Migration Letters

Volume: 19, No: S2 (2022), pp. 1059-1071

ISSN: 1741-8984 (Print) ISSN: 1741-8992 (Online)

www.migrationletters.com

Physical And Psychosocial Variables Linked To Depression In Older Individuals

Zakaria Yahya M Alsanosi[1], Faisal M Alzakri[2], Fahad Ali AL Otiby[3], Mohammed Abdullah Nasser Aldosari[4], Khashman Saleh Khashman Alotaibi[4], Ali Badr Alsulami[5], Saud Musaal Al-Enezi[5], Majed Ghannam Alghtani[6], Saeed Shaie Alqahtani[6], Mohammed S Alarifi[7], Muath Fahad Altoum[8], Mohammed Atie Alzahrani[9], Saeed Ahmad Alzahrani[10], Ibtisam Ibrahim Rajhi[11], Mousa Yahya Ibrahim Hamdi[12], Ali Mubarak Ali Al Qahtani[13]

Abstract

Background: *Old age is a big challenge to human life with respect to health needs as well as psychosocial needs. There is a rapidly ageing population globally, leading to a rise in subsidized public housing in many countries for older adults. According to the World Health Organization, depression is the most prevalent mental disorder in older adults. There is a gap in literature on the factors associated [1]with depression in those older adults, characterized by small living spaces and isolated community settings.* ***The study aims:*** *To examine the associations between socio-demographic variables, social support, self-perceived health and mental status, life satisfaction, exercise, physical functioning, chronic conditions, and the use of eldercare services, with depressive symptoms.* ***Methods:*** *A cross-sectional study was utilized of older adults aged ⩾55 years. Multivariable logistic regression was applied.* ***Results:*** *Widowhood was associated with depressive symptoms, compared to being married or having a domestic partner (adjusted odds ratio (AOR) = 1.70, 95% confidence interval (CI) = 1.01 to 2.86). Odds of depressive symptoms were associated with difficulty bathing and showering (AOR = 3.74, 95% CI = 1.06 to 13.21). Depressive symptoms were associated with cataract (AOR = 1.67, 95% CI = 1.01 to 2.77) and urinary tract disorder (AOR = 4.70, 95% CI = 1.21 to 18.26). There were dose-response relationships between higher odds of depressive symptoms and poorer social support, self-perceived mental health, life satisfaction, and exercise behavior (p for trend < 0.001).* ***Conclusion:*** *Factors including widowhood, physical functioning difficulty, chronic conditions, low social support, and low self-perceived mental health, poor life satisfaction, and lack of exercise behavior, were associated with depressive symptoms in older adults. More attention is needed to care for the psychosocial and physical needs of older adults.*

Keywords: *Depressive symptoms, older adult, ageing, Physical and psychosocial variables.*

Introduction

Over the past few decades aging society is affecting Bangladesh, as is seen in the rest of the world. Psychiatric disorders including depression become more common among aged population irrespective of gender [(1-5)]. There is a rapidly ageing population from lower fertility rates and higher life expectancies globally [(6, 7)]. By 2030, one in five persons

[1]Consultant psychiatry, Eradah and mental health hospital, Saudi Arabia.
[2]Psychiatrist consultant, ERADAH Medical Complex, Saudi Arabia.
[3]Senior psychologist, Eradah and Mental Health Hospital, Saudi Arabia.
[4]SOCIAL WORKER, KING SALMAN HOSPITAL RIYADH, Saudi Arabia.
[5]Social worker, Erada Mental Health Complex, Saudi Arabia.
[6]Social specialist, Eradah and Mental Health Hospital, Saudi Arabia.
[7]Clinical psychologist, AlQuwayiyah General Hospital, Saudi Arabia.
[8]Social specialist, Huraymila general hospital, Saudi Arabia.
[9]Psychologist, Psychological health in Jeddah, Saudi Arabia.
[10]General practice,Ministry of health , makkah almokaramah . Primary health care hadda center, Saudi Arabia.
[11]Senior Social Specialist,Irada Mental Health Complex, Saudi Arabia.
[12]General Practic, Health Affairs in Jazan Region. Southern sector. altwal primary health care center, Saudi Arabia.
[13]Social worker, Al Quwayiyah General Hospital, Saudi Arabia.

worldwide would be aged 60+ years.1 By 2050, 44% of the world's population will live in relatively aged countries, with at least 20% of the population aged 60+ years, and one in four people living in a country where more than 30% are aged above 60 years [6, 7]. According to the World Health Organization (WHO), over 20% of older adults aged 60+ years suffer from a mental disorder, with depression being the most prevalent, affecting 7% of the world's older population [8].

Depression accounts for 5.7% of Years Lived with Disability (YLD) among these older adults [8]. Depressive symptoms are frequently unnoticed and untreated, and older adults with depressive symptoms have poorer functioning than those with chronic conditions like hypertension or diabetes [8, 9]. The WHO Comprehensive Mental Health Action Plan 2013–2020 high-lights the importance of addressing mental health in older adults, especially depressive symptoms [8]. Importantly, this ageing phenomenon has led to a rise in subsidized public housing in many countries, particularly studio apartments (SAs), built specifically for older adults, many of whom live alone [10-12].

Literature shows that depressive symptoms associated with older adults living alone due to widowhood, having never married, being childless, or lacking communication with relatives and friends [13-15]. Older adults living in isolation is reaching epidemic proportions, to the extent of numerous older adults not being assisted in critical conditions and found dead alone a significant time later [16]. Furthermore, older adults living alone significantly associated with depressive symptoms like loss of appetite, suicidal thoughts, and worrying [17]. A study in Korea found that older adults living alone with superficial social support and relationships associated with suicidal ideation [18]. Currently, most literature focus on factors for depressive symptoms associated with older adults in nursing homes or exclusively living alone [19-21].

A systematic review on living arrangements and elderly depression found that depression associated with older adults residing alone, in old folks' homes, or being institutionalized, and there was a lack of studies examining public housing for the aged and depression [22]. There is a gap in understanding the unique living arrangements and immediate environments of public housing for older adults, particularly SAs, characterized by small living spaces and relatively isolated community settings [12, 23-26]. This study aims to examine psychosocial and physical factors associated with depressive symptoms of older adults residing in public housing.

Methods

A cross-sectional social survey conducted in KSA from January to July 2022, with a sampling frame consisting 100% of older adults residing in KSA (n = 1861). Older adults were permanent residents, at least 55 years old, who must reside with a spouse unless unmarried, divorced, or widowed. To minimize non-response, interviewers visited of non-respondents on different days of the week, and at different times of the day. Continued non-response from additional visits was followed-up by leaving a note on the survey form and slipped into the SA for residents to contact interviewers.

The structured interviewer-administered questionnaires were conducted on a one-to-one basis with an average duration of 1.5 hours per participant. The questionnaire included data on: demographics; activity profile; social support; health status; life satisfaction, physical functioning and use of devices; attitude towards assistive devices and home modification; self-care; neighborhood environment; quality of services; living arrangement; and attitude towards living alone. Interviews were carried out with Arabic language.

The outcome measure was being symptomatically depressed. Depressive symptoms were measured using the modified version eight-item CES-D (Center for Epidemiologic Studies-Depression) [27-29]. Each item was scored on a four-point Likert-type scale consisting of: rarely/none of the time = one point; some or little of the time = two

points; occasionally/a moderate amount of time = three points; most/all of the time = four points. The eight items were on whether participants experienced these eight depressive symptoms during the past one week: depressed; everything I did was an effort; sleep was restless; could not get going; felt lonely; enjoyed life; felt sad; was happy. Reverse coding was done for two of the eight items: enjoyed life; was happy.

The scores from the eight items were added to obtain a single summated score, which ranged from eight to 32 points. The higher the summated score, the more symptomatically depressed the participant. We utilized a cut-off point of six points and above for classification as symptomatically depressed. This cut-off was derived using proportional strategy from the 20-items CES-D scale [30]. The original 20-item CES-D scale was a widely used, valid, and reliable index for measuring depressive symptom severity among older adults and has been validated [31]. The eight-item CES-D was validated on European and American older adults under the European Social Survey and the Health and Retirement Study, respectively [32, 33]. Cronbach's Alpha was high at 0.85 for the eight-item CES-D in this study.

The independent variables consisted of psychosocial and physical factors. Psychosocial factors consisted of social support, self-perceived health status, life satisfaction, sensory functioning, exercise behavior, use of eldercare services, and neighborhood environment. Physical factors referred to physical functioning and the presence of chronic medical conditions. Physical and sensory functioning was assessed collectively due to the design of the questionnaire.

In this study used the Multidimensional Scale of Perceived Social Support (MSPSS), which measured social support via relationships with family, friends, and significant others. MSPSS is a widely used scale in different populations, which included older adults, and was shown to be psychometrically sound, with good reliability, factorial validity, and adequate construct validity [34, 35]. There were 12 items and each item was rated on a five-point Likert-type scale ranging from strongly disagree (one point), to strongly agree (five points). The summated range was 12 to 60. The higher the MSPSS score, the better the social support. Cronbach's Alpha was 0.92 in this study.

Social support by marital status was also examined. Categories of marital status comprised: married/domestic partner; separated/divorced; widowed; never married. Participants responded to three self-reported questions on their self-perceived overall, mental, and physical health: 'In general, would you say that your (overall/mental/physical) health is…', and responses were categorized into five options: very poor = one point; poor = two points; fair = three points; good = four points; excellent = five points. The three questions were analyzed separately.

Life satisfaction was measured using self-reported responses to: 'How satisfied are you with your (health; financial/economic situation; relationship with significant other; condition of house; community or neighborhood; life and leisure; overall)?' Responses were categorized using a Likert-type scale of 0 to 100 for each question, 0 being 'absolutely dissatisfied' and 100 being 'absolutely satisfied'. Unlike other Likert scales in this study where all question could be answered, a couple of questions in the Life Satisfaction scale may not be applicable for certain participants. The analysis was based on the total number of questions that were applicable to each of the participants. For example, a participant who was single with no significant other would be unable to answer how satisfied he/she was with the current relationship with his/her significant other, and this was accounted for when calculating the percentage score. The higher the summated score was the higher the satisfaction [36].

Physical functioning was assessed based on activities of daily living, including bathing and showering, getting in and out of bed, and short-distance walking. Sensory function included vision and hearing. Participants self-reported if they had 'difficulty with' each item and responses were categorized into: no; yes; not applicable. Each item was

analyzed as an individual dependent variable. Exercise behavior: Participants responded to the two statements: 'Do regular exercise that are good for me'; 'Find safe and comfortable ways to prevent from getting hurt when doing exercises'. The responses were categorized as follows: completely = four points; mostly = three points; somewhat = two points; a little = one point; not at all = 0 points. The summated score of two statements ranged from 0 to 8. The higher the score was the greater the exercise behavior.

Eldercare services and assistance: Participants were asked about their participation or uptake of eldercare services and assistance, such as counseling and community case management services (CCMS), and the responses were categorized into 'yes' and 'no'. Neighborhood environment: The Neighborhood Environment Scale (NES) is a 10-item assessment related to perceived personal safety, physical appearance, convenience of neighborhood, and appraisals of dangers posed by others in the neighborhood [(37)].

Each item was rated on a five-point Likert scale ranging from 'strongly disagree' (one point) to 'strongly agree' (five points). The question, 'I and my visitors have been lost because of no or unclear signs of directions', were reverse-coded. The summated range was 10 to 50. The higher the summated NES score, the better the perception of the neighborhood environment. Although the NES was developed for use in the context of children and families, the majority of the items were relevant to older adults [(37)]. The modified NES scale's Cronbach's alpha was 0.80 in this study.

Chronic medical conditions: Participants self-reported on whether they were diagnosed by medical doctors or health professionals with chronic conditions such as asthma, cataract, and circulation trouble in arms or legs, urinary tract disorder, depression, general weakness, and high blood cholesterol. Responses were categorized into 'yes', 'no', 'don't know', and 'refused to answer'. Socio-demographics: Additionally, we examined the potential confounders or covariates, including age, gender, ethnicity, living arrangement, SA type, and highest education level.

Statistical analysis: Scores for depressive symptoms were not studied as a continuous variable as scores were skewed even after transformation. We studied depressive symptoms as a binary outcome, as having depressive symptoms (CES-D $\geqslant$ 6) or not (CES-D < 6). We calculated the proportions for categorical variables by the status of being symptomatically depressed (i.e. CES-D score $\geqslant$ 6). Pearson's Chi-Square test or Fisher's exact test was used to compare proportions between groups, and we presented categorical variables as frequencies and percentages. For continuous variables that were normally distributed, we summarized them with means and standard deviations, and Student's t-test was used to compare difference between groups. For those not normally distributed, we calculated medians and inter-quartile ranges, and the Wilcoxon rank- sum test was used to assess difference between groups.

Bivariate analysis was conducted to examine the association between the outcome of interest (i.e. CES-D yes/no) and individual variables, to identify potential confounders or covariates for inclusion in the multivariable model. Unconditional multivariable logistic regression was used to compute adjusted odds ratios (AORs) and 95% confidence intervals (CIs) of the dependent variables associated with depressive symptoms. The forward stepwise method was used to determine the confounders or covariates for inclusion in our multivariable logistic regression model. We reported unadjusted and adjusted ORs, 95% CIs and p-values, and p for trend. ORs and 95% CIs were reported to two decimal places, while p-values were reported to three decimal places. Statistical analyses were conducted with SPSS version 28, assuming two-sided tests with 5% level of significance.

Results

Participant characteristics by depressive symptom status

The total number of respondents was 925. Our final sample size was 899 participants, as 899 out of our total 925 respondents (97.2%) had valid results for CES-D scores to assess

depressive symptoms. **Table (1)** presents the demographic characteristics of participants by depressive status (433 (48.2%) had depressive symptoms, 466 (51.8%) had no depressive symptoms), as well as the variables significantly associated with the outcome of having depressive symptoms.

The proportion of participants with depressive symptoms who were single (59.12%) was higher than that of participants with no depressive symptoms (45.28%). The proportion of participants with depressive symptoms who lived alone (46.88%) was greater than that of participants with no depressive symptoms (36.91%). The age profiles between the two groups were significantly different, with 15.70% of participants with depressive symptoms age 80+ years, and only 8.58% of participants with no depressive symptoms age 80+ years. Education level and neighborhood environment were also significantly different between those with and without depressive symptoms.

Factors associated with depressive symptoms

Table (2) displays unadjusted and adjusted ORs, with corresponding 95% CIs and p-values, for our independent factors for depressive symptoms. Social support: Higher odds of depressive symptoms were significantly associated with being widowed, as compared to being married or having a domestic partner, in both unadjusted and adjusted models (AOR = 1.70, 95% CI = 1.01 to 2.86). Participants who were separated/divorced or never married did not show a significant association with depressive symptoms in both unadjusted and adjusted models. Participants in higher quartiles of social support (Q2 to Q4) compared to the lowest quartile (Q1) showed significantly lower odds of depressive symptoms in both unadjusted and adjusted models (for Q4, AOR = 0.21, 95% CI = 0.10 to 0.42). There was a significant inverse dose–response relationship between increasing support and lower odds of depressive symptoms (p for trend < 0.001).

Self-perceived health status: There was no significant association between self-perceived overall health and depressive symptoms. For self-perceived mental health, odds of depressive symptoms for participants who responded with ‘good/ excellent’ and ‘fair’, compared to ‘very poor/poor’, were not statistically significant in both unadjusted and adjusted models. However, there was a significant dose–response relationship between greater odds of depressive symptoms and poor self- perceived health status (p for trend = 0.001). Life satisfaction: Participants in higher quartiles of life satisfaction (Q2 to Q4) compared to the lowest quartile (Q1) showed significantly lower odds of depressive symptoms in the adjusted model (for Q4, AOR = 0.07, 95% CI = 0.03 to 0.14). There was a significant dose–response relationship between greater odds of depressive symptoms and poorer life satisfaction (p for trend < 0.001).

Physical and sensory functioning: For both unadjusted and adjusted models, difficulty with bathing and showering, short-distance walking, and vision, compared to the reference of ‘no difficulty’, were significantly associated with higher odds of depressive symptoms. The odds of suffering depressive symptoms were highest for those with difficulty bathing and showering (AOR = 3.74, 95% CI = 1.06 to 13.21). Difficulty getting in and out of bed was significantly associated with lower odds of depressive symptoms (AOR = 0.24, 95% CI = 0.07 to 0.77). Exercise behavior: Only participants in the highest quartile (Q4) of exercise behavior, compared to the lowest quartile (Q1), showed significantly lower odds of depressive symptoms in both unadjusted and adjusted models (for Q4, AOR = 0.37, 95% CI = 0.21 to 0.64). There was a significant inverse dose–response relationship (p for trend < 0.001).

Eldercare services and assistance: Although not statistically significant, participants who engaged in counseling and CCMS, compared to those who did not, had much higher odds of depressive symptoms (AOR = 5.45, 95% CI = 0.85 to 34.86). Medical conditions: Depressive symptoms were significantly associated with the self-reported diagnosis of cataract (AOR = 1.67, 95% CI = 1.01 to 2.77) and urinary tract disorder (AOR = 4.70, 95% CI = 1.21 to 18.26).

Table (1): Participant characteristics by depressive status

Depressive symptoms			
Variable	**Yes (CES-D ⩾ 6) *n* = 433**	**No (CES-D < 6) *n* = 466**	***p*-value**
Age group, *n* (%)			
55–59 years	25 (5.78)	41 (8.80)	**0.001**
60–69 years	145 (33.49)	191 (40.99)	
70–79 years	195 (45.03)	194 (41.63)	
80 years and above	68 (15.70)	40 (8.58)	
Gender, *n* (%)			
Male	168 (38.80)	187 (40.13)	**0.733**
Female	265 (61.20)	279 (59.87)	
Marital status, *n* (%)			
Married/domestic partner	177 (40.88)	255 (54.72)	<**0.001**
Separated/divorced	32 (7.39)	34 (7.30)	
Widowed	142 (32.79)	96 (20.60)	
Never married	82 (18.94)	81 (17.38)	
Living arrangement, *n* (%)			
Living alone	203 (46.88)	172 (36.91)	**0.003**
Not living alone	230 (53.12)	294 (63.09)	
Highest education level, *n* (%)			
No education	84 (19.40)	77 (16.52)	<**0.001**
Low level (primary, secondary, ITE/vocational)	317 (73.21)	315 (67.60)	
High level (polytechnic, junior college, university, postgrad, others)	31 (7.16)	73 (15.67)	
No data	1 (0.23)	1 (0.21)	
Neighborhood environment(NES score), *n* (%)			
Q1 (lowest score quartile; worst environment)	146 (33.72)	79 (16.95)	<**0.001**
Q2	103 (23.79)	115 (24.68)	
Q3	115 (26.56)	129 (27.68)	
Q4 (highest score quartile)	50 (11.55)	120 (25.75)	
No data	19 (4.39)	23 (4.94)	

CES-D: Center for Epidemiologic Studies-Depression; NES: Neighborhood Environmental Scale; ITE: Institute of Technical Education.

Table (2): Independent factors associated with depressive symptoms.

	Depressive symptoms Yes: CES-D ⩾ 6; No: CES-D < 6				
	Unadjusted OR (95% CI)	***p*-value**	**AOR (95% CI)^**	***p*-value^**	**Declaration of conflicting interests *p* for trend^**
Marital status (reference: married/domestic partner)					NA
Separated/divorced	0.74 (0.36, 1.54)	0.42	0.73 (0.34, 1.57)	0.423	

	Depressive symptoms **Yes: CES-D ⩾ 6; No: CES-D < 6**				
	Unadjusted OR (95% CI)	***p*-value**	**AOR (95% CI)^**	***p*-value^**	**Declaration of conflicting interests *p* for trend^**
Widowed	2.00 (1.25, 3.13)	**0.003**	1.70 (1.01, 2.86)	**0.047**	
Never married	1.28 (0.76, 2.17)	0.35	1.32 (0.74, 2.34)	0.345	
Social support (reference: Q1 (least social support))					<**0.001**
Q2	0.57 (0.34, 0.96)	**0.03**	0.58 (0.34, 0.99)	**0.047**	
Q3	0.42 (0.25, 0.72)	**0.002**	0.38 (0.21, 0.66)	**0.001**	
Q4	0.23 (0.11, 0.45)	<**0.001**	0.21 (0.10, 0.42)	<**0.001**	
Self-perceived overall health (reference: very poor/poor)					0.053
Fair	0.76 (0.31, 1.81)	0.53	0.89 (0.36, 2.19)	0.800	
Excellent	1.30 (0.51, 3.33)	0.59	1.58 (0.60, 4.18)	0.358	
Self-perceived mental health (reference: very poor/poor)					**0.001**
Fair	0.48 (1.20, 13.61)	0.51	0.49 (0.05, 4.37)	0.519	
Excellent	0.22 (0.03, 1.92)	0.17	0.20 (0.02, 1.78)	0.148	
Life satisfaction (reference: Q1 (lowest life satisfaction))					<**0.001**
Q2	0.59 (0.34, 1.01)	0.056	0.57 (0.33, 0.99)	**0.046**	
Q3	0.15 (0.09, 0.27)	<**0.001**	0.15 (0.08, 0.27)	<**0.001**	

	Depressive symptoms **Yes: CES-D ⩾ 6; No: CES-D < 6**				
	Unadjusted OR (95% CI)	***p*-value**	**AOR (95% CI)^**	***p*-value^**	**Declaration of conflicting interests *p* for trend^**
Q4	0.07 (0.04, 0.15)	**<0.001**	0.07 (0.03, 0.14)	**<0.001**	
Physical functioning (reference: no difficulty)					NA
BADL difficulty					
Bathing and showering	4.05 (1.20, 13.61)	**0.02**	3.74 (1.06, 13.21)	**0.040**	
Getting in and out of bed	0.20 (0.06, 0.60)	**0.004**	0.24 (0.07, 0.77)	**0.017**	
Short-distance walking	2.64 (1.25, 5.59)	**0.01**	2.54 (1.17, 5.54)	**0.019**	
Sensory difficulty					
Vision	1.67 (1.09, 2.55)	**0.02**	1.65 (1.06, 2.57)	**0.026**	
Hearing	1.89 (0.89, 4.02)	0.10	1.74 (0.79, 3.86)	0.171	
Exercise behavior (reference: Q1 (lowest exercise behavior)					<0.001
Q2	1.60 (0.80, 3.19)	0.186	1.51 (0.73, 3.11)	0.271	
Q3	0.75 (0.48, 1.17)	0.201	0.70 (0.44, 1.11)	0.126	
Q4	0.40 (0.26, 0.68)	**0.001**	0.37 (0.21, 0.64)	**<0.001**	
Medical condition (reference: no medical condition)					NA
Asthma	2.39 (1.01, 5.65)	**0.047**	2.14 (0.87, 5.22)	0.096	
Cataract	1.68 (1.04, 2.70)	**0.035**	1.67 (1.01, 2.77)	**0.047**	
Circulation trouble in arms or legs	0.60 (0.28, 1.25)	0.169	0.57 (0.26, 1.25)	0.161	
Urinary tract disorder	4.24	**0.0**	4.70 (1.21,	**0.0**	

	Depressive symptoms Yes: CES-D ⩾ 6; No: CES-D < 6				
	Unadjusted OR (95% CI)	***p*-value**	**AOR (95% CI)^**	***p*-value^**	**Declaration of conflicting interests *p* for trend^**
	(1.16, 15.54)	**29**	18.26)	**25**	
General weakness	2.20 (1.01, 4.76)	**0.046**	2.12 (0.96, 4.67)	0.064	
High blood cholesterol	1.48 (1.02, 2.16)	**0.039**	1.45 (0.98, 2.13)	0.065	
Eldercare services and assistance (reference: no engagement with service)					NA
Counseling and CCMS	6.125 (0.97, 38.51)	0.053	5.45 (0.85, 34.86)	0.073	

^Multivariable model adjusted for age, gender, ethnicity, studio apartment type, neighborhood environment. AOR: adjusted odds ratio; CI: confidence interval; BADL: basic activities of daily living; CCMS: community case management services.

Discussion

Depressive symptoms in older adults were associated with widowhood, lower social support, poorer self-perceived mental health, poorer self-perceived life satisfaction, less exercise behavior, difficulty with physical functioning, and the presence of certain chronic conditions. The prevalence of depressive symptoms in older adults was 48%. This was higher than two studies that used CES-D to assess depressive symptoms in older adults staying in public housing in Delaware (31%) and Indianapolis (23%) [38, 39]. This may be due to these two studies being on older adults in public housing in general, and not only on those who live exclusively in SAs characterized by smaller living spaces and staying alone.

Another study on older adults in Care Homes in Pakistan found a higher prevalence of depressive symptoms using CES-D (69%) [40]. Older adults in care homes may generally be less independent and be in worse physical health, and older adults may have more social support than Pakistan. A study on elderly depression in nursing homes had a lower prevalence of 21% using a Structural Clinical Interview that diagnosed clinical depression, instead of CES-D that assessed depressive symptoms [21]. The association between widowhood and depression was consistent with other studies [41-43]. Depressive symptoms were attributed to bereavement, whereby older adults were more likely than young adults to develop depression following bereavement [44-46].

These findings revealed a dose–response relationship between lower social support and depressive symptoms. This could be due to social networks of older adults shrinking due to deaths of relatives and friends, and relocation, which resulted in over-reliance on resources only available and accessible in their immediate community as sources for integration and social support [47]. Residential communities were the most salient environments for older adults, where social support and residential satisfaction are derived from relationships with neighbors, access to close-proximity services, and the immediate home environment [48]. Residence could facilitate well-being or conversely act as an obstacle that undermined social integration [46, 49].

Exercise behavior showed an inverse dose–response relationship with depressive symptoms. This was supported by other studies that exercise prevented or reduced depression in older adults by improving physical function via aerobic fitness, and providing social interaction when they exercised with others [50-52]. A bi-directional relationship was possible, whereby depressive symptoms reduced the amount of physical activities older adults engaged in, including exercise [53]. Difficulty with bathing, showering, and short-distance walking, as well as poor vision, impair the ability to self-care and socialize, predisposing older adults to depression [54-56].

Depressive symptoms may result from loss of privacy and independence from requiring assistance with bathing or showering. Difficulty with short-distance walking and vision may reduce adults' ability to leave their homes to socialize or explore beyond their immediate residential environments, exacerbating isolation and loneliness, which are risk factors for depression [57, 58]. We found that chronic conditions that were associated with depressive symptoms were cataract and urinary tract disorder. The former impaired vision, while the latter had substantial literature supporting its association with poor mental health, psychological distress, and low quality of life from embarrassment and anxiety of urinary leakage in public situations, and self-restriction on usual daily activities [59, 60].

Reverse causation could also explain these associations. Depression may have reduced their motivation for proper self-care and to socialize, and depression may have affected their ability to follow their treatment regime for chronic illnesses leading to worse health outcomes. Better self-perceived mental health and life satisfaction had dose–response relationships with less depressive symptoms. Literature corroborated that perceiving to have social support, concern from others, a sense of belonging, and access to neighbors were associated with less psychological distress [61]. General physical and psychological health status have shown to have a strong impact on life satisfaction [62].

Conclusion

Factors including widowhood, physical functioning difficulty, chronic conditions, low social support, low self-perceived mental health, poor life satisfaction, and lack of exercise behavior, were associated with depressive symptoms in older adults. More attention is needed to care for the psychosocial and physical needs of older adults.

References

1. 1Barikdar A., Ahmed T., Lasker S. P. (2016). The situation of the elderly in Bangladesh. Bangladesh Journal of Bioethics, 7, 27–36. 10.3329/bioethics.v7i1.29303
2. 2Jindal H. A., Duggal M., Jamir L., Sharma D., Kankaria A., Rohilla L., Avasthi A., Nehra R., Grover S. (2019). Mental health and environmental factors associated with falls in the elderly in North India: A naturalistic community study. Asian Journal of Psychiatry, 39, 17–21. 10.1016/j.ajp.2018.11.013
3. 3Khanam M. A., Streatfield P. K., Kabir Z. N., Qiu C., Cornelius C., Wahlin. (2011). Prevalence and patterns of multi-morbidity among elderly people in rural Bangladesh: A cross-sectional study. Journal of Health Population and Nutrition, 29, 406–414.
4. 4Shahar S., Hassan J., Sundar V. V., Kong A. Y. W., Ping Chin S., Ahmad S. A., Kuan Lee L. (2011). Determinants of depression and insomnia among institutionalized elderly people in Malaysia. Asian Journal of Psychiatry, 4, 188–195. 10.1016/j.ajp.2011.06.001
5. 5WHO. (2017). Depression. Available from: https://www.who.int/news-room/fact-sheets/detail/depression
6. United Nations, Department of Economic and Social Affairs, Population Division. World population ageing 2015 (ST/ESA/ SER.A/390). New York: United Nations, 2015.
7. World Health Organization. Ageing and life-course, http:// www.who.int/ageing/en/
8. World Health Organization. Mental health of older adults, http://www.who.int/news-room/fact-sheets/detail/mental-
9. Ormel J, Kempen GI, Deeg DJ, et al. Functioning, well-being, and health perception in late middle-aged and older people: comparing the effects of depressive symptoms and chronic medical conditions. J Am Geriatr Soc 1998; 46: 39–48.
10. Pynoos J. The future of housing for the elderly: four strategies that can make a difference.

Public Policy Aging Rep 2018; 28: 35–38.
11. Chi I and Chow N. Housing and family care for the elderly in Hong Kong. Ageing Int 1997; 23: 65–77.
12. Addae-Dapaah K. Age segregation and the quality of life of the elderly people in studio apartments. J Housing Elderly 2008; 22: 127–161.
13. Lee M and Kim K. Prevalence and risk factors for self-neglect among older adults living alone in South Korea. Int J Aging Human Dev 2014; 78: 115–131.
14. Wan Mohd Azam WM, Din NC, Ahmad M, et al. Loneliness and depression among the elderly in an agricultural settlement: mediating effects of social support. Asia Pac Psychiatry 2013; 5(Suppl 1): 134–139.
15. Kramarow EA. The elderly who live alone in the United States: historical perspectives on household change. Demography 1995; 32: 335–352.
16. Nomura M, McLean S, Miyamori D, et al. Isolation and unnatural death of elderly people in the aging Japanese society. Sci Justice 2016; 56: 80–83.
17. Ryuta F, Yasuhisa A, Youichi N, et al. Living alone is associated with depression among the elderly in a rural community in Japan. Psychogeriatrics 2012; 12: 179–185.
18. Kwon HJ, Jeong JU and Choi M. Social relationships and suicidal ideation among the elderly who live alone in Republic of Korea: a logistic model. Inquiry 2018; 55: 46958018774177.
19. Chou K-L, Chi I and Boey KW. Determinants of depressive symptoms among elderly Chinese living alone. Clin Gerontol 2000; 20: 15–27.
20. Tong HM, Lai DW, Zeng Q, et al. Effects of social exclusion on depressive symptoms: elderly Chinese living alone in Shanghai, China. J Cross Cult Gerontol 2011; 26: 349–364.
21. Tiong WW, Yap P, Koh GCH, et al. Prevalence and risk factors of depression in the elderly nursing home residents in Singapore. Aging Ment Health 2013; 17: 724–731.
22. Hu X-Y, Cheng Q, Peng X-D, et al. Living arrangements and risk for late life depression: a meta-analysis of published litera- ture. Int J Psychiatry Med 2012; 43: 19–34.
23. Wee LE, Yong YZ, Chng MWX, et al. Individual and area-level socioeconomic status and their association with depression amongst community-dwelling elderly in Singapore. Aging Ment Health 2014; 18: 628–641.
24. Teo P. Space to grow old in: the availability of public spaces for elderly persons in Singapore. Urban Stud 1997; 34: 419–439.
25. Housing Development Board, Singapore. Types of flats, http://www.hdb.gov.sg/cs/infoweb/residential/buying-a-flat/new/ types-of-flats (2019, accessed 2 March 2019).
26. Housing Development Board, Singapore. HDB flat, http://www.hdb.gov.sg/cs/infoweb/residential/buying-a-flat/new/hdb-
27. Carleton RN, Thibodeau MA, Teale MJ, et al. The center for epidemiologic studies depression scale: a review with a theoretical and empirical examination of item content and factor structure. PLOS ONE 2013; 8: e58067.
28. Kohout FJ, Berkman LF, Evans DA, et al. Two shorter forms of the CES-D (Center for Epidemiological Studies Depression) depression symptoms index. J Aging Health 1993; 5: 179–193.
29. Boey KW. Cross-validation of a short form of the CES-D in Chinese elderly. Int J Geriatr Psychiatry 1999; 14: 608–617.
30. American Psychological Association. Center for Epidemiological Studies-Depression, http://www.apa.org/pi/about/publications/caregivers/practicesettings/assessment/tools/depression-scale. aspx
31. Stahl D, Sum CF, Lum SS, et al. Screening for depressive symptoms. Validation of the Center for Epidemiologic Studies Depression Scale (CES-D) in a multiethnic group of patients with diabetes in Singapore. Diabetes Care 2008; 31: 1118–1119.
32. Karim J, Weisz R, Bibi Z, et al. Validation of the eight-item Center for Epidemiologic Studies Depression Scale (CES-D) among older adults. Curr Psychol 2015; 34: 681–692.
33. Steffick DE. Documentation of affective functioning measures in the health retirement study. Report, Survey Research Center, University of Michigan, USA, 2000.
34. Lim AY, Lee AR, Hatim A, et al. Clinical and socio-demographic correlates of suicidality in patients with major depressive disorder from six Asian countries. BMC Psychiatry 2014; 14: 37.
35. Park JI, Han MI, Kim MS, et al. Predictors of suicidal ideation in older individuals receiving home-care services. Int J Geriatr Psychiatry 2014; 29: 367–376.
36. Hong S-I and Han C-K. Asset impacts on life satisfaction in an asset-rich country: focusing on older adults in Singapore. Social Ind Res 2014; 118: 125–140.

37. Lysack CL. Household and neighborhood safety, mobility. In: Lichtenberg PA (ed) Handbook of assessment in clinical gerontology. 2nd ed. San Diego, CA: Academic Press, 2010, pp.619–646.
38. Shin JY, Sims RC, Bradley DL, et al. Prevalence of depressive symptoms and associated factors in older adult public housing residents. Res Gerontol Nurs 2014; 7: 249–255.
39. Bojrab SL, Sipes GP, Weinberger M, et al. A model for predicting depression in elderly tenants of public housing. Hosp Community Psychiatry 1988; 39: 304–309.
40. Qadir F, Haqqani S, Khalid A, et al. A pilot study of depression among older people in Rawalpindi, Pakistan. BMC Res Notes 2014; 7: 409.
41. Mendes de Leon CF, Kasl SV and Jacobs S. A prospective study of widowhood and changes in symptoms of depression in a community sample of the elderly. Psychol Med 1994; 24: 613–624.
42. Williams L, Zhang R and Packard KC. Factors affecting the physical and mental health of older adults in China: the importance of marital status, child proximity, and gender. SSM Popul Health 2017; 3: 20–36.
43. Heuberger R and Wong H. The association between depression and widowhood and nutritional status in older adults. Geriatr Nurs 2014; 35: 428–433.
44. Alexopoulos GS. Depression in the elderly. Lancet 2005; 365: 1961–1970.
45. Jozwiak N, Preville M and Vasiliadis HM. Bereavement-related depression in the older adult population: a distinct disorder? J Affect Disord 2013; 151: 1083–1089.
46. Kennedy GJ. The geriatric syndrome of late-life depression. Psychiatr Serv 1995; 46: 43–48.
47. Rioux L. The well-being of aging people living in their own homes. J Environ Psychol 2005; 25: 231–243.
48. Rioux L and Werner C. Residential satisfaction among aging people living in place. J Environ Psychol 2011; 31: 158–169.
49. Kendig H, Dykstra PA, van Gaalen RI, et al. Health of aging parents and childless individuals. J Fam Issues 2007; 28: 1457– 1486.
50. Belvederi Murri M, Amore M, Menchetti M, et al. Physical exercise for late-life major depression. Br J Psychiatry 2015; 207: 235–242.
51. Mammen G and Faulkner G. Physical activity and the prevention of depression: a systematic review of prospective studies. Am J Prev Med 2013; 45: 649–657.
52. Teixeira AR, Wender MH, Goncalves AK, et al. Dizziness, physical exercise, falls, and depression in adults and the elderly. Int Arch Otorhinolaryngol 2016; 20: 124–131.
53. Moraes H, Deslandes A, Ferreira C, et al. Physical exercise in the treatment of depression in elderly: a systematic review. Rev Psiquiatr Rio Gd Sul 2007; 29: 70–79.
54. Wen MC, Hebscher M and Lee SH. Instrumental activities of daily living in remitted late-life depression: a preliminary study. Int J Geriatr Psychiatry 2014; 29: 109–110.
55. Kivela SL. Depression and physical and social functioning in old age. Acta Psychiatr Scand Suppl 1994; 377: 73–76.
56. McKnight PE and Kashdan TB. The importance of functional impairment to mental health outcomes: a case for reassessing our goals in depression treatment research. Clin Psychol Rev 2009; 29: 243–259.
57. Gan P, Xie Y, Duan W, et al. Rumination and loneliness independently predict six-month later depression symptoms among Chinese elderly in nursing homes. PLOS ONE 2015; 10: e0137176.
58. Tsai HH and Tsai YF. Changes in depressive symptoms, social support, and loneliness over 1 year after a minimum 3-month videoconference program for older nursing home residents. J Med Internet Res 2011; 13: e93.
59. Chin WY, Choi EPH, Wan EYF, et al. The mediating factors in the relationship between lower urinary tract symptoms and health-related quality of life. BMC Res Notes 2017; 10: 611.
60. Wong SY, Hong A, Leung J, et al. Lower urinary tract symp- toms and depressive symptoms in elderly men. J Affect Disord 2006; 96: 83–88.
61. Forsman AK, Nyqvist F and Wahlbeck K. Cognitive components of social capital and mental health status among older adults: a population-based cross-sectional study. Scand J Public Health 2011; 39: 757–765.
62. Helvik AS, Engedal K, Krokstad S, et al. A comparison of life satisfaction in elderly medical inpatients and the elderly in a population-based study: Nord-Trondelag Health Study 3. Scand J Public Health 2011; 39: 337–344.