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Partner loss and depression among older adults in China: a life course perspective

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Abstract. This study examines the relationship between partner loss and depression among middle-aged and older adults in China. Using data from the 2014 China Health and Retirement Longitudinal Study (CHARLS) Life History Survey and 2015 Harmonized CHARLS, the study first analyzes whether experiencing the death of a spouse or cohabiting partner by 2014 is associated with Center for Epidemiologic Studies Depression Scale (CES-D) depressive symptom scores in 2015. It then focuses on respondents with partner loss to examine whether age at first partner loss, child status at the time of loss, and re-partnering are associated with depression. Ordinary Least Squares (OLS) regression results show that partner loss is significantly associated with higher depressive symptom scores, even after controlling for age, gender, hukou status, and education. However, event-history characteristics do not remain stably significant within the partner-loss sample after controls are added. Heterogeneity analyses suggest stronger associations among women and variation across education groups. The findings highlight partner loss as a life course event embedded in family context and social position.

Keywords: partner loss, depression, older adults, gender, education, widowhood characteristics

1. Introduction

Partner loss is one of the most consequential life events in later adulthood. For middle-aged and older adults, the death of a spouse or cohabiting partner is not only a change in marital status, but also a disruption to companionship, household routines, caregiving arrangements, and future expectations. These changes can have important consequences for mental health, especially depression. A large body of research has shown that widowhood is associated with higher levels of depression, suggesting that the loss of a long-term partner may have effects that extend beyond the immediate moment of bereavement [1-3]. From a life course perspective, partner loss is important because it occurs within a longer trajectory of relationships, family roles, and social positions. Its consequences may depend not only on whether the event happened, but also on when it happened, what family relationships surrounded it, and how the surviving person's life was reorganized afterward [4, 5].

China provides an especially important context for studying this relationship. Later life in China is closely tied to family relations and intergenerational support. Adult children are often expected to provide emotional, financial, and caregiving support for aging parents, while spouses or partners may serve as central sources of

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daily companionship and household cooperation. When partner loss occurs, the surviving older adult may therefore lose not only an intimate relationship, but also an important part of the family support structure. At the same time, the availability of support after the loss may differ by gender, education, rural-urban background, and children's resources. Existing Chinese studies have shown that widowhood is associated with worse mental health among older adults, and that children's support, living arrangements, gender, and socioeconomic position can shape this relationship [6-10].

However, existing research has focused more on widowhood status and post-widowhood adjustment than on heterogeneity within partner loss itself. Studies have examined whether widowed older adults receive support, whether they live alone, or whether their health outcomes differ by gender and socioeconomic position [6-10]. These questions are important, but they often treat partner loss as a relatively homogeneous condition, as if the experience of losing a partner can be captured mainly by a yes-or-no widowhood indicator. Less attention has been placed on the event characteristics of partner loss: when the first partner loss occurred, whether the respondent already had children at that time, and whether the respondent later re-partnered. These characteristics may shape how much support was available at the time of loss, how daily life had to be reorganized afterward, and how the surviving person adjusted emotionally. Examining them can help show whether depression among people who experienced partner loss is associated not only with widowhood itself, but also with the circumstances under which the loss entered the life course.

This study uses data from the China Health and Retirement Longitudinal Study to examine the relationship between partner loss and depression among middle-aged and older adults in China [11, 12]. It first asks whether respondents who had experienced the death of a spouse or cohabiting partner by 2014 reported higher CES-D depressive symptom scores in 2015 than those who had not experienced partner loss. It then focuses on respondents with partner loss and examines whether age at first partner loss, child status at the time of first partner loss, and re-partnering are associated with depression. Finally, the study conducts heterogeneity analyses by gender and education to examine whether these relationships vary across social positions. By doing so, this study places partner loss within a life course framework and connects widowhood-depression research with the timing and family context of the loss itself.

2. Background

2.1. Partner loss and depression

Partner loss is one of the most disruptive life events in later adulthood. It is not only the end of a marital or cohabiting relationship, but also the loss of a person around whom daily life, future expectations, and family responsibilities may have been organized for many years. Life course theory helps explain why such an event can have consequences beyond the immediate moment of bereavement. Later-life outcomes are shaped by long-term trajectories of events, relationships, and social positions, and the impact of a life event depends partly on when it occurs, which relationships surround it, and how roles and resources are reorganized afterward [4, 5]. Seen from this perspective, partner loss is a critical life event because it interrupts not only an intimate relationship, but also the structure of life built through that relationship.

The consequences of partner loss may be especially strong for middle-aged and older adults. By later life, a spouse or cohabiting partner is often a long-term companion, a household collaborator, a caregiver, and a partner in economic and retirement planning. Losing this person can therefore disturb both emotional life and practical life. The surviving partner may need to make household decisions alone, take over tasks previously shared or handled by the partner, adjust to new financial constraints, and rebuild daily routines without the person who had been present in ordinary life for many years. Prior research on older adults' adjustment to

widowhood shows that dependence on a spouse before loss, including emotional and instrumental dependence, shapes later psychological adjustment [13]. Research on the daily consequences of late-life widowhood also shows that widowhood can change household responsibilities, and that these changes are connected to gender and intergenerational support [14]. These findings suggest that partner loss is not only a moment of grief, but a broader reorganization of everyday life.

This broader disruption helps explain why depression has become a central concern in widowhood research. Depression matters here not because every bereaved person can or should be clinically diagnosed, but because partner loss can change the conditions that support emotional stability in daily life. When a long-term partner dies, the surviving person may lose the person who listened to them, shared routines with them, helped them make decisions, and gave continuity to their future plans. The difficulty is not only that the person is gone, but that the surviving partner must turn a relationship that was part of everyday reality into memory while still continuing ordinary life. When companionship, routine, and future expectations are disrupted at the same time, depression becomes one important way to understand how partner loss enters later-life mental health.

A large body of research has found that spousal loss is associated with higher levels of depression, suggesting that bereavement can have lasting consequences for psychological well-being [1-3]. This association is not only a matter of sadness following death. Existing studies suggest that widowhood can affect depression through several linked pathways, including financial strain, changes in household responsibilities, loss of social support, and psychological adjustment. Umberson and colleagues [15] found that the mechanisms linking widowhood and depression differ by gender: financial strain was especially important for women, while strains related to household management were more important for men. Sasson and Umberson [3] also showed that widowhood-related depression should be understood through gender differences, selection, and adjustment processes. In this sense, widowhood-depression research has moved beyond asking whether widowhood is associated with depression and toward asking why this association occurs and why it varies across individuals.

Because depression cannot always be directly observed in survey data, aging studies often use depressive symptom scales to approximate this broader mental health condition. Measures such as the CES-D were developed to capture depressive symptomatology in the general population rather than to provide a clinical diagnosis [16]. These measures typically include symptoms such as depressed mood, loneliness, poor sleep, low motivation, and difficulty continuing ordinary activities. This is useful for widowhood research because the psychological consequences of partner loss may appear in exactly these everyday forms: not only as grief, but also as disrupted sleep, reduced motivation, loneliness, and difficulty maintaining routine life. Therefore, depressive symptoms are not merely a convenient survey outcome. They provide a way to measure how the emotional and practical consequences of partner loss become visible in later-life mental health.

Much of the existing literature, however, focuses on adjustment after partner loss: how economic strain changes, whether social support decreases, how household and caregiving tasks are reorganized, and how different groups adapt to widowhood over time. These are important processes, but life course theory also directs attention to the location of the event itself within a person's life history. Partner loss may have different meanings depending on whether it occurs earlier or later in adulthood, whether children are already present at the time of loss, and whether the surviving partner later forms another partnership. These questions concern the timing of the event, the family relationships surrounding it, and the relationship trajectory that follows. They are therefore central to understanding partner loss not only as a marital status, but as an event embedded in a broader life course.

2.2. Partner loss in the Chinese context

The Chinese context makes these questions especially important. Later life in China is deeply connected to family relations and intergenerational support. In a family-centered context shaped by filial responsibility, adult children are often expected to provide emotional, financial, or caregiving support for aging parents. This does not mean that such support is always available or sufficient, especially under conditions of migration, urbanization, and unequal resources. But it does mean that the consequences of partner loss may be closely tied to the structure of the family. When a spouse or cohabiting partner dies, the surviving older adult may not only lose a partner, but may also need to rely more heavily on children, relatives, or other support networks.

This family-centered context links partner loss to depression in a specific way. If a spouse had been the main source of companionship and daily support, then the loss may increase the importance of adult children or other family members. At the same time, the availability of such support depends on whether children exist, whether they are emotionally close, whether they have economic resources, and whether they can provide care in person. In China, where adult children are often culturally expected to support aging parents, the absence or weakness of such support may be especially consequential for psychological well-being. Studies of older adults in rural China show that intergenerational support is associated with depression, and that this relationship varies by gender and marital status [7]. This suggests that family support is not simply a background condition; it can shape how older adults experience widowhood and later-life mental health.

Existing Chinese studies support this view. Li and colleagues [6] found that widowhood had negative mental health consequences for older Chinese adults, and that support from adult children buffered the harmful effect of widowhood. Li and Liu [7] found that intergenerational support was associated with depression among older adults in rural China, with patterns varying by gender and marital status. Wang and colleagues [8], using CHARLS data, found that children's income and face-to-face emotional interaction improved the mental health of widowed older adults. Recent CHARLS-based research has also shown that widowhood in China has heterogeneous health consequences, with rural women appearing especially vulnerable, and that living alone may shape the relationship between widowhood and depression in different ways across groups [9, 10]. Together, these studies suggest that the widowhood-depression relationship in China is closely connected to family support, children's support, gender, and social position.

At the same time, this literature also leaves room for a more event-centered life course approach. Existing studies have shown that support after widowhood matters, that living arrangements matter, and that gender and social position matter. Yet many of these explanations focus on conditions after partner loss has already occurred. From a life course perspective, the event itself also needs to be located more precisely: when did the first partner loss occur, what family relationships existed at that time, and did the surviving person later form another partnership? These questions are not only descriptive details. They correspond to timing, linked lives, and relationship trajectory, which are central to understanding how a critical life event becomes embedded in later life.

This study addresses this gap by using spouse and partner histories from the 2014 CHARLS Life History Survey to bring the event-history context of partner loss into the analysis of depression among middle-aged and older adults in China. Instead of treating partner loss only as a widowhood status or only examining post-widowhood support, this study considers whether age at first partner loss, child status at the time of first partner loss, and re-partnering are associated with depression among respondents who had experienced partner loss. It also examines gender and education heterogeneity to consider whether the relationship between partner loss and depression varies across different social positions. In this way, the study connects widowhood-depression research with a more specific life course question: how the timing and family context of partner loss shape later-life mental health.

3. Data and methods

3.1. Data

This study uses data from the China Health and Retirement Longitudinal Study (CHARLS), which is a nationally representative longitudinal survey of Chinese residents aged 45 and older and their spouses. The 2011 national baseline survey included approximately 10,000 households and 17,500 individuals from 150 counties or districts and 450 villages or resident committees, using a multistage sampling design [11].

This study combines respondent-level information from the 2014 CHARLS Life History Survey and Harmonized CHARLS Version D. Unlike a standard follow-up wave, the 2014 Life History Survey retrospectively records respondents' earlier life experiences, including spouse, partner, and child histories. Therefore, it was used to construct the partner-loss variables. Harmonized CHARLS is a processed version of selected CHARLS variables created by the USC Gateway to Global Aging Data team to make CHARLS data more accessible and comparable across aging surveys [12]. In this study, Harmonized CHARLS was used to obtain the Wave 3, or 2015, CES-D depression score and the control variables. The original 2015 CHARLS follow-up questionnaire was used as documentation for the CES-D items underlying the Harmonized Wave 3 depression score.

After excluding respondents with no *hukou* (household registration status) and those with missing values on the dependent variable, independent variables, or control variables, the full complete-case sample includes 17,424 respondents. For analyses of partner-loss characteristics, the sample is restricted to respondents who had experienced partner loss by 2014, resulting in a restricted complete-case sample of 2,031 respondents.

3.2. Measures

Dependent variable. The dependent variable in this study is depressive symptoms in 2015. Depressive symptoms were measured using the CES-D-10 score from Harmonized CHARLS. In the 2015 CHARLS questionnaire, respondents were asked ten questions about how they "felt and behaved during the last week." The items ask whether respondents were bothered by things, had trouble concentrating, felt depressed, felt that everything was an effort, felt hopeful, felt fearful, had restless sleep, felt happy, felt lonely, and felt unable to "get going". The Harmonized CHARLS documentation provides the Wave 3 respondent CES-D score variable, R3CESD10, which ranges from 0 to 30, with higher values indicating more depressive symptoms [12]. This study treats the CES-D-10 score as a continuous dependent variable.

*Independent Variables.*The main independent variable is partner loss by 2014. The 2014 CHARLS Life History Survey was used to identify whether respondents had experienced the death of a spouse or cohabiting partner. The survey first asks, "Have you ever had a spouse or partner?" It defines a spouse as someone who had a marriage ceremony or registered marriage with the respondent, and a partner as someone who lived with the respondent for a long time without formal marriage. For a married spouse, CHARLS asks whether the respondent is still living with that spouse. If the answer is no, the survey asks the reason for not living together, with one option being "Widowed/partner died," and then asks the year in which the spouse died. For a cohabiting partner, CHARLS similarly asks whether the respondent is still living with that partner; if not, it asks the reason, including "Partner died," and records the year of the partner's death. Partner loss was coded as 1 if the respondent had any recorded spouse or partner death year in or before 2014, and 0 otherwise.

To describe the specific circumstances of partner loss, three additional variables were constructed among respondents who had experienced partner loss by 2014. Age at first partner loss was calculated by subtracting the respondent's birth year from the earliest recorded spouse or partner death year. Had child at first partner loss was coded as 1 if the respondent's first recorded child was born in or before the year of first partner loss,

and 0 otherwise. CHARLS records or verifies children's basic information, including birth year and birth month, and also asks whether respondents had other biological or adopted children not previously mentioned. Re-partnered after loss was coded as 1 if the respondent had another spouse or cohabiting partner after the first partner death, and 0 otherwise. This variable was constructed from the repeated spouse/partner history: after one spouse or partner is recorded, CHARLS asks whether the respondent had any other spouse or partner, and then collects information on the next relationship if the answer is yes.

Control Variables. This study included age, gender, *hukou* status, and education as control variables. Age was measured in years at the 2015 interview. Gender was coded as female = 1 and male = 0. *Hukou* status was included because the urban-rural divide in China is closely related to access to social welfare and other resources. It was recoded into a binary variable, with non-agricultural or unified residence *hukou* coded as 1 and agricultural *hukou* coded as 0; respondents without *hukou* were excluded from the analytic sample. The original CHARLS *hukou* categories include agricultural *hukou*, non-agricultural *hukou*, unified residence *hukou*, and no *hukou*. Education was recoded into three categories: illiterate, primary or below but literate, and middle school or above. The original CHARLS education categories range from no formal education to postgraduate education. This three-category measure was used because the sample consists of middle-aged and older adults with generally low levels of schooling, and this grouping separates respondents with no formal education, those with basic literacy or primary-level education, and those who reached at least middle school.

3.3. Analytical strategy

This study first reports descriptive statistics for the full sample and for the restricted sample of respondents who had experienced partner loss by 2014. Since the dependent variable is a continuous CES-D depression score, Ordinary Least Squares (OLS) linear regression was used. For each set of OLS models, a baseline model was estimated followed by a full model with control variables, including age, gender, *hukou* status, and education. Heterogeneity analyses were then conducted by running the full models separately by gender and education level. All models used complete-case samples, and the results are interpreted as associations rather than causal effects.

4. Results

4.1. Descriptive analysis

Table 1 presents descriptive statistics for the full sample. The mean CES-D depression score was 7.90 on a 0–30 scale, suggesting that the average level of depressive symptoms in the full sample was closer to the lower end of the scale. About 11.70% of respondents had experienced the death of a spouse or cohabiting partner by 2014, while 88.30% had not. The average age of respondents was 59.56, and women made up 52.62% of the sample. Most respondents had agricultural *hukou*, accounting for 91.02% of the sample. This large share is likely related to the composition of the CHARLS sample, which focuses on middle-aged and older Chinese adults and includes a substantial rural population. In terms of education, nearly three quarters of respondents had less than middle school education: 24.64% were illiterate and 46.94% had primary-level education or below but were literate.

Table 2 presents descriptive statistics for the restricted sample of respondents who had experienced partner loss by 2014. This group had a higher mean CES-D depression score than the full sample, 9.62 compared with 7.90. The average age at first partner loss was 53.63, and 20.43% of respondents had re-partnered after the first partner loss. The most notable demographic difference is gender: women made up 68.29% of the partner-

loss sample, compared with 52.62% of the full sample. Other control-variable distributions are presented in Table 2 but are not discussed in detail because they do not differ as sharply from the full-sample pattern.

Table 1. Descriptive statistics: full sample (n = 17,424)

Variable	Category	Mean/%
Dependent variable		
CES-D depression score		7.90
Independent variable		
Partner loss	Yes	11.70
	No	88.30
Control variables		
Age		59.56
Gender	Male	47.38
	Female	52.62
Hukou status	Agricultural *hukou*	91.02
	Non-agricultural or unified *hukou*	8.98
Education	Illiterate	24.64
	Primary or below, literate	46.94
	Middle school or above	28.43

Table 2. Descriptive statistics: partner-loss sample (n = 2,031)

Variable	Category	Mean/%
Dependent variable		
CES-D depression score		9.62
Independent variables		
Age at first partner loss		53.63
Had child at first partner loss	Yes	15.16
	No	84.84
Re-partnered after loss	Yes	20.43
	No	79.57
Control variables		
Age		68.23
Gender	Male	31.71
	Female	68.29
Hukou status	Agricultural *hukou*	91.63
	Non-agricultural or unified *hukou*	8.37
Education	Illiterate	41.41
	Primary or below, literate	41.41
	Middle school or above	17.18

Figure 1 shows the distribution of CES-D depression scores by partner-loss status. The boxplot suggests that respondents who had experienced partner loss had higher depressive symptoms than those who had not.

This pattern is also supported by the independent-samples t-test. Respondents without partner loss had an average CES-D score of 7.67, while respondents with partner loss had an average score of 9.61. The difference of about 1.94 points was statistically significant at the $p < 0.001$ level. This provides the first evidence that partner loss is associated with higher depressive symptoms in 2015.

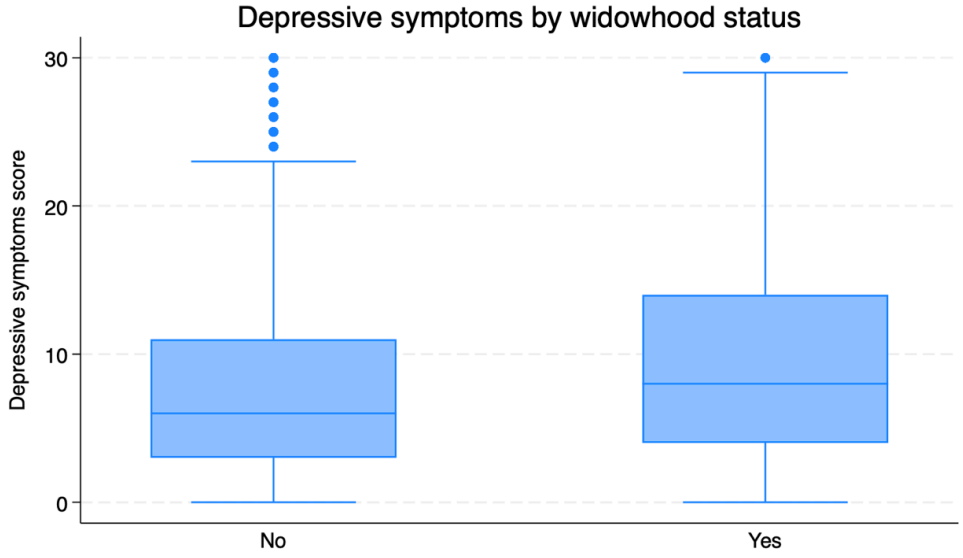

Figure 1. Distribution of CES-D depression scores by partner-loss status

4.2. OLS analysis

Table 3 reports the OLS regression results for the full sample. In the baseline model, partner loss was significantly associated with higher depressive symptoms. Respondents who had experienced partner loss scored 1.94 points higher on the CES-D scale than those who had not experienced partner loss. This association was statistically significant at the $p < 0.001$ level.

After adding age, *hukou* status, education, and gender in the full model, the coefficient for partner loss decreased from 1.94 to 0.99, but it remained statistically significant at the $p < 0.001$ level. This means that part of the difference in depressive symptoms between respondents with and without partner loss can be explained by demographic and socioeconomic differences. However, even after accounting for these controls, partner loss was still associated with higher depressive symptoms. Among the control variables, age and female gender were positively associated with depressive symptoms, while non-agricultural or unified *hukou* and higher education levels were associated with lower depressive symptoms.

Table 4 reports the OLS regression results for the restricted partner-loss sample. In the baseline model, age at first partner loss was negatively associated with depressive symptoms, meaning that respondents who experienced partner loss at an older age tended to report slightly lower depressive symptoms. Re-partnering after loss was also associated with lower depressive symptoms, with re-partnered respondents scoring 1.54 points lower than those who did not re-partner. Having a child at first partner loss was not statistically significant.

However, after adding age, *hukou* status, education, and gender in the full model, none of the three partner-loss characteristics remained statistically significant. Age at first partner loss, having a child at first partner loss, and re-partnering after loss were no longer significantly associated with depressive symptoms after controls were added. This is an important result: while experiencing partner loss itself was strongly associated

with higher depressive symptoms in the full sample, differences within the partner-loss group were less clearly explained by the timing and circumstances of the loss. Instead, demographic and socioeconomic factors, especially gender, *hukou* status, and education, appeared to explain more of the variation within the restricted sample.

Table 3. OLS regression results for partner loss and depressive symptoms in the full sample

Variables	(1) Baseline	(2) Full model
Partner loss (ref: No partner loss)		
Yes	1.944***	0.992***
	(0.162)	*(0.168)*
Age		0.034***
		(0.005)
Female		1.660***
		(0.099)
Hukou status (ref: Agricultural *hukou*)		
Non-agricultural or unified *hukou*		-1.236***
		(0.153)
Education (ref: Illiterate)		
Primary or below, literate		-0.865***
		(0.132)
Middle school or above		-2.000***
		(0.144)
Constant	7.670***	5.948***
	(0.050)	*(0.341)*
Observations	17,424	17,424

Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 4. OLS regression results for partner-loss characteristics among respondents with partner loss

Variables	(1) Baseline	(2) Full model
Age at first partner loss	-0.031*	-0.014
	(0.012)	*(0.014)*
Child status at first partner loss (ref: No child at first partner loss)		
Had child at first partner loss	0.870	0.632
	(0.445)	*(0.439)*
Relationship after first partner loss (ref: Did not re-partner)		
Re-partnered after loss	-1.545***	-0.670
	(0.431)	*(0.421)*
Age		-0.041*
		(0.018)

Table 4. Continued

Female		2.180***
		(0.325)
Hukou status (ref: Agricultural *hukou*)		
Non-agricultural or unified *hukou*		-1.898***
		(0.504)
Education (ref: Illiterate)		
Primary or below, literate		-1.140**
		(0.360)
Middle school or above		-2.013***
		(0.482)
Constant	11.482***	12.681***
	(0.736)	*(1.259)*
Observations	2,031	2,031

Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

4.3. Heterogeneity analysis

Table 5 presents the gender heterogeneity analysis for the full sample. Among men, partner loss was positively associated with depressive symptoms, but the coefficient was not statistically significant. Among women, however, partner loss was significantly associated with higher depressive symptoms. Women who had experienced partner loss scored 1.34 points higher on the CES-D scale than women who had not experienced partner loss, and this association was significant at the $p < 0.001$ level. This suggests that the relationship between partner loss and depressive symptoms was stronger and more statistically clear among women than among men.

Table 6 presents the gender heterogeneity analysis within the restricted partner-loss sample. Among widowed men, re-partnering after loss was associated with a 1.31-point lower CES-D score and was statistically significant at the $p < 0.05$ level. Age at first partner loss and having a child at first partner loss were not statistically significant. Among widowed women, none of the three partner-loss characteristics was statistically significant. This suggests that within the partner-loss sample, the timing and circumstances of partner loss did not consistently explain depressive symptoms across gender groups. The only exception was re-partnering among men, which was associated with lower depressive symptoms.

Table 5. Gender heterogeneity analysis in the full sample

Variables	(1) Male	(2) Female
Partner loss (ref: No partner loss)		
Yes	0.403	1.339***
	(0.255)	*(0.221)*
Age	0.042***	0.026***
	(0.006)	*(0.007)*
Hukou status (ref: Agricultural *hukou*)		
Non-agricultural or unified *hukou*	-1.061***	-1.411***
	(0.201)	*(0.232)*

Table 5. Continued

Education (ref: Illiterate)		
Primary or below, literate	-0.607**	-0.987***
	(0.227)	*(0.167)*
Middle school or above	-1.798***	-2.049***
	(0.231)	*(0.197)*
Constant	5.281***	8.133***
	(0.460)	*(0.470)*
Observations	8,255	9,169

Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 6. Gender heterogeneity analysis among respondents with partner loss

Variables	(1) Male widowed	(2) Female widowed
Age at first partner loss	-0.028	-0.009
	(0.020)	*(0.019)*
Child status at first partner loss (ref: No child at first partner loss)		
Had child at first partner loss	1.014	0.506
	(0.814)	*(0.521)*
Relationship after first partner loss (ref: Did not re-partner)		
Re-partnered after loss	-1.311*	-0.238
	(0.592)	*(0.595)*
Age	0.024	-0.070**
	(0.028)	*(0.023)*
Hukou status (ref: Agricultural *hukou*)		
Non-agricultural or unified *hukou*	-1.500*	-2.171**
	(0.707)	*(0.690)*
Education (ref: Illiterate)		
Primary or below, literate	-0.055	-1.578***
	(0.672)	*(0.429)*
Middle school or above	-1.309	-2.045**
	(0.762)	*(0.662)*
Constant	8.269***	16.737***
	(1.936)	*(1.546)*
Observations	644	1,387

Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 7 presents the education heterogeneity analysis for the full sample. Partner loss was significantly associated with higher depressive symptoms across all three education groups. Among illiterate respondents, partner loss was associated with a 1.46-point higher CES-D score. Among respondents with primary-level education or below, partner loss was associated with a 0.64-point higher score. Among respondents with middle school education or above, partner loss was associated with a 1.26-point higher score. Although the magnitude varied across education groups, the association between partner loss and depressive symptoms remained significant in all three groups. This indicates that the emotional burden associated with partner loss was not limited to one education group.

Table 8 presents the education heterogeneity analysis within the restricted partner-loss sample. Across all three education groups, age at first partner loss, having a child at first partner loss, and re-partnering after loss were not statistically significant. This pattern is consistent with the main restricted-sample regression: among respondents who had already experienced partner loss, the specific timing and circumstances of the loss did not show a robust association with depressive symptoms after controls were included.

Table 7. Education heterogeneity analysis in the full sample

Variables	(1) Illiterate	(2) Primary/below	(3) Middle school+
Partner loss			
(ref: No partner loss)			
Yes	1.455***	0.635*	1.263***
	(0.293)	*(0.248)*	*(0.362)*
Age	-0.012	0.066***	0.014
	(0.010)	*(0.007)*	*(0.010)*
Hukou status			
(ref: Agricultural *hukou*)			
Non-agricultural or unified *hukou*	-2.012***	-1.440***	-0.943***
	(0.562)	*(0.264)*	*(0.198)*
Female	1.756***	1.699***	1.548***
	(0.239)	*(0.140)*	*(0.170)*
Constant	8.760***	3.286***	5.108***
	(0.682)	*(0.401)*	*(0.585)*
Observations	4,293	8,178	4,953

Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 8. Education heterogeneity analysis among respondents with partner loss

Variables	(1) Illiterate widowed	(2) Primary/below widowed	(3) Middle school+ widowed
Age at first partner loss	-0.018	-0.020	0.010
	(0.023)	*(0.021)*	*(0.035)*
Child status at first partner loss			
(ref: No child at first partner loss)			
Had child at first partner loss	0.791	0.311	2.131
	(0.623)	*(0.667)*	*(1.562)*

Table 8. Continued

Relationship after first partner loss (ref: Did not re-partner)			
Re-partnered after loss	-0.860	-0.413	-0.545
	(0.907)	*(0.588)*	*(0.817)*
Age	-0.091**	0.009	-0.039
	(0.030)	*(0.027)*	*(0.041)*
Hukou status (ref: Agricultural *hukou*)			
Non-agricultural or unified *hukou*	0.745	-2.609***	-2.443**
	(1.277)	*(0.771)*	*(0.793)*
Female	2.592***	1.855***	2.812***
	(0.617)	*(0.455)*	*(0.733)*
Constant	16.068***	8.802***	9.050***
	(2.108)	*(1.752)*	*(2.298)*
Observations	841	841	349

Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

5. Discussion

The results first show a clear overall association between partner loss and depression among middle-aged and older adults in China. Respondents who had experienced partner loss reported higher CES-D scores than those without partner loss, and this association remained significant after age, gender, *hukou* status, and education were taken into account. Within the restricted partner-loss sample, however, age at first partner loss, child status at the time of loss, and re-partnering did not remain stably significant after controls were added. This suggests that while partner loss itself is closely associated with later-life depression, variation within the partner-loss group is not fully explained by these event-history characteristics alone.

The heterogeneity analyses further clarify how this association differs across social groups. The association between partner loss and depression was more evident among women than among men, and the magnitude of the association varied across education groups. These patterns suggest that partner loss does not operate in the same way across all social groups. Gender may shape marital roles, the types of support lost after partner loss, and the process of rebuilding daily life. Education may also reflect longer-term differences in resources, health knowledge, and coping capacity.

Several limitations should be noted. First, this study examines associations rather than causal effects. The analysis uses baseline and full models to show how the association changes after age, gender, *hukou* status, and education are taken into account, but it does not establish that partner loss directly causes later depression. Second, the analysis is limited by the available CHARLS data. The 2014 Life History Survey provides valuable retrospective information on spouse and partner histories, allowing this study to construct age at first partner loss, child status at the time of loss, and re-partnering. However, it does not fully capture relationship quality before the loss, actual support from children, household income changes, living arrangement changes, or subjective grief. The child-status variable also requires caution. It identifies whether the respondent's first recorded child was born by the year of first partner loss, but it does not show whether that child was from the lost partnership or whether the child actually provided support. Because the proportion of respondents coded

as having a child at first partner loss is unexpectedly low, this measure may be affected by missing information or imperfect matching between spouse/partner histories and child histories. To address this limitation as much as possible, the study uses the available spouse/partner history and child history, and includes *hukou* status and education to account for broader socioeconomic differences.

6. Conclusion

This study examined the relationship between partner loss and depression among middle-aged and older adults in China. The results show that respondents who had experienced partner loss reported higher CES-D scores in 2015, and this association remained significant after controlling for age, gender, *hukou* status, and education. Within the partner-loss sample, age at first partner loss, child status at the time of first partner loss, and re-partnering showed some suggestive patterns in the baseline model, but these associations did not remain stable after demographic and socioeconomic controls were added.

The main contribution of this study is that it brings the event-history location of partner loss more directly into widowhood-depression research. Prior studies have examined widowhood, post-widowhood adjustment, social support, living arrangements, duration, and socioeconomic differences. This study builds on that work by asking when the first partner loss occurred, whether the respondent already had children at that time, and whether the respondent later re-partnered. These questions matter because they treat partner loss not as a homogeneous widowhood status, but as an event with its own timing, family context, and later relationship trajectory. Although these event-history variables did not remain significant in the full model, examining them still helps show why partner loss should be understood as a heterogeneous life event embedded in family context and social position.

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