

Effect of spousal loss on depression in older adults

Yong-Hsin Chen

Chung Shan Medical University

Meng-Chih Lee

Chung Shan Medical University

Mei-Huey Shiau

Chung Shan Medical University

Chih-Jung Yeh (✉ alexeyeh@csmu.edu.tw)

Chung Shan Medical University

Research article

Keywords: Spousal death, Depression, Older adults

Posted Date: June 30th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-38175/v1>

License:   This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background: In addition to increasing the mortality among older adults, spousal death (SD) increases their risk of depression. This study explored the factors affecting depression among widowed older adults to provide health care strategies for successful aging.

Methods: A total of 710 adults older than 60 years completed a questionnaire before and after their spouses' deaths. The survey data included age, sex, ethnic group, education level, financial station socioeconomic status, SD (including time point), smoking status, alcohol consumption, self-rated health status, Center for Epidemiologic Studies Depression Scale score, mobility, and degree of support from relatives and friends.

Results: The proportion of participants with depression after SD was 1.7 times that of before SD ($P < 0.0001$). Worsened mobility (odds ratio [OR] = 1.3, $P < 0.01$), low self-rated health status (OR = 0.5, $P < 0.01$), and a high degree of support from relatives and friends (OR = 1.5, $P < 0.01$) had a significant positive correlation with depression after SD. The proportion of depression that occurred within 6 months after SD was 6.0 times higher than that of depression before SD. Participants who lived alone after losing their spouses who were healthy before their deaths exhibited a significantly increased proportion of depression after their spouses' deaths.

Conclusion: Male sex, spouse's health, and the period of 6 months after SD are risk factors for depression in older adults. The maintenance of mobility, positive self-rated health status, and a shorter period of depression after a spouse's death result in more favorable adaptability among women. Social workers or family members should focus on older adults whose spouses died unexpectedly or within the last 6 months. Living with family members after SD can alleviate depression in older adults.

Background

Spousal death (SD) has a wide range of health effects on older adults [1]. It is closely related to the risk of death in older adults [2] and increases the mortality of various diseases [3]. In particular, the mortality of older adults increases in the first few months after a spouse's death [4, 5]. The lifestyle changes caused by SD increase the incidence of almost all types of cancer [6]. It is also a risk factor for stroke [7] and is related to the severity of cardiovascular disease [8]; moreover, widowed men have an increased risk of type II diabetes [9]. In 1980, a study demonstrated that in addition to medical technology and drugs, a decrease in the proportion of SD was a reason for the decline in disabilities among older adults in the United States [10].

Although the emotional response of older adults after their spouses' deaths may gradually decrease over time [11], their period of grief is several years long rather than temporary [1, 12] [13, 14], and the sadness caused by a spouse's death affects the occurrence of depression [15]. Similar to sorrow, depressive symptoms continue to occur in older adults at a relatively high level [16, 17]. Depression is a common mental illness among older adults [18] with a morbidity rate of 4.7–16% [19]. Older adults with depression

have a relatively high rate of disease comorbidity as well as increased mortality and risk of disability and suicide [20, 21, 22]. Older adults living independently from family or friends are particularly susceptible to depression [23]; however, social isolation is more likely to cause depression in older adults compared with people who live alone [24]. Although family support can reduce the difference in depressive symptoms between older adults who experienced SD and other older adults [25], the absence of children does not increase loneliness or depression in widowed older adults [26]. In addition, help from children and the sharing of living arrangements with them yield reduced depression symptoms and favorable self-rated health [27]. This study explored the major effects of SD on older adults' depression and whether, in addition to SD, the changes in lifestyle habits, interpersonal relationships, or living environments after a spouse's death are influencing factors. The results may provide health care strategies for the successful aging of older adults.

Method

The TLSA (Taiwan Longitudinal Study of Aging) data source of this study is the Institute of Family Planning, which was the predecessor of the Health Promotion Bureau of the Ministry of Health and Welfare, Taiwan. Stratified three-stage random sampling was adopted to select 4,412 individuals from the registered population of Taiwan who were older than 60 years at the end of 1988. Of the selected individuals, 710 completed the questionnaire before and after their spouses' deaths. A questionnaire survey was conducted by special investigators through interviews to collect baseline data. For selected participants who could not respond to the questionnaire because of conditions such as unconsciousness, severe illness, or deaf-mutism, family members or caregivers who understood their situations could answer for them.

A total of six longitudinal surveys were conducted in 1989, 1993, 1996, 1999, 2003, and 2007. Collected data included age, sex, ethnic group, education level, financial status, smoking status, alcohol consumption, and self-rated health status. The simple version of the 10-item Center of Epidemiological Studies Depression Scale (CESD) was used to measure depression, and a score of ≥ 10 indicated depressive symptoms. In the mobility investigation, participants were asked if they had difficulty squatting, raising both hands, picking up objects with their fingers, lifting an 11-kg object, walking up two to three floors, or walking 200–300 m, with higher scores indicating poorer mobility. In the survey on relative and friend (RF) support, participants were asked if they believed that their relatives and friends were willing to listen to their worries, whether their relatives and friends cared about them, whether they were satisfied with the level of care expressed by their relatives and friends, and whether their relatives and friends were hypercritical to what they did. In addition, the participants were asked whether their relatives and friends would ask for their opinions when making decisions or during discussions. In terms of the quantification of support from relatives and friends, a higher score indicated lower support. Regarding the questionnaire items, reduced-rank regression was first adopted to obtain the factor loadings for SD, after which the scores for mobility and RF support were acquired. Therefore, mobility and RF support scores were used to represent mobility and RF support in the later section of this study.

The McNemar's Chi-square test was conducted to determine whether each participant presented significant differences before and after SD, and the effect of variable adjustment on SD was analyzed using multinomial logistic regression. SAS 9.4 (SAS Institute Inc., Cary, NC, USA) was employed with a significance level of 0.05.

Results

Table 1 presents the calculation results for the factor loadings of mobility and RF support. The factor loading for each mobility was positive and greater than 0.2, indicating a positive correlation between the degree of disability and depression. The factor loadings for the surveyed items of RF support were negative and greater than 0.2, implying a negative correlation between support level and depression. Table 2 presents the participant demographic variables and the descriptive statistics for SD time point and Time since SD. Of the 710 participants, 256 were men and 454 were women. The participants were divided into six groups (on the basis of the spouses' age at death), four education levels (from primary school to university and above), and four ethnic groups. The years 1989, 1993, 1996, 1999, 2003, and 2007 were used as the points of tangency for the time of SD occurrence. Time since SD was divided into five levels, namely less than 3 months, 3–6 months, 6–12 months, 12–24 months, and more than 24 months.

Table 3 presents data before and after SD according to participant sex. No significant difference was observed in income satisfaction between men and women before and after SD. A decline in the proportions of both men ($OR_m = 4.38, p < 0.001$) and women ($OR_m = 7.0, p < 0.05$) who smoked was observed. However, neither men nor women exhibited a significant difference in alcohol consumption before and after their spouses' deaths. In terms of self-rated health, men did not exhibit a significant difference before and after SD, whereas the proportion of women who believed that they had favorable health declined after SD ($OR_m = 1.40, p < 0.05$). In Table 3, *diff* represents the result of subtracting the post-SD score from the pre-SD score. Men exhibited a significantly decreased degree of depression after SD (mean = $1.52 \pm 6.09, p < 0.0001$), whereas the women's degree of depression increased significantly (mean = $-1.31 \pm 7.49, p < 0.01$). A mobility score *diff* of < 0 indicates improved mobility. Men exhibited reduced mobility after SD (mean = $0.33 \pm 1.25, p < 0.0001$), whereas the mobility of women improved (mean = $-0.52 \pm 1.50, p < 0.0001$). Neither men nor women exhibited a significant difference RF support scores after SD, indicating no significant change in support from relatives and friends after SD.

Table 4 presents the multinomial logistic regression analysis of the effect of SD on depression. Model 1 consists of the simple effect without any variable adjustment; the mobility score was adjusted in Model 2, self-rated health was adjusted in Model 3, and the RF support score was adjusted in Model 4. Under the Model 1 SD effect, the proportion of depression among the participants after SD was 1.7 times that of before SD ($P < 0.0001$), whereas the SD effects of Models 2, 3, and 4 resulted in a proportion of depression after SD 1.5–1.7 times that of before SD, and the increase was significant. The odds ratios (ORs) of the adjustment variables in Models 1–4 were all significant, indicating that worsened mobility ($OR = 1.3, p < 0.01$), declined self-rated health status ($OR = 0.5, p < 0.01$), and higher RF support ($OR = 1.5,$

$p < 0.01$) led to a higher proportion of depression. After variable adjustment, the SD effect on men remained significant, and the ORs of the adjustment variables were nonsignificant. After the mobility score (Model 2) and favorable self-rated health status (Model 3) were adjusted, the OR of the SD effect on women became nonsignificant, whereas the ORs of the adjustment variables became statistically significant (OR = 1.3, $p < 0.01$; OR = 0.4, $p < 0.01$).

Table 5 indicates that the proportion of post-SD depression was 6.0 times, 0.9 times, 1.7 times, and 1.3 times that of pre-SD depression when Time since SD was less than 6 months (OR = 6.0, $p < 0.0001$), 6–12 months (OR = 0.9, $p > 0.05$), 12–24 months (OR = 1.7, $p < 0.05$), and ≥ 24 months (OR = 1.3, $p > 0.05$), respectively. The proportion of depression decreased rapidly after 6 months. In the sex-stratified analysis, only men had a significantly higher proportion of post-SD depression compared with pre-SD depression in the 12–24 months after SD (OR = 2.38, $p < 0.05$), whereas women exhibited a significantly higher proportion of post SD depression less than 6 months after SD (OR = 4.0, $p < 0.01$). The remaining variables yielded no significant changes.

In the analysis of post-SD living arrangements, Table 5 indicates that the proportion of depression among widowers and widows living alone and those living with family members was 2.3 times (OR = 2.3, $p < 0.01$) and 1.5 times that before SD (OR = 1.5, $p < 0.01$). A further sex stratification analysis revealed that only men who lived with their families after SD exhibited significantly more severe depression compared with before SD (OR = 2.3, $p < 0.01$).

In terms of the stratified analysis of spouse's health status, Table 5 indicates that a significantly large proportion of participants whose spouses had a favorable health status exhibited post-SD depression (all participants; OR = 2.0, $p < 0.01$, men: OR = 2.3, $p < 0.05$, women: OR = 1.8, $p < 0.05$). However, no significant difference was observed in the proportion of widowers and widows with post-SD depression whose spouses were in poor health.

Table 1

Factor loading derived by reduced rank regression: using pre SD mobility and social support items

Mobility items	Factor loading	Social support items	Factor loading
Squatting	0.43	Willingness of significant others to talk with you	-0.40
Raising the arms up	0.35	Willingness of significant others to care for you	-0.54
Grasping with the fingers	0.42	Satisfaction with care from significant others	-0.57
Carrying 11 kg weight	0.37	Significant others' complaints to you	-0.27
Walking 200–300 m	0.44	Willingness of significant others to ask your opinion	-0.38
Climbing up 2–3 floors	0.43	–	

SD

Spouse Death; Factor loadings with absolute value ≥ 0.2 are shown in bold; higher mobility scores mean worse mobility function; higher social support scores mean lower level of social support.

Table 2
Characteristics of study subjects

	Total subjects (N = 710)		Male (n = 256)		Female (n = 454)	
	N	%	N	%	N	%
Age of SD 60-	39	5.5%	5	2.0%	34	7.5%
60–65	87	12.3%	20	7.8%	67	14.8%
65–70	148	20.9%	49	19.1%	99	21.8%
70–75	160	22.4%	54	21.1%	105	23.0%
75–80	165	23.2%	68	26.6%	97	21.4%
80+	112	15.8%	60	23.4%	52	11.5%
Education illiterate	320	45.1%	52	20.3%	268	59.0%
Elementary	295	41.6%	146	57.0%	149	32.8%
Junior/senior high	85	12.0%	50	19.5%	35	7.7%
Above college	10	1.4%	8	3.1%	2	0.4%
Ethnicity Fukinese	510	71.8%	172	67.2%	338	74.5%
Hakka	113	15.9%	46	18.0%	67	14.8%
Mainlander	75	10.6%	38	14.8%	37	8.2%
Other	12	1.7%	0	0.0%	12	2.6%
SD between 1989–1993	120	16.9%	43	16.8%	77	17.0%
1993–1996	110	15.5%	54	21.1%	56	12.3%
1996–1999	138	19.4%	38	14.8%	100	22.0%
1999–2003	196	27.6%	70	27.3%	126	27.8%
2003–2007	146	20.6%	51	19.9%	95	20.9%
Time since SD 0–3 months	40	5.6%	16	6.3%	24	5.3%
3–6 months	47	6.6%	18	7.0%	29	6.4%
6–12 months	105	14.8%	37	14.5%	68	15.0%
12–24 months	215	30.3%	83	32.4%	132	29.1%
>24 months	303	42.7%	102	39.8%	201	44.3%

Table 3
 Characteristics of study subjects: pre and post spouse death (SD)

Categorical variables				Male		OR _m			Female		OR _m
				Post SD					Post SD		
					+	-			+	-	
Satisfied Income	+: Yes	Pre	+	69	45	0.80	Pre	+	104	68	0.94
	-: No	SD	-	56	86	(NS)	SD	-	72	210	(NS)
				+	-				+	-	
Smoking habit	+: Yes	Pre	+	98	35	4.38	Pre	+	15	7	7
	-: No	SD	-	8	115	()	SD	-	1	431	(*)
				+	-				+	-	
Alcohol drinking	+: Yes	Pre	+	58	31	1.11	Pre	+	18	20	1.11
	-: No	SD	-	28	139	(NS)	SD	-	18	398	(NS)
				+	-				+	-	
self-rated health	+: Yes	Pre	+	162	44	1.42	Pre	+	207	85	1.40
	-: No	SD	-	31	19	(NS)	SD	-	61	101	(*)
		Mean		(sd)		P	Mean		(sd)		P
CESD											
Depressive: higher score		diff	1.52	(6.09)		***	-1.31		(7.49)		**
Mobility											
Worse: Lower score		diff	0.33	(1.25)		***	-0.52		(1.50)		***
RF support											
Low support: Higher score		diff	0.11	(1.16)		NS	0.05		(1.15)		NS
# p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.0001											

Table 4

Effect of spouse death on depression: multiple conditional logistic regression

	Total		Male		Female	
	OR	P	OR	P	OR	P
Model 1:						
SD Effect (Post SD vs. Pre SD)	1.7	***	2.6	**	1.5	*
Model 2:						
SD Effect(Post SD vs. Pre SD)	1.5	**	2.3	**	1.2	NS
Mobility (higher score means worse)	1.3	**	1.3	NS	1.3	**
Model 3:						
SD Effect(Post SD vs. Pre SD)	1.7	**	2.6	**	1.4	#
Self-rated health (good vs. not good)	0.5	**	0.8	NS	0.4	**
Model 4:						
SD Effect(Post SD vs. Pre SD)	1.7	**	2.3	**	1.5	*
Higher social support	1.5	**	1.5	#	1.4	*
# p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.0001						

Table 5
Effect of spouse death on depression: stratification analysis

		Total		Male		Female	
		OR	P	OR	P	OR	P
Stratified by time since SD							
< 6 months	Post SD vs. Pre SD	6.0	***	Infinite	–	4.00	**
6–12 months	Post SD vs. Pre SD	0.9	NS	1.00	NS	0.88	NS
12–24 months	Post SD vs. Pre SD	1.7	*	2.38	*	1.41	NS
>=24 months	Post SD vs. Pre SD	1.3	NS	1.89	NS	1.18	NS
Stratified by living arrangement after SD							
Live alone after SD	Post SD vs. Pre SD	2.3	**	3.0	#	2.0	#
Live with family members after SD	Post SD vs. Pre SD	1.5	**	2.3	**	1.3	NS
Stratified by spouse's health status before SD(N = 548)							
Spouse's health status: Good	Post SD vs. Pre SD	2.0	**	2.3	*	1.8	*
Spouse's health status: Not good	Post SD vs. Pre SD	1.3	NS	1.9	NS	1.2	NS
# p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.0001							

Conclusion

Smoking among men and women declined after SD, whereas alcohol consumption among the participants exhibited no significant difference, which was inconsistent with the finding of increased tobacco and alcohol abuse after SD in previous studies [28, 29, 30]. The proportion of self-rated health decline after SD increased significantly among women. This was consistent with the findings of previous studies indicating that widowed older adults have poorer self-rated health [31, 32] and that SD negatively affects health [33]. Men exhibited an obvious decline in mobility after SD, whereas the mobility of women improved, indicating a sex difference. Previous studies have demonstrated that women's mobility after SD is inferior to that of women whose spouses are still alive [34, 35]; however, another study revealed that widows in Taiwan are more active in recreational activities compared with married women [36]. The disparity between the present research results and the literature may be attributable to cultural

differences. Although RF support did not differ significantly after SD, depression and the degree of support from relatives and friends were positively correlated. This may be explained by the increased care that participants received from relatives and friends due to their depression. However, RF support had little influence on SD effects after variable adjustment, indicating that such support cannot significantly alleviate depression. According to attachment theory, support from friends cannot compensate for the loss of someone to whom an individual had an attachment [37], and attachment problems are particularly prevalent among older adults [38]. These studies may explain why support from relatives and friends cannot effectively alleviate depression.

Men exhibited a decline in depression after SD whereas women presented increased depression. However, after adjusting for mobility, self-health rating, and RF support, the proportion of men who had depression after SD was greater than that of women, indicating that SD had a significant effect on depression among men (more than 2.3 times that before SD). In other words, adopting approaches to alleviate the effects of SD on depression is more difficult for men. The proportion of women with depression after SD increased significantly (1.5 times); however, after adjusting for mobility and self-rated health, the original effect of SD on depression was explained by the adjustment variables. In addition, the adjustment variables were significantly correlated with depression. In other words, the effects of SD on depression could be alleviated or reduced in women through more favorable mobility and a favorable perception of their own health, a phenomenon not observed in men. This result is consistent with the findings of previous studies, which demonstrated that depressive symptoms caused by SD has a stronger effect on men, whereas women have superior adaptability [39, 40]. Moreover, recreational physical activity has a preventive effect on depression in women [41]. Increased participation in recreational activities is beneficial for widows, and changes in leisure activities after SD have a greater effect on health and disability compared with aging [42]. These findings corroborate the aforementioned research results.

The proportion of depression was obvious within 6 months after SD; however, this trend gradually slowed after 6 months. For women, this increase was not significantly different after 6 months (however, a significant difference was observed among men between 12 and 24 months after SD). After 24 months, both men and women exhibited no significant difference in depression before and after SD; therefore, the effect of SD can be alleviated over time. A previous study demonstrated that older adults experience relatively high levels of depressive symptoms within 2 years after their spouses' deaths [16]. The proportion of depression among women remained high within 6 months after SD; however, this proportion decreased to pre-SD levels after 1 year [17]. These conclusions are consistent with our research results. This study indicated that SD has a shorter effect on depression in women compared with men. Past research has also demonstrated that the amount of time after a spouse's death affects morale and social engagement [43]. The relatively short duration of depression among women after SD may cause them to have a more positive self-rated health status or participate in social engagement, which may also explain why women have more favorable adaptability to depression caused by SD [39, 40].

The proportion of depression increased after SD regardless of the participants' living arrangements; however, depression in older adults living alone after their spouses' deaths exhibited a greater increase than that of older adults living with family members. Although the aforementioned trend persisted after sex stratification, depression among only men who lived with their families exhibited statistical significance. Therefore, both living alone and living with family members significantly affects depression. However, previous research has demonstrated that living alone is not correlated with depression [44]. After adjustment for demographic variables, health status, social support, and financial status, the effect of living alone on depression disappeared [45]. Although the same trend was observed in this study, participants who lived alone still exhibited a relatively high proportion of depression. Older adults whose spouses were healthy exhibited significantly higher proportion of depression after SD, a trend that was clearly observed in both men and women. However, older adults whose spouses had poor health exhibited no significant change in the proportion of depression after SD. Past studies have demonstrated that older adults who have lost their spouses are more likely to be depressed if they were not the primary caregiver of their sick spouses [46], and the accidental death of a spouse may increase the risk of depression in older adults [47]. The aforementioned results can be used to illustrate the phenomena revealed in this study.

By conducting a long-term investigation of widowed older adults, this study demonstrated that SD is a risk factor for depression among older adults in Taiwan, and men and women adapt differently to their spouses' deaths. Women's shorter duration of depression after SD, their ability to maintain their mobility, and their more favorable self-rated health result in an increased willingness to participate in activities. This enables them to have superior adaptability to the effects of SD. Older adults are at risk of depression within 6 months after SD. Relatives, friends, and social workers should increase their attention to and care of older adults during this period. In terms of living arrangements, encouraging older adults to live with family members or friends after SD can reduce the incidence of depression.

Abbreviations

Spousal Death (SD); Odds Ratio (OR); Taiwan Longitudinal Study of Aging (TLSA); Center of Epidemiological Studies Depression (CESD); Relative and Friend (RF)

Declarations

Ethics approval and consent to participate

This study was approved by the Medical Ethics Committee and Data Protection Board of Taiwan. (Funding number: DOH93-HP-1702). All participants signed an informed consent before the interview.

Consent for publication of data and materials: Not Applicable.

Competing interests: The authors declare that they have no competing interests.

Funding: None.

Authors' contributions

YH, MC and CJ conceived and designed this manuscript.

YH and CJ analyzed and interpreted the data of this study.

YH wrote the original draft.

YH, MH and CJ reviewed and edited the manuscript.

All authors were contributed to drafting and/or revising the article approved the final version to be published.

Acknowledgements

Thanks to the support of the "Ministry of Health and Welfare's plan to build an innovative service model that integrates health and social administration" (Case No: M09M7269):

References

1. Das A. Spousal loss and health in late life: moving beyond emotional trauma. *J Aging Health*. 2013;25:221–42.
2. Ho SH, Hung WS. The impacts of widowhood, chronic disease, and physical function on mortality among older people. *J Nurs Res*. 2013;21:110–9.
3. Elwert F, Christakis. NA. The effect of widowhood on mortality by the causes of death of both spouses. *Am J Public Health*. 2008;98:2092–8.
4. Mellstrom D, Nilsson A, Oden A, Rundgren A, Svanborg A. Mortality among the widowed in Sweden. *Scand J Soc Med*. 1982;10:33–41.
5. Seifter A, Singh S, McArdle PF, Ryan KA, Shuldiner AR, Mitchell BD, Schäffer AA. Analysis of the bereavement effect after the death of a spouse in the Amish: a population-based retrospective cohort study. *BMJ Open*. 2004;4:e003676.
6. Hemminki K, Li X. Lifestyle and cancer: effect of widowhood and divorce. *Cancer Epidemiol Biomarkers Prev*. 2003;12:899–904.
7. Copstein L, Fernandes JG, Bastos GAN. Prevalence and risk factors for stroke in a population of Southern Brazil. *Arq Neuro-Psiquiatr*. 2013;71:294–300.
8. Daoulah A, Alama MN, Elkhateeb OE, Al-Murayeh M, Al-Kaabi S, Al-Faifi SM, Alosaimi HM, Lotfi A, Asiri KS, Elimam AM, Abougalambo AS, Murad W, Haddara MM, Dixon CM, Alsheikh-Ali AA. Widowhood and severity of coronary artery disease: a multicenter study. *Coron Artery Dis*. 2017;28:98–103.

9. Cornelis MC, Chiuve SE, Maria Glymour M, Chang SC, Tchetgen Tchetgen EJ, Liang L, Koenen KC, Rimm EB, Kawachi I, Kubzansky LD. Bachelors, divorcees, and widowers: does marriage protect men from type 2 diabetes? *PLoS One*. 2014;9:e106720.
10. Schoeni RF, Freedman VA, Martin LG. Why is late-life disability declining? *Milbank Q*. 2008;86:47–89.
11. Carlsson ME, Nilsson IM. Bereaved spouses' adjustment after the patients' death in palliative care. *Palliat Support Care*. 2007;5:397–404.
12. Kowalski SD, Bondmass MD. Physiological and psychological symptoms of grief in widows. *Res Nurs Health*. 2008;31:23–30.
13. Tseng FM, Petrie D, Leon-Gonzalez R. The impact of spousal bereavement on subjective wellbeing: evidence from the Taiwanese elderly population. *Econ Hum Biol*. 2017;26:1–12.
14. Carnelley KB, Wortman CB, Bolger N, Burke CT. The time course of grief reactions to spousal loss: evidence from a national probability sample. *J Pers Soc Psychol*. 2006;91:476–92.
15. Bennett K. A longitudinal study of wellbeing in widowed women. *Int J Geriatr Psychiatry*. 1997;12:61–6.
16. Turvey CL, Carney C, Arndt S, Wallace RB, Herzog R. Conjugal loss and syndromal depression in a sample of elders aged 70 years or older. *Am J Psychiatry*. 1999;156:1596–601.
17. Harlow SD, Goldberg EL, Comstock GW. A longitudinal study of the prevalence of depressive symptomatology in elderly widowed and married women. *Arch Gen Psychiatry*. 1991;48:1065–8.
18. Alexopoulos G. Depression in the elderly. *Lancet*. 2005;365:1961–70.
19. Barua A, Ghosh MK, Kar N, Basilio MA. Prevalence of depressive disorders in the elderly. *Ann Saudi Med*. 2011;31:620–4.
20. Beekman AT, Penninx BW, Deeg DJ, de Beurs E, Geerling SW, van Tilburg W. The impact of depression on the well-being, disability and use of services in older adults: a longitudinal perspective. *Acta Psychiatr Scand*. 2002;105:20–7.
21. Abas M, Hotopf M, Prince M. Depression and mortality in a high-risk population: 11-year follow-up of the medical research council elderly hypertension trial. *Br J Psychiatry*. 2002;181:123–8.
22. Conwell Y, Duberstein PR, Caine ED. Risk factors for suicide in later life. *Biol Psychiatry*. 2002;52:193–204.
23. Wilson K, Mottram P, Sixsmith A. Depressive symptoms in the very old living alone: prevalence, incidence and risk factors. *Int J Geriatr Psychiatry*. 2007;22:361–6.
24. Osborn DPJ, Fletcher AE, Smeeth L, Stirling S, Bulpitt CJ, Breeze E, Ng ESW, Nunes M, Jones D, Tulloch A. Factors associated with depression in a representative sample of 14 217 people aged 75 and over in the United Kingdom: results from the MRC trial of assessment and management of older people in the community. *Int J Geriatr Psychiatry*. 2003;18:623–30.
25. Zhang B, Li J. Gender and marital status differences in depressive symptoms among elderly adults: the roles of family support and friend support. *Aging Ment Health*. 2001;15:844–54.

26. Zhang Z, Hayward MD. Childlessness and the psychological well-being of older persons. *J Gerontol B Psychol Sci Soc Sci.* 2001;56:311–20.
27. Zunzunegui MV, Béland F, Otero A. Support from children, living arrangements, self-rated health and depressive symptoms of older people in Spain. *Int J Epidemiol.* 2001;30:1090–9.
28. Choi SW, Rhee JA, Shin JH, Shin MH. The comparison of health behaviors between widowed women and married women in Jeollanamdo Province, Korea. *J Prev Med Public Health.* 2008;41:272–8.
29. Byrne GJA, Raphael B, Arnold E. Alcohol consumption and psychological distress in recently widowed older men. *Aust NZ J Psychiat.* 1999;33:740–7.
30. Ilomäki J, Gnjidic D, Le Couteur DG, Bell JS, Blyth FM, Handelsman DJ, Cumming RG, Seibel MJ, Waite LM, Naganathan V, Hilmer SN. Alcohol consumption and tobacco smoking among community-dwelling older Australian men: the concord health and ageing in men project. *Aust J Ageing.* 2014;33:185–92.
31. Ho SH. Correlations among self-rated health, chronic disease, and healthcare utilization in widowed older adults in Taiwan. *J Nurs Res.* 2018;26:308–15.
32. Li Y, Chi I, Krochalk PC, Xu L. Widowhood, family support, and self-rated health among older adults in China. *Int J SocWelfare.* 2011;20:72–85.
33. Feldman S, Byles JE, Beaumont R. Is anybody listening? The experiences of widowhood for older Australian women. *J Women Aging.* 2000;12:155–76.
34. Van Den Brink CL, Tijhuis M, Van Den Bos GAM, Giampaoli S, Kivinen P, Nissinen A, Kromhout D. Effect of widowhood on disability onset in elderly men from three European countries. *J Am Geriatr Soc.* 2004;52:353–8.
35. Vable AM, Subramanian SV, Rist PM, Glymour MM. Does the "widowhood effect" precede spousal bereavement? Results from a nationally representative sample of older adults. *Am J Geriatr Psychiatry.* 2015;23:283–92.
36. Jhan BS, Chiao C. Widowhood, leisure activity, and physical function among middle-aged and older Taiwanese women: relationships over time. *Taiwan J Public Health.* 2012;31:71–82.
37. Stroebe W, Stroebe M, Schut H, Abakoumkin G. The role of loneliness and social support in adjustment to loss: a test of attachment versus stress theory. *J Pers Soc Psychol.* 1996;70:1241–9.
38. Bradley JM, Cafferty TP. Attachment among older adults: current issues and directions for future research. *Attach Hum Dev.* 2001;3:200–21.
39. Lee GR, DeMaris A, Bavin S, Sullivan R. Gender differences in the depressive effect of widowhood in later life. *J Gerontol B Psychol Sci Soc Sci.* 2001;56:56–61.
40. Van Grootheest DS, Beekman ATF, Broese Van Groenou MI, Deeg DJH. Sex differences in depression after widowhood. Do men suffer more? *Soc Psychiatry Psychiatr Epidemiol.* 1999;34:391–8.
41. Wang F, DesMeules M, Luo W, Dai S, Lagace C, Morrison H. Leisure-time physical activity and marital status in relation to depression between men and women: a prospective study. *Health Psychol.* 2011;30:204–11.

42. Janke MC, Nimrod G, Kleiber DA. Leisure activity and depressive symptoms of widowed and married women in later life. *J Leis Res.* 2008;40:250–66.
43. Bennett K. Psychological wellbeing in later life: the longitudinal effects of marriage, widowhood and marital status change. *Int J Geriatr Psychiatry.* 2005;20:280–4.
44. Osborn DPJ, Fletcher AE, Smeeth L, Stirling S, Bulpitt CJ, Breeze E, Ng ESW, Nunes M, Jones D, Tulloch A. Factors associated with depression in a representative sample of 14 217 people aged 75 and over in the United Kingdom: results from the MRC trial of assessment and management of older people in the community. *Int J Geriatr Psychiatry.* 2003;18:623–30.
45. Chou KL, Ho AHY, Chi I. Living alone and depression in Chinese older adults. *Aging Ment Health.* 2006;10:583–91.
46. Schulz R, Beach SR, Lind B, Martire LM, Zdaniuk B, Hirsch C, Jackson S, Burton L. Involvement in caregiving and adjustment to death of a spouse: findings from the caregiver health effects study. *J Am Med Assoc.* 2001;285:3123–29.
47. Burton AM, Haley WE, Small BJ. Bereavement after caregiving or unexpected death: effects on elderly spouses. *Aging Ment Health.* 2006;10:319–26.