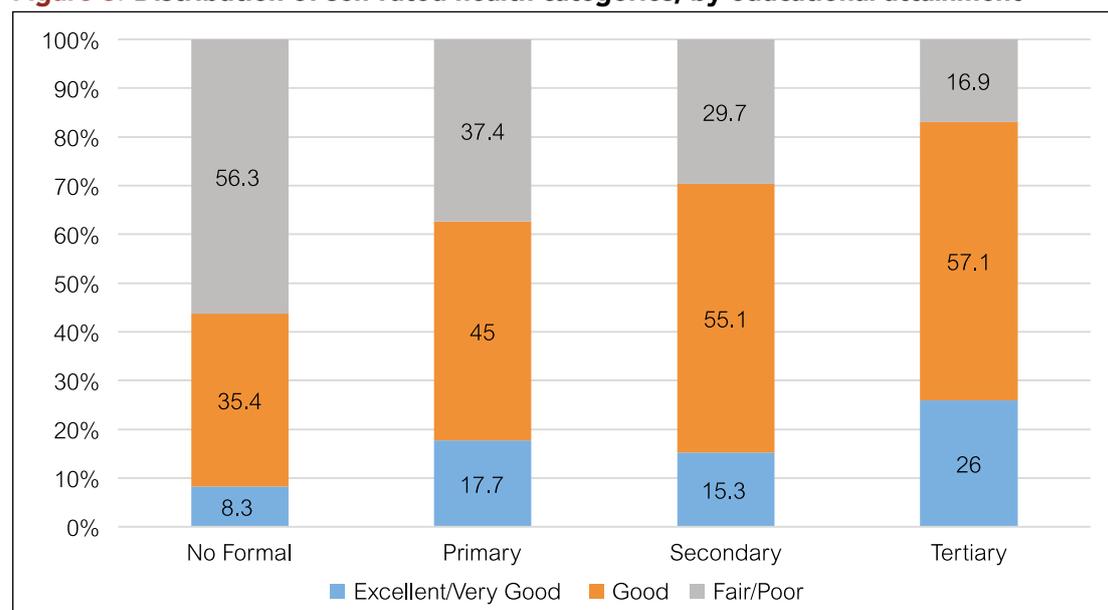
In **Figure 1**, we present the distribution of self-rated health by ethnic group. Overall, the highest proportion of older-midlife adults reporting being in good or better health, i.e. good, very good, or excellent SRH was among the Malays (87%). This proportion was similar among the Chinese and Indian (80%). The proportion of those specifically reporting excellent or very good health was similar for the Chinese and Malays, whereas it was the lowest among the Indians. Those reporting fair or poor health was similar among the Chinese and Indian older-midlife adults, and lowest among the Malays.

Figure 2: Distribution of self-rated health categories, by marital status



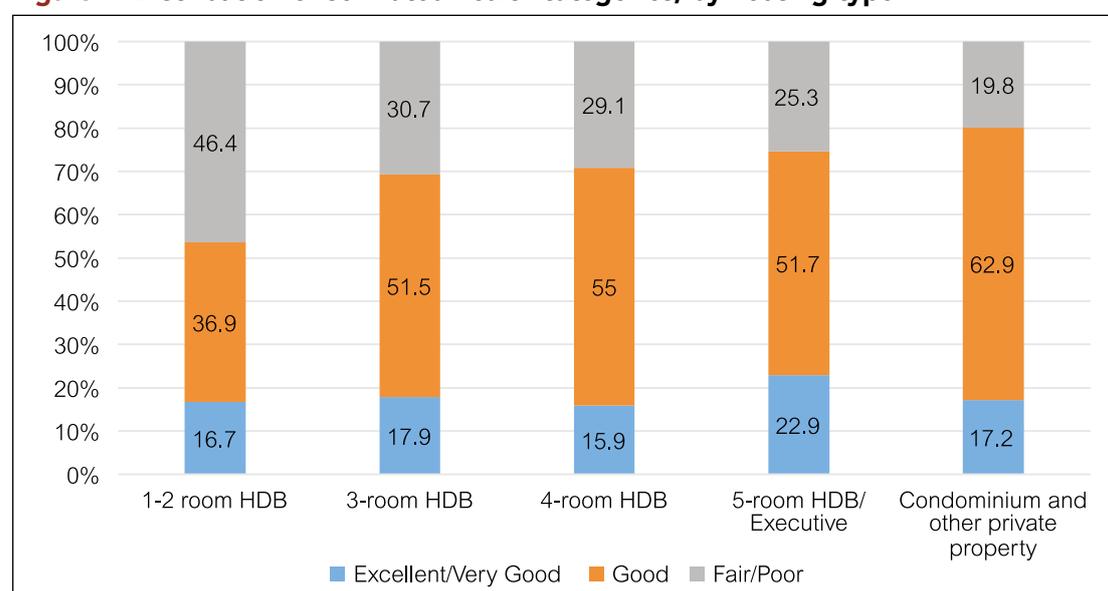
The distribution of SRH by marital status, presented in **Figure 2**, indicates that a higher proportion of those who were currently widowed, separated, or divorced reported that they were in fair or poor health (45%), and a lower proportion in good health (38.4%), compared to those who were married or never married. The highest proportion of excellent or very good health was among those currently married (19%).

Figure 3: Distribution of self-rated health categories, by educational attainment



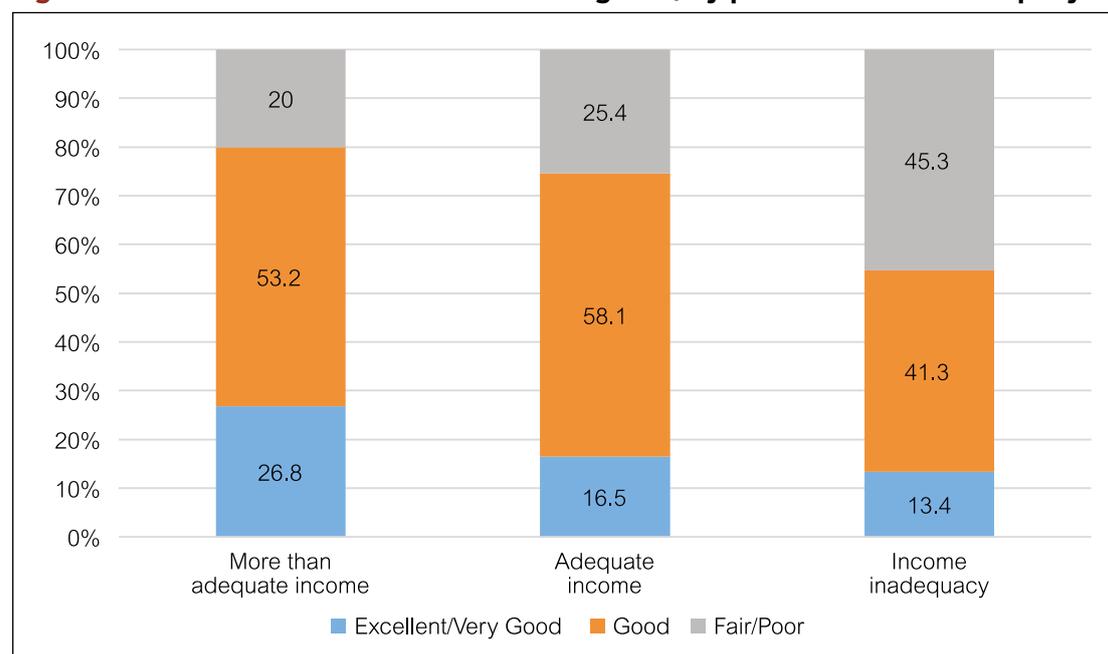
The distribution of SRH by educational attainment is presented in **Figure 3**. Overall, we see the presence of an educational gradient, with the proportion of those reporting good or better health increasing with greater education. The proportion of those reporting fair or poor health was the highest among those with no formal education and the lowest among those with tertiary education.

Figure 4: Distribution of self-rated health categories, by housing type



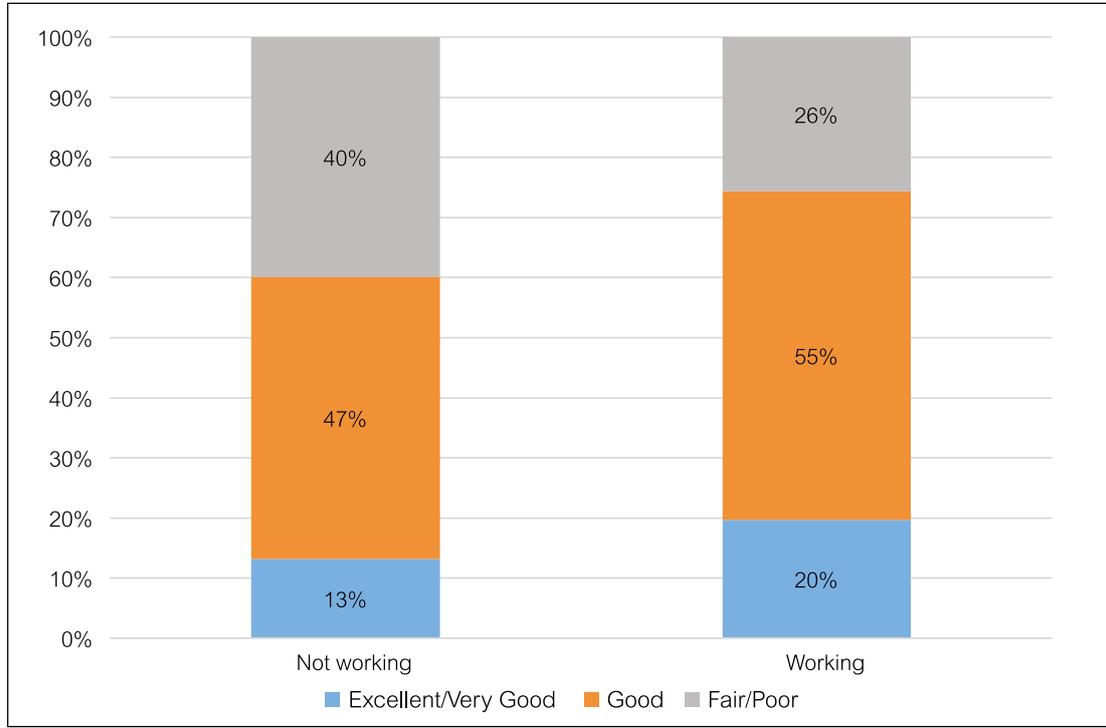
In **Figure 4**, we see the distribution of SRH by respondents' housing type. The proportion of respondents who reported fair or poor SRH was the highest among older-midlife adults in 1-2 room HDB apartments (46%). This proportion declined with increasing housing size, and was the lowest among those living in private property (20%). The distribution of excellent or very good SRH did not follow a clear gradient, with the highest proportion reported among those in 5-room HDB apartments (23%), followed by those in 3-room HDB flats (18%) and private housing (17%).

Figure 5: Distribution of self-rated health categories, by perceived income adequacy



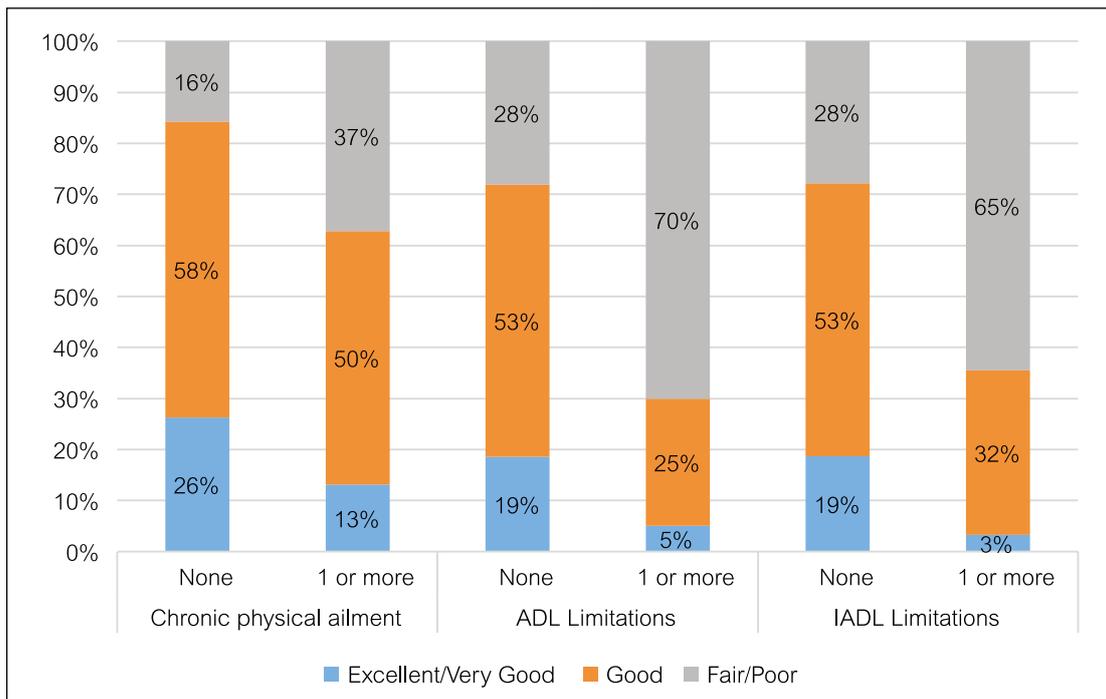
In **Figure 5**, we see that the highest proportion of older-midlife adults with excellent or very good SRH was among those with more than adequate income (27%). This proportion was lower among those with adequate income (17%), and the lowest among those with income inadequacy. The highest proportion of fair or poor SRH was among those with income inadequacy (45.3%), and the lowest among those with more than adequate income (20%).

Figure 6: Distribution of self-rated health categories, by current employment status



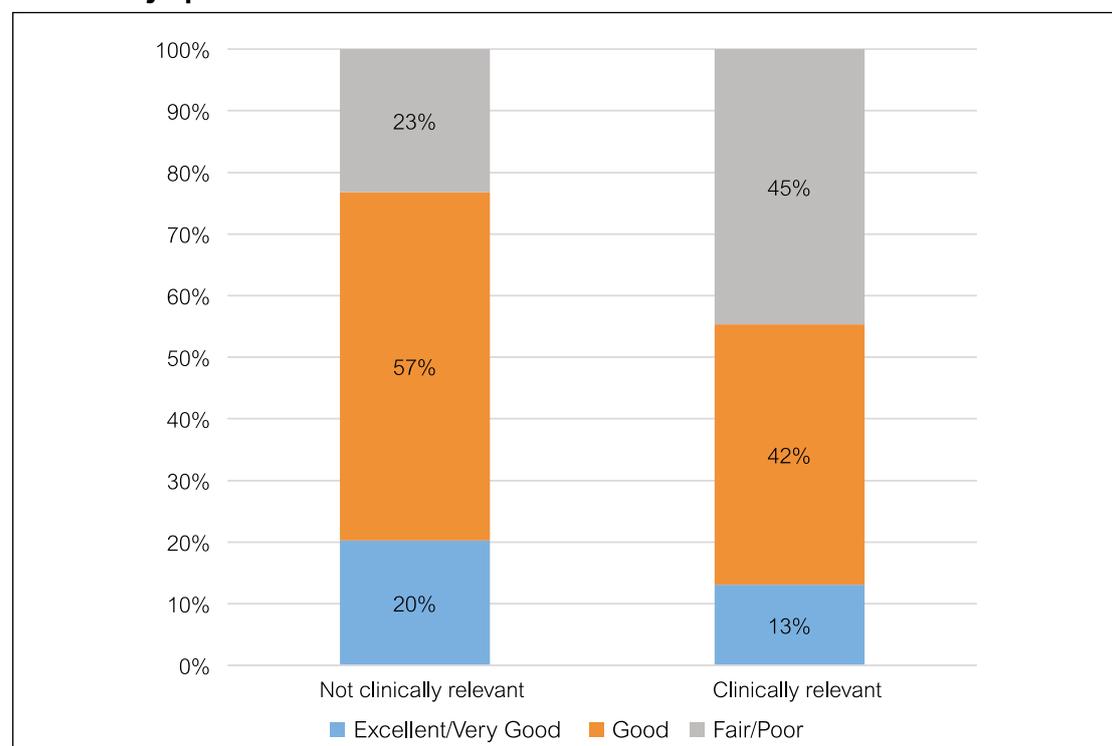
The distribution of SRH between the two employment status categories, as seen in **Figure 6**, indicates that among those working, the proportions of excellent or very good SRH and good SRH were higher and the proportion of fair or poor SRH lower compared to those not working.

Figure 7: Distribution of self-rated health categories, by physical health status



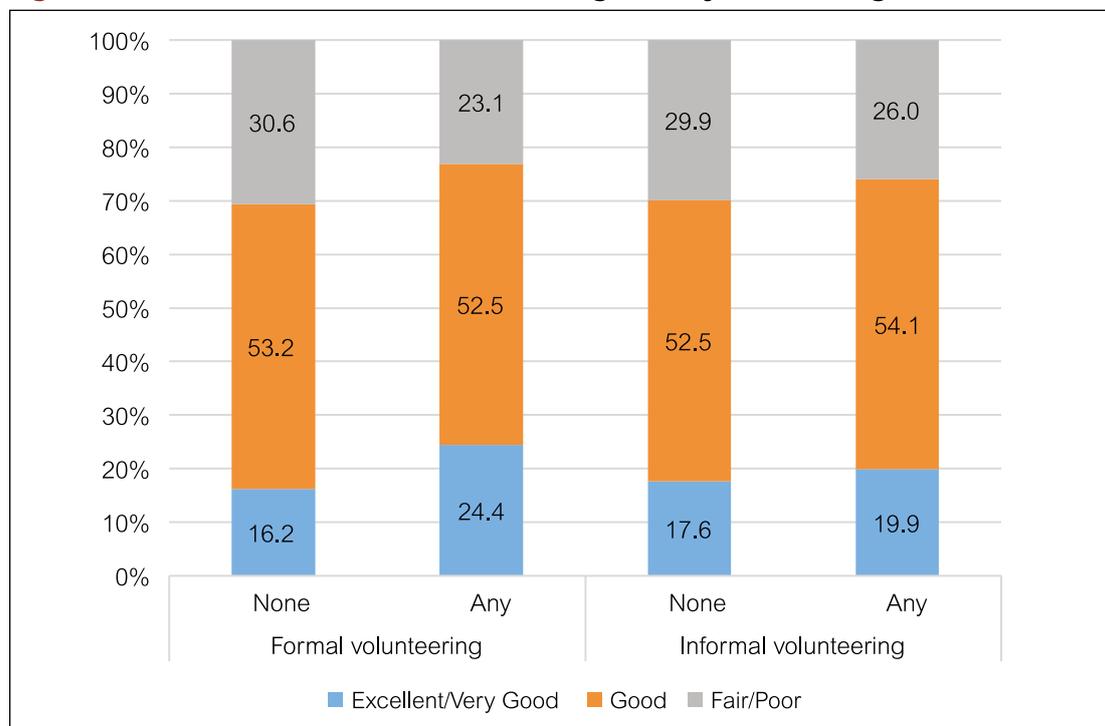
The distribution of SRH by the three physical health variables, none versus 1 or more chronic physical ailment, limitations in ADLs, and limitations in instrumental ADLs is presented in **Figure 7**. As expected, within each of the three variables, we see that older-midlife adults in the study who were in worse physical health also reported a significantly higher proportion of fair or poor SRH and a lower proportion of good or better SRH. Although descriptive, this lends credence to the idea that self-rated health is an accurate indicator of an individual's physical health status.

Figure 8: Distribution of self-rated health categories, by clinically relevant depressive symptoms



At the same time, self-rated health may also be influenced by an individual's mental health and in **Figure 8** we present the distribution of SRH by the two categories of depressive symptomatology that we are using in this study: not clinically relevant and clinically relevant levels of depressive symptoms. We see that SRH was good or better among a higher proportion of those without clinically relevant depressive symptoms. In contrast, those with clinically relevant depressive symptoms had a higher proportion of fair or poor SRH.

Figure 9: Distribution of self-rated health categories, by volunteering status



The distribution of SRH by the two types of volunteering that were measured in this study suggests that SRH was better among those with any type of formal volunteering in the past year compared to those who had not done any formal volunteering. These differences were smaller among those with informal volunteering compared to those without.

In **Table 2**, we present the results of the multivariable multinomial logistic regression models of self-rated health. The table shows the relative risk ratios of self-reported fair or poor health and excellent or very good health, compared to good health. We describe here the results that were found to be statistically significant. For categorical variables, a relative risk ratio is the ratio of the probability (or risk) of being in a self-rated health category between the different groups being compared. For instance, in the table below we interpret the relative risk ratio of 1.63 for females as females having 1.63 times the probability of males in reporting that they are in fair or poor health instead of good health. Another way of saying this would be that females are 63% more likely than males to report fair or poor SRH compared to good SRH.

Table 2: Relative risk ratios of reporting fair or poor self-rated health, and excellent or very good self-rated health, compared to good self-rated health

	Fair or Poor (Compared to good self-rated health)	Excellent or very good
Demographic Characteristics		
Age (Ref.=50-54 years)		
55-59 years	1.10	0.92
Sex (Ref.=Males)		
Females	1.63**	0.87
Ethnicity (Ref.=Chinese)		
Malay	0.56***	0.51**
Indian	0.38***	0.87
Marital Status (Ref.=Married)		
Widowed/separated/divorced	1.91**	1.42
Never married	0.81	0.79
Number of children	1.00	1.11
Socioeconomic Status		
Education attainment (Ref.=No formal or primary)		
Secondary/vocational/ITE	0.88	0.67*
JC/Polytechnic/University	0.52**	0.90
Housing type (Ref.=3-room HDB)		
1-2 room HDB	1.29	1.35
4-room HDB	1.08	0.69
5-room HDB/Executive	1.10	0.89
Condominium and other private property	0.83	0.52
Perceived income adequacy (Ref.=Adequate income)		
More than adequate income	1.20	1.70**
Income inadequacy	2.29***	1.19
Currently working (Ref.=Not working)	0.68*	1.06
Physical Health		
Chronic physical ailment (Ref.=None)	2.99***	0.57***
ADL difficulty (Ref.=None)	3.36	1.22
IADL difficulty (Ref.=None)	0.99	0.71
Psychological Characteristics		
Psychological resilience	0.98	1.05***
Clinically relevant depressive symptoms (Ref.=None)	2.47***	1.02
Social engagement		
Social Networks		
Friends-based social network	0.97**	0.99
Family-based social network	0.98	1.02
Volunteering		
Formal volunteering (Ref.=None)	1.00	1.56*
Informal volunteering (Ref.=None)	1.03	0.84
Observations	1604	

Note: *** p <0.001, ** p <0.01, * p <0.05

In terms of other demographic characteristics, we see that Malays and Indians are less likely to rate their health as fair or poor, i.e. they are more likely than the Chinese to report being in good health compared to fair or poor health. At the same time, Malays are less likely than the Chinese to report being in excellent or very good health.

In terms of socioeconomic status, compared to those with no formal education or primary education, those with secondary-level education are less likely to report excellent or very good health. Compared to those with perceived income adequacy, those with perceived income inadequacy were more than twice as likely to report being in fair or poor health. Compared to the same reference group, those with more than adequate income were more likely to be in the excellent or very good SRH category.

The only measure of physical health associated with SRH in these multivariable models was the presence of any chronic physical ailment. Those with any chronic physical ailment(s) were significantly more likely than those with no chronic ailments to have fair or poor SRH and less likely to have excellent or very good SRH, compared to good health.

We find that psychological resilience was positively associated with the likelihood of excellent or very good SRH compared to good health. Depressive symptoms were positively associated with a higher likelihood of fair or poor SRH.

Wider friends-based social networks were associated with a lower likelihood of fair or poor SRH compared to good health. Finally, formal volunteering was associated with a higher likelihood of excellent or very good SRH compared to good health.

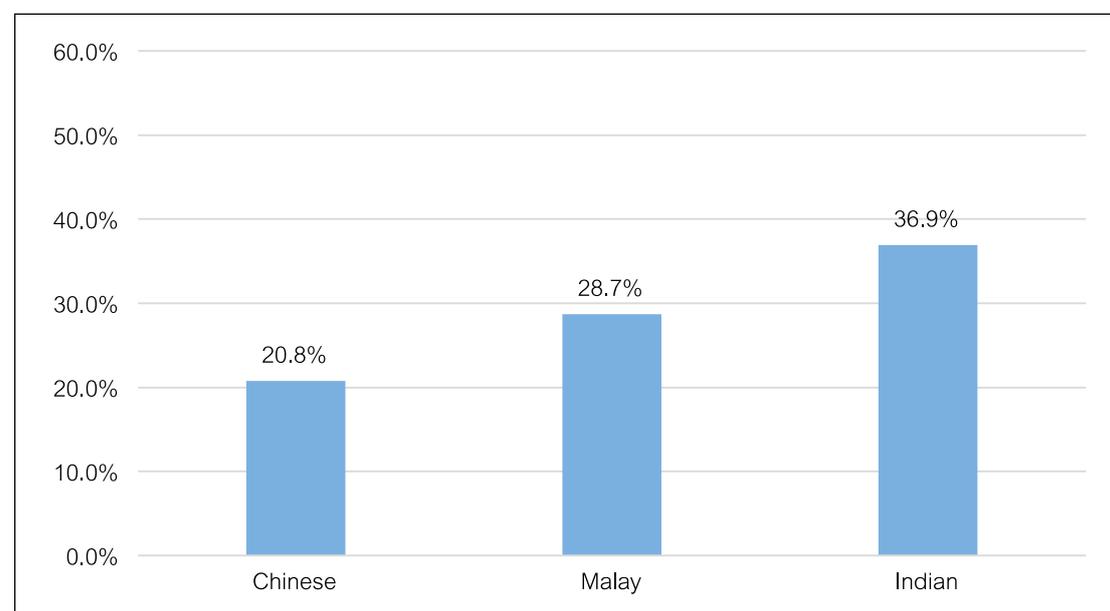
RESULTS: Depressive Symptomatology

We turn next to depressive symptomatology, which, as noted above, we have operationalised as the presence of clinically relevant depressive symptoms. In **Table 3**, we see overall that about 25% of the older-midlife adults in the study had clinically relevant depressive symptoms. The proportion was marginally higher among those aged 50-54 years compared to those aged 55-59 years. We also see a gender difference: a higher proportion of males (29%) had clinically relevant depressive symptoms compared to females (21%).

Table 3: Proportion with clinically relevant depressive symptoms

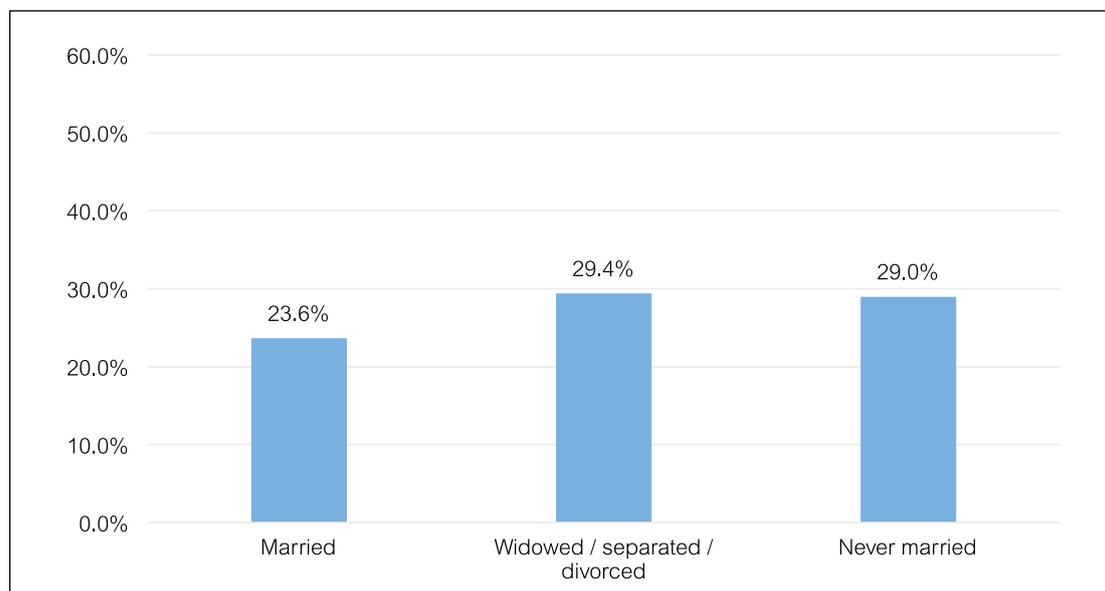
	N	Clinically relevant depressive symptoms
Overall	1604	24.8
Age-group		
50-54 years	769	25.6
55-59 years	835	24.0
Gender		
Females	832	20.7
Males	772	29.2

Figure 10: Distribution of clinically relevant depressive symptoms, by ethnic group



As seen in **Figure 10**, the proportion of clinically relevant depressive symptoms was the highest among the Indian older-midlife adults in the study (37%), lower for the Malays (29%) and the lowest among the Chinese (21%).

Figure 11: Distribution of clinically relevant depressive symptoms, by marital status



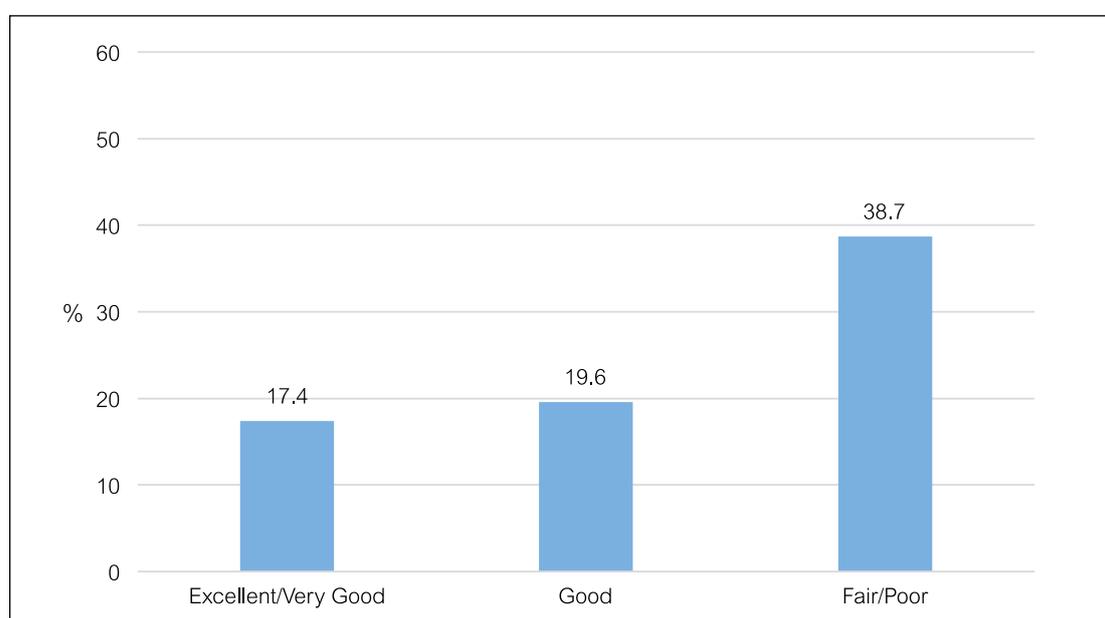
As seen in **Figure 11**, the proportion of clinically relevant depressive symptoms was highest among those who were widowed, separated, or divorced (29%), and similar to those who had never married. The proportion was lower among those currently married (24%).

Table 4: Proportion of clinically relevant depressive symptoms by measures of socioeconomic status

	N	Clinically relevant depressive symptoms (%)
Educational attainment		
No formal or primary	362	32.3
Secondary	820	24.0
Tertiary	422	19.7
Housing type		
1-2 room HDB	80	43.8
3-room HDB	325	23.7
4-room HDB	635	27.9
5-room HDB/Executive	452	19.5
Condominium and other private property	112	17.9
Perceived income adequacy		
More than adequate income	431	16.2
Adequate income	787	22.6
Income inadequacy	386	38.6
Employment status		
Currently working	1285	24.3
Not working	319	26.7

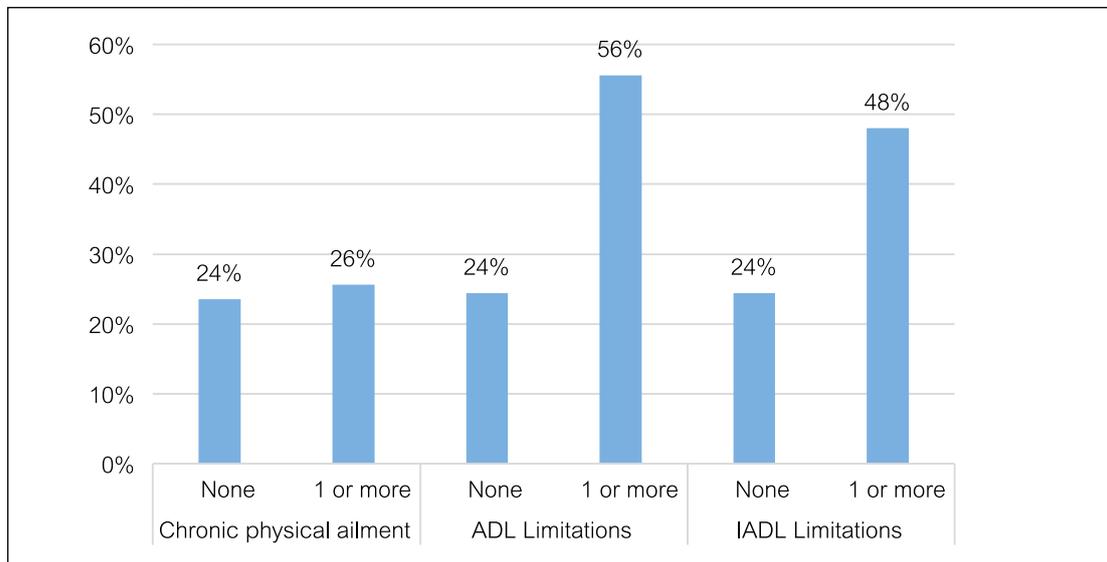
In **Table 4**, we present the proportion of clinically relevant depressive symptoms within the different categories of socioeconomic status measures. The proportion declined with higher educational attainment as well as housing type. Among the perceived income adequacy categories those with more than adequate income had the lowest proportion of clinically relevant depressive symptoms (16%), followed by those with income adequacy (23%) and the highest among those with income inadequacy (39%). The proportion was marginally higher in absolute terms among those currently not working, compared to those working.

Figure 12: Proportion of individuals with clinically relevant depressive symptom scores, by self-rated health



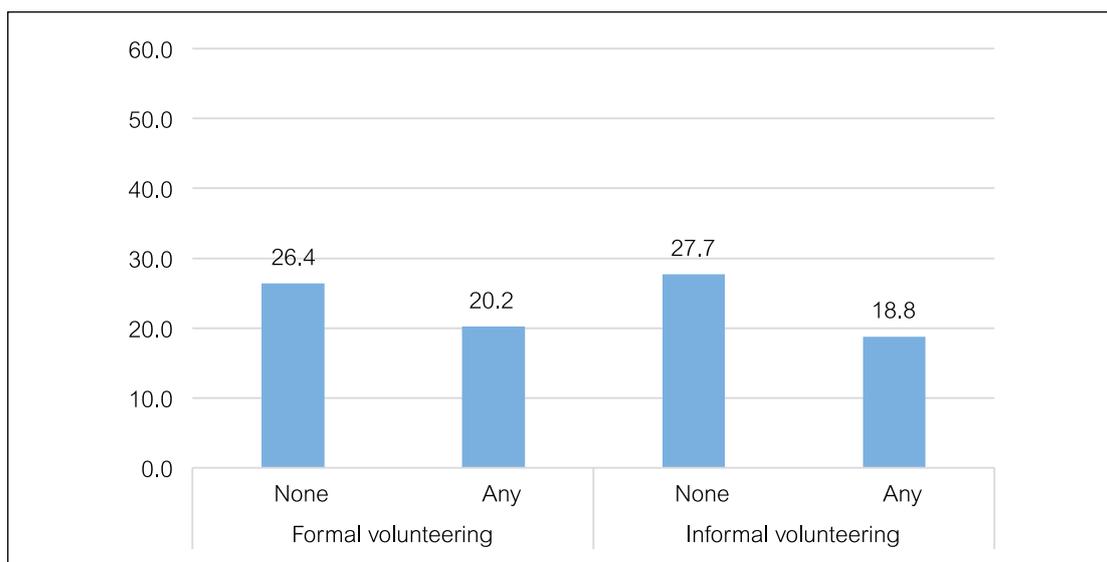
As observed in Figure 8 earlier, we see a relationship between SRH and depressive symptomatology in **Figure 12**, with individuals with the highest proportion of clinically relevant depressive symptoms among those with fair or poor SRH. Those in good, or excellent or very good SRH had significantly lower proportions of clinically relevant depressive symptoms.

Figure 13: Proportion of individuals with clinically relevant depressive symptom scores, by physical health status



In **Figure 13**, we see that the proportion of clinically relevant depressive symptoms was significantly higher among those with 1 or more ADL limitations and those with 1 or more IADL limitations compared to those without these limitations respectively. Among those with 1 or more chronic physical ailments, the proportion was marginally higher compared to those with no chronic physical ailments.

Figure 14: Proportion of individuals with clinically relevant depressive symptom scores, by volunteering status



Finally, we observe in **Figure 14** that the proportion of clinically relevant depressive symptoms was lower among those doing either of the two types of volunteering in the past year, compared to those who were not.

Table 5: Odds ratios of having clinically relevant depressive symptoms

Demographic Characteristics	
Age (Ref.=50-54 years)	
55-59 years	0.92
Sex (Ref.=Males)	
Females	0.62**
Ethnicity (Ref.=Chinese)	
Malay	1.77**
Indian	2.39***
Marital Status (Ref.=Married)	
Widowed/separated/divorced	1.24
Never married	1.46
Number of children	1.04
Socioeconomic Status	
Education attainment (Ref.=No formal or primary)	
Secondary/vocational/ITE	0.80
JC/Polytechnic/University	0.80
Housing type (Ref.=3-room HDB)	
1-2 room HDB	1.57
4-room HDB	1.59**
5-room HDB/Executive	1.18
Condominium and other private property	1.47
Perceived income adequacy (Ref.=Adequate income)	
More than adequate income	0.92
Income inadequacy	1.67*
Currently working (Ref.=Not working)	1.06
Physical Health	
Chronic physical ailment (Ref.=None)	1.06
ADL difficulty (Ref.=None)	3.09
IADL difficulty (Ref.=None)	0.91
Psychological Characteristics	
Psychological resilience	0.92***
Social Networks	
Friends-based social networks	0.98
Family-based social networks	0.98
Volunteering	
Formal volunteering (Ref.=None)	1.12
Informal volunteering (Ref.=None)	0.78
Observations	1604

Note: *** p <0.001, ** p <0.01, * p <0.05

In **Table 5**, we present results of the logistic regression model of clinically relevant depressive symptom. We find that females had lower odds compared to males, and Malays and Indians compared to the Chinese had higher odds of having clinically relevant depressive symptom. In terms of socioeconomic status, we find that older-midlife adults living in 4-room HDB apartments were more likely to have clinically relevant depressive symptoms compared to those living in 3-room apartments. Perceived income inadequacy was associated with a higher likelihood of clinically relevant depressive symptom. Interestingly, we did not find a relationship between depressive symptomatology and any of the physical health variables in the analysis. We found a negative relationship between psychological resilience and clinically relevant depressive symptom with every 1-unit increase in the CD-RISC-10 score associated with an 8% decline in the odds of clinically relevant depressive symptom. None of the measures of social engagement that we considered in the analysis were statistically significant.

The lower likelihood of clinically relevant depressive symptoms among females compared to males in our study contrasts the findings of other studies that have found higher depressive symptomatology among females (for example, see a multi-country analysis in Boerma, Hosseinpoor, Verdes and Chatterji (2016) [30]). Therefore, we examined male and female responses to the individual items in the CES-D." They are presented in **Table 6** in increasing order of the "none/rarely" response for males to the negatively worded statements (Nos. 1-9 below) in the scale.

Table 6: Distribution of responses to the 11 CES-D questions across the three response options, by gender

	Males			Females		
	None / Rarely	Sometimes	Often	None / Rarely	Sometimes	Often
1 I felt that everything I did was an effort	26.5	33.5	40.1	54.2	31.3	14.5
2 My sleep was restless	47.2	43.3	9.6	55.1	30.6	14.3
3 I felt people were unfriendly	50.7	46.2	3.1	69.5	28.0	2.5
4 I felt sad	52.2	45.5	2.3	53.4	42.7	4.0
5 I felt depressed	58.4	40.0	1.7	62.5	34.3	3.3
6 I felt that people had disliked me	60.4	36.6	1.8	72.0	25.0	1.4
7 I felt lonely	62.4	35.3	2.3	72.1	24.2	3.7
8 My appetite was poor	75.4	23.0	1.7	79.1	18.4	2.5
9 I could not get "going"	77.9	20.0	2.2	86.4	11.8	1.8
10 I felt happy	4.8	27.3	67.8	5.5	31.7	62.5
11 I enjoyed life	5.1	25.7	69.2	7.7	27.2	65.0

In each of the negatively worded items, where a response of none/rarely indicates the absence or infrequency of that feeling or symptom of depression, the proportion of none/rarely responses was higher among females compared to males. That is, a higher percentage of males had nearly all of the symptoms associated with depression, and our overall finding is not determined by one or two particularly skewed responses.

Males do not consistently report higher 'often' responses to these items compared to females, but when we examine the responses of both 'often' and 'sometimes', the combined proportion is higher among males compared to females. There are two responses where more than 50% of the males answered 'sometimes' or 'often'. These are "I felt that everything I did was an effort", where 40% responded 'often', and 33.5% responded 'sometimes', and "My sleep was restless", where about 10% responded 'often', and 43% responded 'sometimes'. Among females, the corresponding proportions are lower compared to males and below 50%, but high nonetheless. These responses suggest that there may be a higher prevalence of factors associated with stress at older-midlife among males compared to females.

Even though we examined the individual items of the CES-D, it is important to note that in order to study depressive symptomatology overall, we make use of all the questions in the CES-D scale. Responses to each of the individual items are scored and then totalled together to form a score for an individual.

DISCUSSION AND CONCLUSION

Overall, in terms of self-rated health and depressive symptomatology, nearly three-quarters of respondents reported being in good, very good, or excellent health, and a similar proportion had depressive symptoms scores that were not clinically relevant. This suggests that the majority of older-midlife adults in this study enjoyed good general health and mental wellbeing, while at the same time highlighting that there is a significant proportion of those who rate their own health as fair or poor, or experience clinically relevant depressive symptomatology.

As other studies have noted, depressive symptomatology allows us to better understand psychological wellbeing in the population and identify sub-groups experiencing psychological distress [31]. However, at the individual level, clinical diagnosis is required to determine the need for accessing mental health services for addressing depression. An examination of the items that formed the scale measuring depressive symptoms revealed that more than half the males and nearly half of the females reported that sometimes or often, they felt that everything they did was an effort and that their sleep was restless. As discussed earlier, a number of life transitions and competing demands make older-midlife an especially demanding stage of life, and our findings suggests the need for further studying the prevalence and factors related to stress among the older-midlife population in Singapore.

Our results also indicate that females were less likely compared to males to have clinically relevant depressive symptoms. This contrasts the findings of previous studies which find that women are more likely than men to report higher depressive symptomatology and be diagnosed with depression [33, 34]. Further research with larger samples of older-midlife adults in Singapore may be needed to confirm the gender difference seen in this study.

Our finding that females report poorer self-rated health compared to males is consistent with the findings in a number of other countries [30]. One possible explanation for gender differences in SRH provided in the literature is that women take a more comprehensive view of their health including functional ability and chronic conditions, whereas men tend to focus on more serious health ailments in their assessment. Some studies have found that although the gender difference in SRH holds true only at middle ages and not at older ages, both men and women at all ages self-assess their health based on a similar set of factors including chronic and acute health ailments, functional abilities, and health-related behaviours and utilization [32]. Further qualitative research on the conceptualization of one's own health and wellbeing status, as well as quantitative research that correlates self-rated health with other objective measures of health, can help understand these gender differences better.

Our findings indicate that Malays are more likely to be in the 'good' SRH category compared to either worse or better health. At the same time, Malays are more likely to have clinically relevant depressive symptoms compared to the Chinese. In other research with this data, we have found that at older-midlife in Singapore, Malays had higher self-assessed psychological resilience compared to the Chinese [35]. Further studies and those with larger datasets may also allow for an understanding of the mechanisms related to depressive symptomatology among different ethnic groups. Nonetheless, interventions that address psychological wellbeing should be cognisant of the potential differences in risk factors between different ethnic groups.

In our study, greater psychological resilience is associated with a higher likelihood of excellent or very good SRH, and a lower likelihood of clinically relevant depressive symptoms. A number of approaches and initiatives have been proposed in various studies for enhancing resilience [36], indicating that a focus on psychological resilience as a modifiable factor in innovative programmes in Singapore can potentially enhance other aspects of wellbeing at older-midlife as well.

Perceived income inadequacy is an important correlate of both self-rated health and depressive symptomatology. Income adequacy has implications for an individual's ability to seek timely and appropriate healthcare, and financial hardship in particular is a source of significant psychological distress [37]. Concerted efforts at the familial as well as policy levels to increase income adequacy is likely to have a significant positive impact on the wellbeing of individuals at older-midlife.

In terms of social engagement, our findings indicate that formal volunteering is associated with excellent or very good SRH, indicating that there are health benefits from volunteering at older-midlife in Singapore. Our multivariable regression models did not find any association between the social engagement measures studied and clinically relevant depressive symptoms, but whether some factors moderate the relationship between social engagement and depressive symptomatology at older-midlife should be further studied.

Overall, this research brief helps understand some of the correlates of self-rated health and depressive symptomatology among a cohort of older-midlife individuals in Singapore. The factors that were found common to both were gender, ethnicity, perceived income adequacy, and psychological resilience. Our study indicates the need to be sensitive to gender- and ethnic group-differences among participants in programmes and policies that are aimed at improving self-rated health and enhancing mental wellbeing at older-midlife. Factors such as income adequacy and psychological resilience, and formal volunteering in the case of self-rated health are potentially modifiable and addressing them can in turn improve wellbeing at older-midlife.

For more information, please contact:

Abhijit Visaria

Senior Research Fellow
Centre for Ageing Research and Education
Duke-NUS Medical School
Singapore 169857
E-mail: abhijit@duke-nus.edu.sg

References

1. Infurna, F.J., D. Gerstorf, and M.E. Lachman, *Midlife in the 2020s: Opportunities and challenges*. *American Psychologist*, 2020. 75(4): p. 470-485.
2. Lachman, M.E., S. Teshale, and S. Agrigoroaei, *Midlife as a pivotal period in the life course: Balancing growth and decline at the crossroads of youth and old age*. *International Journal of Behavioral Development*, 2015. 39(1): p. 20-31.
3. Finke, M.S., S.J. Huston, and D.L. Sharpe, *Balance sheets of early boomers: are they different from pre-boomers?* *Journal of Family and Economic Issues*, 2006. 27(3): p. 542-561.
4. Singapore Department of Statistics, *Resident Population by Age Group, Ethnic Group, Sex and Residential Status (Table 1)*, D.o. Statistics, Editor. 2011, Ministry of Trade & Industry, Republic of Singapore: Singapore.
5. Singapore Department of Statistics, *Resident Population by Age Group, Ethnic Group, Sex and Residential Status (Table 1)*, D.o. Statistics, Editor. 2021, Ministry of Trade & Industry, Republic of Singapore.
6. Brüssow, H., *What is health?* *Microb Biotechnol*, 2013. 6(4): p. 341-8.
7. World Health Organisation, *Constitution of the World Health Organization*. *American Journal of Public Health and the Nations Health*, 1946. 36(11): p. 1315-1323.
8. Falk, H., et al., *Self-rated health and its association with mortality in older adults in China, India and Latin America – a 10/66 Dementia Research Group study*. *Age and Ageing*, 2017. 46(6): p. 932-939.
9. Schnittker, J. and V. Bacak, *The increasing predictive validity of self-rated health*. *PLoS one*, 2014. 9(1): p. e84933-e84933.
10. Bond, J., et al., *Self-rated health status as a predictor of death, functional and cognitive impairment: a longitudinal cohort study*. *European journal of ageing*, 2006. 3(4): p. 193-206.
11. Cesari, M., et al., *Physical function and self-rated health status as predictors of mortality: results from longitudinal analysis in the iSIRENTE study*. *BMC geriatrics*, 2008. 8: p. 34-34.
12. Hoare, E., et al., *Depressive symptomatology, weight status and obesogenic risk among Australian adolescents: a prospective cohort study*. *BMJ Open*, 2016. 6(3): p. e010072.
13. Turiano, N.A., et al., *Personality Trait Level and Change as Predictors of Health Outcomes: Findings From a National Study of Americans (MIDUS)*. *The Journals of Gerontology: Series B*, 2011. 67B(1): p. 4-12.
14. Song, X., et al., *The distribution and correlates of self-rated health in elderly Chinese: the China Kadoorie Biobank study*. *BMC Geriatrics*, 2019. 19(1): p. 168.
15. Choi, N.G. and J. Kim, *The effect of time volunteering and charitable donations in later life on psychological wellbeing*. *Ageing and Society*, 2011. 31(4): p. 590-610.
16. Earle, J.R., et al., *Women, Marital Status, and Symptoms of Depression in a Midlife National Sample*. *Journal of Women & Aging*, 1997. 10(1): p. 41-57.

17. Finnegan, L., L. Marion, and C. Cox, *Profiles of self-rated health in midlife adults with chronic illnesses*. *Nurs Res*, 2005. 54(3): p. 167-77.
18. Latham, K. and C.W. Peek, *Self-Rated Health and Morbidity Onset Among Late Midlife U.S. Adults*. *The Journals of Gerontology: Series B*, 2012. 68(1): p. 107-116.
19. Marmot, M.G., et al., *Contribution of psychosocial factors to socioeconomic differences in health*. *Milbank Q*, 1998. 76(3): p. 403-48, 305.
20. Smith, K.J. and C. Victor, *Typologies of loneliness, living alone and social isolation, and their associations with physical and mental health*. *Ageing and Society*, 2019. 39(8): p. 1709-1730.
21. Chen, Y.-C., et al., *Activity Patterns and Health Outcomes in Later Life: The Role of Nature of Engagement*. *The Gerontologist*, 2018. 59(4): p. 698-708.
22. Cacioppo, J.T., L.C. Hawkley, and R.A. Thisted, *Perceived social isolation makes me sad: 5-year cross-lagged analyses of loneliness and depressive symptomatology in the Chicago Health, Aging, and Social Relations Study*. *Psychol Aging*, 2010. 25(2): p. 453-63.
23. Tajvar, M., E. Grundy, and A. Fletcher, *Social support and mental health status of older people: a population-based study in Iran-Tehran*. *Ageing & Mental Health*, 2018. 22(3): p. 344-353.
24. Xu, X., G.D. Mishra, and M. Jones, *Depressive symptoms and the development and progression of physical multimorbidity in a national cohort of Australian women*. *Health Psychol*, 2019. 38(9): p. 812-821.
25. Kohout, F.J., et al., *Two shorter forms of the CES-D depression symptoms index*. *Journal of Aging and Health*, 1993. 5(2): p. 179-193.
26. Yokoyama, E., Kaneita, Y., Saito, Y., Uchiyama, M., Matsuzaki, Y., Tamaki, T., et al. (2008). Cut-off point for the 11-item shorter form of the CES-D Depression Scale. *Nihon University Journal of Medicine*, 50, 123-132
27. Malhotra, R., et al., *Life-Course Socioeconomic Status and Obesity Among Older Singaporean Chinese Men and Women*. *The Journals of Gerontology: Series B*, 2013. 68(1): p. 117-127.
28. Connor, K.M. and J.R. Davidson, *Development of a new resilience scale: the Connor-Davidson Resilience Scale (CD-RISC)*. *Depression and Anxiety*, 2003. 18(2): p. 76-82.
29. Campbell-Sills, L. and M.B. Stein, *Psychometric analysis and refinement of the Connor-Davidson Resilience Scale (CD-RISC): Validation of a 10-item measure of resilience*. *Journal of Traumatic Stress*, 2007. 20(6): p. 1019-28.
30. Lubben, J., M. Gironda, and A. Lee, *Refinements to the Lubben Social Network Scale: The LSNS-R*. *The Behavioral Measurements Letter*, 2002. 7(Winter 2002): p. 2-11.
31. Boerma, T., et al., *A global assessment of the gender gap in self-reported health with survey data from 59 countries*. *BMC Public Health*, 2016. 16(1): p. 675.
32. Abrams, L.R. and N.K. Mehta, *Changes in depressive symptoms over age among older Americans: Differences by gender, race/ethnicity, education, and birth cohort*. *SSM - Population Health*, 2019. 7: p. 100399.

33. Zajacova, A., S. Huzurbazar, and M. Todd, *Gender and the structure of self-rated health across the adult life span*. *Social Science & Medicine*, 2017. 187: p. 58-66.
34. Brody, D.J., L.A. Pratt, and J.P. Hughes, *Prevalence of Depression Among Adults Aged 20 and Over: United States, 2013-2016*. *NCHS Data Brief*, 2018(303): p. 1-8.
35. Burns, R.A., et al., *Gender differences in the trajectories of late-life depressive symptomology and probable depression in the years prior to death*. *International Psychogeriatrics*, 2013. 25(11): p. 1765-1773.
36. Visaria, A. and A. Chan, *Psychological Resilience of Older Midlife Singaporeans: Findings from a National Study*, in *Research Brief 8*. 2020, Centre for Ageing Research and Education: Singapore.
37. Helmreich, I., et al., *Psychological interventions for resilience enhancement in adults*. *Cochrane Database of Systematic Reviews*, 2017.
38. Kahn, J.R. and L.I. Pearlin, *Financial strain over the life course and health among older adults*. *J Health Soc Behav*, 2006. 47(1): p. 17-31.

Publisher

The Centre for Ageing Research and Education (CARE) is an academic research centre based in Duke-NUS Medical School. It aims to harness the potentials of population ageing both in Singapore and the region through its interdisciplinary expertise and collaborations across medical, social, psychological, economics and environmental perspectives. Recognising the need for a consolidated and long-term approach towards longevity, CARE spearheads educational programmes to build competencies in ageing among researchers, policy and programme professionals. CARE also actively engages with government and industry partners to meet the needs of population ageing.

CARE's vision is an ageing population that is healthy, socially included and enjoys a high quality of life.

CARE's mission is to:

- Provide an environment that enables interdisciplinary research and education on ageing
- Implement and evaluate best practices to improve health and function of older adults
- Inform policy and practice agenda on ageing

ACKNOWLEDGEMENTS

Panel on Ageing and Transitions in Health Survey (PATHS) was funded by the Singapore Ministry of Health's National Medical Research Council under its Singapore Translational Research Investigator Award "Establishing a Practical and Theoretical Foundation for Comprehensive and Integrated Community, Policy and Academic Efforts to Improve Dementia Care in Singapore" (NMRC-STAR-0005-2009).

**Centre for Ageing Research and Education (CARE)
Duke-NUS Medical School**

8 College Road, Singapore 169857
www.duke-nus.edu.sg/care
care@duke-nus.edu.sg