The effects of parental loss in childhood on mental health in adults

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The effects of parental loss in childhood on mental health in adults

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ABSTRACT

The effects of parental loss in childhood on mental health in adults

Background: Previous research has focused on the mental health of children and adolescents who experienced parental loss. Studies so far have been investigating the short-term effects of loss rather than the long-term effects. Parental death in childhood has little identified yet as a risk factor for mental health problems in adulthood.

Objectives: The purpose of this study was to investigate the effects of parental loss in childhood as a risk factor for mental health problems, such as depression symptoms and suicidal ideation, in adults in the Republic of Korea.

Methods: This study used the Korean Welfare Panel Study (KOWEPS) data from 2006 to 2013 with follow-up examinations each year. Information on childhood (0−17 years of age) parental loss was collected retrospectively in 2006. Prevalence of depression symptoms was measured by the Korean version of the Center for Epidemiologic Studies Depression Scale (CES-D) each year. A cut-off of 16 points or more was used to define depression symptoms. After excluding missing values, the study subjects for depression symptom analyses included 13,671 (84,012 observations). In the suicidal ideation analyses, (9,285 subjects (26,986 observations) from 2011 to 2013 were included. A Generalized Estimating Equations (GEE) analysis was conducted to estimate odds ratios

(ORs) and 95% confidence intervals (95% CIs) of depression symptoms and suicidal ideation respectively in relation to parental loss in childhood.

Results: Among the study population (n=13,671), 26.2% (n=3,577) were suffering from depression symptoms, and 18.7% (n=2,566) had experienced parental loss in childhood. Parental loss was associated with depression symptoms (OR = 1.185; 95% CI: 1.114–1.260). After stratification by gender, the risk of depression symptoms was significant for both men and women who had experienced parental loss (OR = 1.189; 95% CI: 1.076−1.314 in men; OR = 1.174; 95% CI: 1.086−1.268 in women). ORs by age group indicated that middle-aged (OR = 1.229; 95% CI: 1.115–1.354) and elderly (OR = 1.184; 95% CI: 1.089–1.287) participants were significantly more likely to exhibit depression symptoms. Among the total population of 9,285, the number of people who experienced suicidal ideation was 12.8% (n=1,192). The number of people who experienced parental loss was 19.5% (n=1,814). Parental loss was associated with suicidal ideation (OR = 1.189; 95% CI: 1.041–1.358). After stratifying by gender, the risk of suicidal ideation was not significant for men or women who had experienced parental loss (OR = 1.194; 95% CI: 0.955−1.494 in men; OR = 1.163; 95% CI: 0.985–1.373 in women). ORs by age group indicated that middle-aged participants were at a significantly higher risk of suicidal ideation (OR = 1.260; 95% CI: 1.031–1.540). However, young adults and the elderly were not.

Conclusions: Parental death in childhood was positively associated with the risk of adulthood depression symptoms and suicidal ideation respectively. The risk of depression

symptoms was statistically significant for both men and women. The risk was significantly higher in middle-aged and elderly people. The risk of suicidal ideation was significant for middle-aged people. Therefore, this study identified that parental death in childhood negatively affected mental health in adults. In this regard, the results of this study will help policy development of family support programs for bereaved families.

Keywords: parental loss, depression symptoms, suicidal ideation, longitudinal study

I. Introduction

Mental health-related problems, such as depression and suicide, are one of the most challenging public health concerns. It is estimated that almost 350 million people suffer from depression globally.[1,2] Depressive disorder is expected to become the leading cause of disease-related burden worldwide by 2030.[3] The suicide rate in the Republic of Korea was 29.1 per 100,000 persons in 2012, which is more than twice the global average of 12.1 per 100,000 persons, and it has continuously occupied the highest rank for the last 10 years among the Organization for Economic Cooperation and Development (OECD) member countries.[4,5]

Many studies have suggested that various factors could lead individuals to suffer from depression and suicidal ideation. For instance, parental death during childhood can be a traumatic factor that produces grief, despondency, and depression when faced with a similar condition in adult life.[6] Bereavement has been suggested to elevate the risk of suicidality.[7-9] Kessler et al. reported a significant association between childhood bereavement and later onset of psychiatric disorders.[10] Some studies show that adulthood depression is associated with early harmful exposure, such as long-term separation from a parent and parental death.[11,12] The studies mentioned above have focused on the short-term effects of parental loss on the mental health of children and adolescents.[13,14] Although family disruption may significantly affect children by impairing their ability to make successful transitions to adult life, childhood bereavement has not been studied

extensively as a risk factor for mental health problems in adult life.

Several previous studies reported positive associations between parental loss during childhood and adulthood depression, whereas others have reported no association. Most previous studies were conducted in the USA[12,15,16] or in European countries.[17,18] Relatively few studies have been conducted to examine the association between parental loss and adulthood depression in Asian countries.[19] Several previous studies have reported that childhood adversity (e.g., parental loss, parental separation and divorce, sexual, physical, and emotional abuse) is associated with an increased risk of adult depression,[20-23] whereas others have reported no association.[24] However, only few studies have examined the association between parental loss in childhood and suicidal ideation in adulthood.

Therefore, the present study focuses on examining childhood parental loss as one of the risk factors of adulthood depression symptoms and suicidal ideation.

II. Objectives

The purpose of this study is to investigate the effects of parental loss in childhood as a mental health risk factor in adults.

The detailed objectives of this study are as follows:

1) To investigate the associations of childhood parental loss with depression symptoms in adults
2) To investigate the associations of childhood parental loss with suicidal ideation in adults

III. Literature Review

Bereavement can be viewed as a normal, natural experience, one that most people manage to come to terms with over the course of time. However, parental loss during childhood is viewed as an event so traumatic that it not only produces immediate grief and despondency but also predisposes the sufferer to react with depression, making him/her more likely to develop depression when faced with loss or rejection in adult life. Akerman and Statham implied that children who lose a parent can continue to be afflicted by the trauma throughout their lifetime.[25] Fauth et al. identified that among a nationally representative sample of 5 to 16 years, 3.5% had experienced the death of a parent.[26]

Bereavement has been associated with various psychological symptoms and illnesses.[27] Reviews of the studies on childhood bereavement following parental death reported that children in such situations experience a wide range of emotional and behavioral responses to grief.[28,29] In addition to the psychological and emotional effects of childhood bereavement, several studies have suggested that parental separation, such as through death, is strongly associated with an increased risk of major depression.[30,31]

Brent et al. identified that compared to a non-bereaved comparison group, bereaved offspring had higher rates of depression (10.2% vs. 2.4%).[32] Moreover, 25–45% had mild levels of depression symptoms, and 10–20% showed clinical levels.[33] Buckley et al. (2009) identified that acutely bereaved individuals had increased levels of depression symptoms, anxiety, and anger compared with non-bereaved individuals.[34]

Bereavement is a period of intense suffering for most individuals, associated with an increased risk of developing mental and physical health problems, such as loneliness, suicidal ideation, cutting of social ties/economic support, and disease.[35] Some longitudinal studies suggested that children and adolescents exposed to sudden parental death were at an increased risk of depression during the first year, which persisted into the second year after the death.[36,37] Cerel et al. investigated the effect of parental death on psychiatric sequelae during the first two years after the bereavement compared to non-bereaved children.[38] Bereavement was associated with increased psychiatric problems during the two years following parental death. Brent et al. identified that the period of increased incidence of depression in the exposed group lasted approximately 18 months after the initial exposure.[39]

In particular, for a hypothetical parental loss event at age 10, it is predicted that the risk for major depression increases dramatically and then returns relatively quickly to baseline at age 25.[40] Adulthood depression is linked to early childhood adversity, including long-term separation from a parent and parental death. In particular, financial instability after parental loss can make children more symptomatic.[41] The 1970 British Cohort Study reported that childhood bereavement did have some long-term impact at age 30. For example, men who had experienced childhood bereavement were found to be less likely to be employed at age 30. Children from disrupted families had a significantly lower chance of gaining a degree qualification and being employed at age 30.[42] The negative impact of childhood bereavement or disruption on these educational measures

was far more apparent for boys, particularly those from bereaved families.

Brown and Harris examined the long-term impact of early maternal loss and demonstrated that this major stressor can render individuals vulnerable to recurrent depression.[43] Survivors often experience suicidal thoughts either as a result of their desire to join the deceased or because of depression and grief. Compared to typical bereaved and non-bereaved individuals, family members of suicide completers are more likely to suffer from mental health problems such as depression[32] and suicidal ideation.[44] In particular, within bereaved offspring, the risk of depression between 9 and 21 months after the death tended to be higher in those whose parents had died by suicide than in those with parental loss due to natural death (18.9% vs. 1.3%).[32]

The offspring of suicide attempters have higher rates of suicide attempts compared to the offspring of non-attempters. Suicide attempts by parents may lead to negative social consequences, including within the family environment.[45,46] Maternal suicide was also found to be associated with an increased risk of hospitalization by suicide attempt (HR=1.80; 95% CI=1.29–2.74).[40] Among ideators, a suicide plan is associated with a high risk of making an attempt. Indeed, 60% of transitions from ideation to plan and attempt occur within the first year, after the onset of ideation.[40] Thus, suicide is a major public health challenge in addition to the loss of the deceased.

A population-based study examined the psychiatric antecedents and sequelae of bereaved offspring.[36] Bipolar disorder was shown commonly in those who died due to suicide or accident.[47] In several studies, adversity in childhood has been identified as a

biological mechanism for bereavement and depression symptoms. Buckley and his colleagues showed that the acutely bereaved had a higher level of cortisol and stress hormones. In addition, the acutely bereaved showed reduced appetite, total cholesterol, and low-density lipoprotein compared with the non-bereaved.[34] A Swedish longitudinal study found a significantly increased risk of hospitalization for depressive disorder in individuals who had experienced paternal death (HR=1.29; 95% CI=1.03–1.61). Moreover, Cho et al. observed an increase in the risk of being hospitalized for cardiovascular diseases, diabetes mellitus, or psychiatric disorders despite having no previous record of such diseases if the subject had experienced parental loss by suicide in childhood for both men and women (HR=2.14 in men, HR=1.61 in women).[48]

Patients who lose their parents at an early age have a higher percentage chance of suffering from mental disorders. Bereavement damages the patient's biological capacity to feel passion and enjoyment. Given the aforementioned studies, it is obvious that parental loss can lead to mental health problems ranging from grief and depression to suicidal behaviors.

IV. Materials and Methods

1. Study sample and Dataset

Data were obtained from the Korean Welfare Panel Study (KOWEPS) (Figure 1). The KOWEPS was launched in 2006 by the Korean Institute of Social and Health Affairs in conjunction with the Social Welfare Research Institute of Seoul National University as a longitudinal study consisting of an annual ongoing survey on a nationally representative sample of Korean households. Trained interviewers conducted face-to-face interviews at the participants' households using structured questionnaires. The first wave of KOWEPS started in 2006 with a sample of 18,856 participants from 7,072 households who were recruited by two-stage stratified cluster sampling at baseline in the Republic of Korea. A full description of the study can be found in the most recent version of the KOWEPS user's guide (www.koweps.re.kr).[49] The KOWEPS data are secondary data that do not contain private information, and they are openly available to researchers.

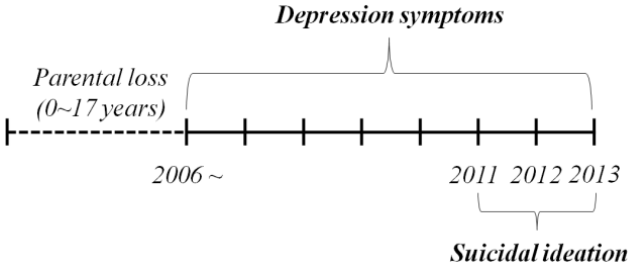

Figure 1. Data source (KOWEPS) and study period

In this study, KOWEPS data from 2006 to 2013 were used. Data is collected annually (Figure 2). The data analysis included adults aged 19 years and over. In 2006, a total of 18,856 survey participants were followed up from the KOWEPS baseline, of which 13,671 study subjects had completed the survey without missing values.

In the second wave, 17,478 subjects completed the survey. The annual data excluded those with missing values. Since 2012, the newly entered participants and missing values were excluded. For the first objective of the present study targeting depression symptoms, after excluding subjects without follow-up in 2013 or with any missing values, the pooled study dataset was 84,012 observations across the 8-year balanced panel. For the second objective involving suicidal ideation, the number of observations was 26,986 from 2011 to 2013.

Ethical approval for this study was granted by the Institutional Review Board (IRB) of the Graduate School of Public Health, Yonsei University (approval number 2-1040939-AB-N-01-2015-413), Seoul, Republic of Korea.[50]

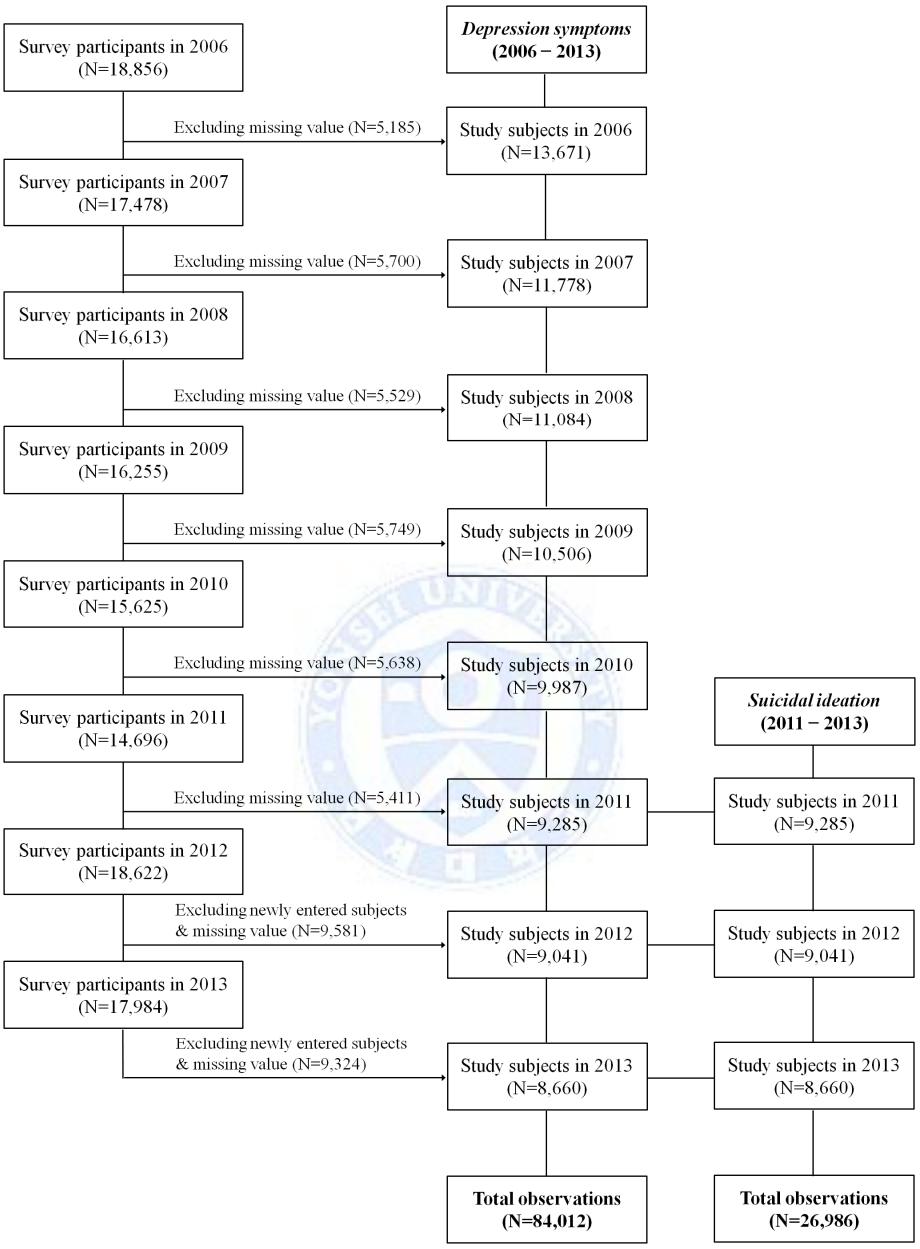

Figure 2. Flowchart for selection of study population from KOWEPS

2. Measures and Variables

A. Dependent variables

1) Depression symptoms

The KOWEPS used the Korean version of the Center for Epidemiologic Studies Depression Scale (CES-D) questionnaire with 11 items (CES-D-11), which was developed from the 20-item standard form CES-D.[51,52] In this study, to measure depression symptoms at the point of interview annually, we used questions such as "*How often have you experienced specific depression symptoms in the past week?"* (e.g., restless sleep, poor appetite, and feeling lonely) on an 11-item, 4-point Likert scale (0 = "rarely or never" to 3 = "most or all of the time"). The CES-D-11 score was multiplied by 20/11 to match the CES-D-20 score. Following the KOWEPS's guideline,[49] the total score of 11 items was calculated. The summed total score of the 11-item version ranged from 0 to 33. A cut-off of 16 points or more was used to define depression symptoms.

2) Suicidal Ideation

Suicidal ideation was assigned in 2011 (baseline). Thus, suicidal ideation was measured by *"Have you ever thought about committing suicide until now?"*(with "yes" or "no" response choices) in 2011. After 2012, suicide ideation was measured by *"Have you thought about committing suicide in the past 12 months?"*(with "yes" or "no" response

choices).

B. Independent variables

1) Parental loss

Childhood parental loss was defined as a disruption of the parent and child relationship. Information on childhood parental loss was collected retrospectively in 2006. Parental loss was assessed in the first wave of the KOWEPS survey in 2006 using the following question: *"During your childhood (0–17 years old), did you ever experience parental loss?"*(with "yes" or "no" response choices). In addition, participants who responded "yes" were asked to identify the age at which the loss occurred and the duration of the separation. If both parents had died, the time of bereavement was based on the first deceased.

2) Covariate

Covariate included age, gender, education, marital status, household income, area of residence, employment status, subjective health status, smoking status, possible alcoholism using CAGE (CAGE: Cut-down, Annoyed, Guilty, Eye-opener), chronic disease, and unmet healthcare needs.

Age was regarded as a continuous variable. Education level was examined in three groups: primary or less, middle or high school, and college or more. For the marital

status variable, individuals were divided into three states: married, unmarried, and other (divorced, widowed, and separated). Household income, which was a continuous variable, was divided by quartiles: lowest (quartile 1), low, high, highest (quartile 4). Area of residence was divided into three categories: metropolitan, urban, and rural. Subjective health status was distinguished as good, moderate, and poor. Employment status was dichotomized into employed (yes) and unemployed (no). The following variables were also dichotomized into "yes" and "no": smoking status, chronic disease, and unmet healthcare needs.

Possible alcoholism was assessed by four items: *"Have you ever felt you ought to **cut-down** on your drinking?", "Have people **annoyed** you by criticizing your drinking?", "Have you ever felt bad or **guilty** about your drinking?",* and *"Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover (as an **eye-opener**)?"*. Those who answered yes to two or more of the four items were considered to have possible alcoholism.

3. Statistical Analyses

Data analyses were conducted according to two main objectives: For the first objective, a total of 13,671 participants and a total of 84,012 observations were included in the statistical analyses. For the second objective, a total of 9,285 participants and a total of 26,986 observations were included in the statistical analyses.

The differences in the distributions for characteristics of individuals were assessed by chi-squared tests (categorical variables). The correlates of CES-D scores occurring between each year were examined by means of standard parametric univariate statistics. Generalized Estimating Equations (GEE) analyses were used to estimate the risks of the prevalence of depression symptoms and suicidal ideation after adjustment of age, gender, education, area of residence, marital status, household income, employment status, smoking status, possible alcoholism, chronic diseases, and subjective health status.

The risks were expressed as odds ratios (ORs) with 95% confidence intervals (95% CIs). In addition, the identical analyses were conducted after stratification by age group and gender. Depression symptoms, suicidal ideation, and all covariates were measured annually and treated as time-varying variables allowing multiple transitions. All statistical tests were two-tailed, and statistical significance was set at $p < 0.05$. Data analyses were performed using SAS software, version 9.3 (SAS Institute Inc., Cary, NC, USA).

V. Results

1. Depression symptoms

The study population's baseline characteristics of depression symptoms (2006) are summarized in Table 1. Among the total population of 13,671, the number of people who experienced depression symptoms was 3,577 (26.2%). The number of people who experienced parental loss was 2,566 (18.7%). The mean age was 53.9 years in the depression symptoms dataset. In terms of age group, 33.4% were young adults (19-39 years), 41.1% were middle-aged (40-64 years), and 25.5% were elderly (≥65 years). The distribution of gender was 44.8% men and 55.2% women.

Table 1. Baseline Characteristics of study subjects for depression symptom analyses (2006)

Variables	n=13,671	%	Variables	n=13,671	%
Depression symptoms			**Area of residence**		
No	10,094	73.8	Metropolitan	6,271	45.9
Yes	3,577	26.2	Urban	4,351	31.8
Parental loss			Rural	3,049	22.3
No	11,115	81.3	**Employment status**		
Yes	2,556	18.7	No	6,957	50.9
Age			Yes	6,714	49.1
Mean ± SD	53.9 ± 16.9		**Subjective health status**		
Young adults (19-39 years)	4,571	33.4	Good	7,846	57.4
Middle-aged (40-64 years)	5,616	41.1	Moderate	1,851	13.5
Elderly (≥65)	3,484	25.5	Poor	3,974	29.1
Gender			**Smoking status**		
Men	6,130	44.8	No	10,297	75.3
Women	7,541	55.2	Yes	3,374	24.7
Education			**CAGE**‡		
Primary or less	4,210	30.8	No	12,676	92.7
Middle or high school	5,766	42.2	Yes	995	7.3
College or more	3,695	27.0	**Chronic disease**		
Marital status			No	8,893	65.1
Married	9,279	67.9	Yes	4,778	35.0
Unmarried	2,040	14.9	**Unmet healthcare needs**		
Others†	2,352	17.2	No	12,775	93.5
Household income			Yes	896	6.6
Quartile 1 (lowest)	3,418	25.0			
Quartile 2	3,421	25.0			
Quartile 3	3,415	25.0			
Quartile 4 (highest)	3,417	25.0			

Note: p-value is based on chi-squared test statistic.
†Others included divorced, widowed, and separated.
‡CAGE (Cut-down, Annoyed, Guilty, Eye-opener)

Table 2 shows the baseline proportions of depression symptoms in 2006. Among the 13,671 subjects, the number of people who reported depression symptoms was 3,577 (26.2%). The number of people who experienced parental loss in childhood was 2,556 (18.7%). Among these, 885 (34.6%) reported depression symptoms. Young adults (15.9%), middle-aged (24.9%), and elderly (41.7%) people had experienced depression symptoms. The proportions of gender were 20.8% men and 30.6% women. For depression symptoms, the differences of characteristics were significant for all variables except smoking status.

Table 2. Baseline proportions of depression symptoms (2006)

Variables	Total	Depression symptoms				*p*-value
		No		Yes		
	n=13,671	n=10,094	73.8%	n=3,577	26.2%	
Parental loss						
No	11,115	8,423	75.8	2,692	24.2	<.0001
Yes	2,556	1,671	65.4	885	34.6	
Age (years)						
Mean±SD	50.0±17.2	47.7±16.5		56.7±17.2		
Young adults (19-39 years)	4,571	3,846	84.1	725	15.9	<.0001
Middle-aged (40-64 years)	5,616	4,216	75.1	1,400	24.9	
Elderly (≥65)	3,484	2,032	28.3	1,452	41.7	
Gender						
Men	6,130	4,858	79.3	1,272	20.8	<.0001
Women	7,541	5,236	69.4	2,305	30.6	
Education						
Primary or less	4,210	2,428	57.7	1,782	42.3	<.0001
Middle or high school	5,766	4,460	77.4	1,306	22.7	
College or more	3,695	3,206	86.8	489	13.2	
Marital status						
Married	9,279	7,274	78.4	2,005	21.6	<.0001
Unmarried	2,040	1,680	82.4	360	17.7	
Others†	2,352	1,140	48.5	1,212	51.5	
Household income						
Quartile 1 (lowest)	3,418	1,880	55.0	1,538	45.0	<.0001
Quartile 2	3,421	2,397	70.1	1,024	29.9	
Quartile 3	3,415	2,764	80.9	651	19.1	
Quartile 4 (highest)	3,417	3,053	89.4	364	10.7	
Area of residence						
Metropolitan	6,271	4,649	74.1	1,622	25.9	<.0001
Urban	4,351	3,285	75.5	1,066	24.5	
Rural	3,049	2,160	70.8	889	29.2	
Employment status						
No	6,957	4,655	66.9	2,302	33.1	<.0001
Yes	6,714	5,439	81.0	1,275	19.0	
Subjective health status						
Good	7,846	6,726	85.7	1,120	14.3	<.0001
Moderate	1,851	1,343	72.6	508	27.4	
Poor	3,974	2,025	51.0	1,949	49.0	
Smoking status						
No	10,297	7,582	73.6	2,715	26.4	0.3595
Yes	3,374	2,512	74.5	862	25.6	
CAGE‡						
No	12,676	9,407	74.2	3,269	25.8	0.0004
Yes	995	687	69.1	308	31.0	
Chronic disease						
No	8,893	7,333	82.5	1,560	17.5	<.0001
Yes	4,778	2,761	57.8	2,017	42.2	
Unmet healthcare needs						
No	12,775	9,750	76.3	3,025	23.7	<.0001
Yes	896	344	38.4	552	61.6	

Note: p-value are based on chi-squared test statistic.
†Others included divorced, widowed, and separated.
‡CAGE (Cut-down, Annoyed, Guilty, Eye-opener)

Table 3 summarizes the total ORs on depression symptoms and childhood parental loss experiences. Each variable was demonstrated in the GEE analyses. Parental loss was associated with depression symptoms (OR = 1.185; 95% CI: 1.114–1.260).

Women showed significantly higher rates of depression symptoms than did men (OR = 1.463; 95% CI: 1.367−1.565). The ORs for depression symptoms of those with primary or less education (OR = 1.501; 95% CI: 1.358–1.658) or middle or high school (OR = 1.299; 95% CI: 1.202–1.405) compared to college or more were significant. Lower household income (OR = 2.251; 95% CI: 2.086–2.429), poor health status (OR = 2.970; 95% CI: 2.810–3.138), and unmet healthcare needs (OR = 2.193; 95% CI: 2.006–2.397) were associated with depression symptoms.

Table 3. Association between parental loss in childhood and depression symptoms in adulthood

Variables	OR*	95% CI	*p*-value
Parental loss			
No	1.000		
Yes	1.185	(1.114 – 1.260)	<.0001
Year	0.879	(0.872 – 0.887)	<.0001
Age	0.998	(0.996 – 1.001)	0.2010
Gender			
Men	1.000		
Women	1.463	(1.367 – 1.565)	<.0001
Education			
Primary or less	1.501	(1.358 – 1.658)	<.0001
Middle or high school	1.299	(1.202 – 1.405)	<.0001
College or more	1.000		
Marital status			
Married	1.000		
Unmarried	1.387	(1.261 – 1.525)	<.0001
Others†	1.671	(1.569 – 1.781)	<.0001
Household income			
Quartile 1 (lowest)	2.251	(2.086 – 2.429)	<.0001
Quartile 2	1.799	(1.678 – 1.929)	<.0001
Quartile 3	1.238	(1.157 – 1.325)	<.0001
Quartile 4 (highest)	1.000		
Area of residence			
Metropolitan	1.286	(1.206 – 1.371)	<.0001
Urban	1.196	(1.119 – 1.279)	<.0001
Rural	1.000		
Employment status			
No	1.228	(1.170 – 1.289)	<.0001
Yes	1.000		
Subjective health status			
Good	1.000		
Moderate	1.530	(1.452 – 1.611)	<.0001
Poor	2.970	(2.810 – 3.138)	<.0001
Smoking status			
No	1.000		
Yes	1.325	(1.238 – 1.418)	<.0001
CAGE‡			
No	1.000		
Yes	1.534	(1.421 – 1.656)	<.0001
Chronic disease			
No	1.000		
Yes	1.122	(1.065 – 1.183)	<.0001
Unmet healthcare needs			
No	1.000		
Yes	2.193	(2.006 – 2.397)	<.0001

*Odds ratios were estimated using GEE analyses.
†Others included divorced, widowed, and separated.
‡CAGE (Cut-down, Annoyed, Guilty, Eye-opener)

The effects of childhood parental loss on depression symptoms by gender are shown in Table 4. The ORs by gender indicate that men and women showed significantly higher rates of depression symptoms in men (OR = 1.189; 95% CI: 1.076−1.314) and in women (OR = 1.174; 95% CI: 1.086−1.268, respectively).

Regarding the men, those with the lowest education compared to those with the highest education level showed significantly higher rates of depression symptoms (OR = 1.478; 95% CI: 1.285−1.699). Rates of depression symptoms for those in the lowest (OR = 2.115; 95% CI: 1.872–2.389) and second lowest (OR = 1.699; 95% CI: 1.522–1.896) income quartiles differed significantly compared to that of the highest quartile. Unemployed men showed significantly higher rates of depression symptoms compared to employed men (OR = 1.598; 95% CI: 1.475−1.732).

Meanwhile, regarding the women, those with the lowest education compared to the highest education level showed significantly higher rates of depression symptoms (OR = 1.621; 95% CI: 1.402−1.875). Risk of depression symptoms differed significantly in the lowest (OR = 2.258; 95% CI: 2.047–2.491) and second lowest (OR = 1.819; 95% CI: 1.661–1.992) income quartiles compared to the highest income quartiles. Unemployed women did not show significantly higher rates of depression symptoms compared to employed women (OR = 1.038; 95% CI: 0.977−1.102).

Table 4. Effect of childhood parental loss on adulthood depression symptoms by gender

Variables	Men		Women	
	OR*	95% CI	OR*	95% CI
Parental loss				
No	1.000		1.000	
Yes	1.189	(1.076 – 1.314)	1.174	(1.086 – 1.268)
Year	0.865	(0.853 – 0.877)	0.885	(0.876 – 0.895)
Age	0.998	(0.994 – 1.002)	0.999	(0.996 – 1.002)
Education				
Primary or less	1.478	(1.285 – 1.699)	1.621	(1.402 – 1.875)
Middle or high school	1.229	(1.102 – 1.371)	1.381	(1.230 – 1.550)
College or more	1.000		1.000	
Marital status				
Married	1.000		1.000	
Unmarried	1.367	(1.187 – 1.576)	1.346	(1.174 – 1.545)
Others†	2.102	(1.866 – 2.369)	1.522	(1.410 – 1.642)
Household income				
Quartile 1 (lowest)	2.115	(1.872 – 2.389)	2.258	(2.047 – 2.491)
Quartile 2	1.699	(1.522 – 1.896)	1.819	(1.661 – 1.992)
Quartile 3	1.138	(1.025 – 1.265)	1.297	(1.187 – 1.416)
Quartile 4 (highest)	1.000		1.000	
Area of residence				
Metropolitan	1.257	(1.130 – 1.399)	1.270	(1.172 – 1.376)
Urban	1.228	(1.100 – 1.370)	1.155	(1.062 – 1.256)
Rural	1.000		1.000	
Employment status				
No	1.598	(1.475 – 1.732)	1.038	(0.977 – 1.102)
Yes	1.000		1.000	
Subjective health status				
Good	1.000		1.000	
Moderate	1.490	(1.366 – 1.626)	1.546	(1.448 – 1.650)
Poor	3.110	(2.842 – 3.404)	2.890	(2.695 – 3.100)
Smoking status				
No	1.000		1.000	
Yes	1.317	(1.215 – 1.428)	1.505	(1.317 – 1.721)
CAGE‡				
No	1.000		1.000	
Yes	1.540	(1.410 – 1.680)	1.700	(1.423 – 2.031)
Chronic disease				
No	1.000		1.000	
Yes	1.159	(1.066 – 1.259)	1.087	(1.015 – 1.163)
Unmet healthcare needs				
No	1.000		1.000	
Yes	2.012	(1.737 – 2.329)	2.311	(2.061 – 2.591)

*Odds ratios were estimated using GEE analyses.
†Others included divorced, widowed, and separated.
‡CAGE (Cut-down, Annoyed, Guilty, Eye-opener)

Table 5 shows the effect of childhood parental loss on depression symptoms by age group. ORs by age group indicated that middle-aged (OR = 1.229; 95% CI: 1.115–1.354), and elderly (OR = 1.184; 95% CI: 1.089–1.287) people showed significantly higher rates of depression symptoms. However, young adults did not show significantly higher rates of depression symptoms.

In young adults (19-39 years), women were associated with depression symptoms more than men (OR = 1.753; 95% CI: 1.495−2.056). Those with middle or high school compared to those with the highest education level showed significantly higher rates of depression symptoms (OR = 1.454; 95% CI: 1.293−1.635). Rates of depression symptoms for those in the lowest (OR = 2.199; 95% CI: 1.820–2.656) and second lowest (OR = 1.717; 95% CI: 1.501–1.964) income quartiles differed significantly from those in the highest quartile. Unemployed young adults exhibited depression symptoms more than the employed group (OR = 1.228; 95% CI: 1.103–1.367).

Meanwhile, in the middle-aged group (40-64 years), women were associated with depression symptoms more than men (OR = 1.449; 95% CI: 1.300−1.615). Those with the lowest education compared to those with the highest education level showed significantly higher rates of depression symptoms (OR = 1.315; 95% CI: 1.133−1.526). Household income quartiles differed significantly. The lowest income quartile was associated with depression symptoms more than the highest income quartile (OR = 2.431; 95% CI: 2.161–2.735). In addition, the second lowest income quartile was significantly more likely to exhibit depression symptoms (OR = 1.920; 95% CI: 1.734–2.125).

Unemployed individuals were associated with depression symptoms more than employed individuals (OR = 1.287; 95% CI: 1.189−1.392).

In the elderly group (≥65 years), women were associated with depression symptoms more than men (OR = 1.426; 95% CI: 1.284−1.584). Elderly people with lower education levels were at a significantly greater risk for depression symptoms (OR = 1.714; 95% CI: 1.387–2.119). Risk of depression symptoms for those in the lowest (OR = 2.127; 95% CI: 1.821–2.485) and second lowest (OR = 1.707; 95% CI: 1.456–2.001) income quartiles differed significantly from those in the highest quartile. Unemployed individuals were associated with depression symptoms more than employed individuals (OR = 1.165; 95% CI: 1.076−1.262).

Table 5. Effect of childhood parental loss on adulthood depression symptoms by age group

Variables	Young age (19-39 years)		Middle aged (40-64 years)		Elderly (≥ 65 years)	
	OR*	95% CI	OR*	95% CI	OR*	95% CI
Parental loss						
No	1.000		1.000		1.000	
Yes	1.100	(0.921 – 1.315)	1.229	(1.115 – 1.354)	1.184	(1.089 – 1.287)
Year	0.836	(0.815 – 0.857)	0.873	(0.860 – 0.885)	0.892	(0.880 – 0.903)
Age	1.000	(0.986 – 1.013)	0.987	(0.981 – 0.993)	1.019	(1.013 – 1.026)
Gender						
Men	1.000		1.000		1.000	
Women	1.753	(1.495 – 2.056)	1.449	(1.300 – 1.615)	1.426	(1.284 – 1.584)
Education						
Primary or less	1.653	(0.883 – 3.095)	1.315	(1.133 – 1.526)	1.714	(1.387 – 2.119)
Middle or high school	1.454	(1.293 – 1.635)	1.098	(0.974 – 1.238)	1.425	(1.149 – 1.767)
College or more	1.000		1.000		1.000	
Marital status						
Married	1.000		1.000		1.000	
Unmarried	1.389	(1.205 – 1.602)	1.521	(1.263 – 1.832)	1.894	(0.997 – 3.596)
Others†	1.898	(1.480 – 2.433)	2.001	(1.805 – 2.217)	1.413	(1.296 – 1.540)
Household income						
Quartile 1 (lowest)	2.199	(1.820 – 2.656)	2.431	(2.161 – 2.735)	2.127	(1.821 – 2.485)
Quartile 2	1.717	(1.501 – 1.964)	1.920	(1.734 – 2.125)	1.707	(1.456 – 2.001)
Quartile 3	1.209	(1.072 – 1.363)	1.293	(1.175 – 1.424)	1.163	(0.982 – 1.378)
Quartile 4 (highest)	1.000		1.000		1.000	
Area of residence						
Metropolitan	1.277	(1.077 – 1.516)	1.295	(1.165 – 1.440)	1.260	(1.150 – 1.381)
Urban	1.194	(1.001 – 1.426)	1.147	(1.026 – 1.283)	1.213	(1.105 – 1.331)
Rural	1.000		1.000		1.000	
Employment status						
No	1.228	(1.103 – 1.367)	1.287	(1.189 – 1.392)	1.165	(1.076 – 1.262)
Yes	1.000		1.000		1.000	
Subjective health status						
Good	1.000		1.000		1.000	
Moderate	1.768	(1.561 – 2.002)	1.581	(1.462 – 1.709)	1.460	(1.339 – 1.591)
Poor	2.301	(1.892 – 2.799)	3.084	(2.826 – 3.364)	2.991	(2.750 – 3.253)
Smoking status						
No	1.000		1.000		1.000	
Yes	1.236	(1.047 – 1.459)	1.472	(1.324 – 1.636)	1.234	(1.110 – 1.372)
CAGE‡						
No	1.000		1.000		1.000	
Yes	2.059	(1.766 – 2.401)	1.483	(1.334 – 1.649)	1.218	(1.044 – 1.422)
Chronic disease						
No	1.000		1.000		1.000	
Yes	1.347	(1.171 – 1.549)	1.133	(1.051 – 1.223)	1.118	(1.023 – 1.222)
Unmet healthcare needs						
No	1.000		1.000		1.000	
Yes	1.978	(1.564 – 2.502)	2.196	(1.926 – 2.504)	2.308	(1.997 – 2.667)

*Odds ratios were estimated using GEE analyses.
†Others included divorced, widowed, and separated.
‡CAGE (Cut-down, Annoyed, Guilty, Eye-opener)

2. Suicidal ideation

The study population's baseline characteristics of suicidal ideation (2011) are summarized in Table 6. Among the total population of 9,285, the number of people who experienced suicidal ideation was 1,192 (12.8%). The number of people who experienced parental loss was 1,814 (19.5%). The mean age was 50.0 years in the suicidal ideation dataset. In terms of age group, 19.8% were young adults (19-39 years), 43.9% were middle-aged (40-64 years), and 36.3% were elderly (≥ 65 years). The distribution of gender was 43.2% men and 56.8% women.

Table 6. Baseline characteristics of study subjects for suicidal ideation analyses (2011)

Variables	n=9,285	%	Variables	n=9,285	%
Suicidal ideation			**Area of residence**		
No	8,093	87.2	Metropolitan	3,900	42.0
Yes	1,192	12.8	Urban	3,022	32.6
Parental loss			Rural	2,363	25.5
No	7,471	80.5	**Employment status**		
Yes	1,814	19.5	No	4,270	46.0
Age			Yes	5,015	54.0
Mean ± SD	50.0 ± 17.2		**Subjective health status**		
Young adults (19-39 years)	1,835	19.8	Good	5,061	54.5
Middle-aged (40-64 years)	4,076	43.9	Moderate	2,071	22.3
Elderly (≥65)	3,374	36.3	Poor	2,153	23.2
Gender			**Smoking status**		
Men	4,015	43.2	No	7,416	79.9
Women	5,270	56.8	Yes	1,869	20.1
Education			**CAGE**‡		
Primary or less	3,162	34.1	No	8,649	93.2
Middle or high school	3,871	41.7	Yes	636	6.9
College or more	2,252	24.3	**Chronic disease**		
Marital status			No	4,267	46.0
Married	6,457	69.5	Yes	5,018	54.0
Unmarried	840	9.1	**Unmet healthcare needs**		
Others†	1,988	21.4	No	9,101	98.0
Household income			Yes	184	2.0
Quartile 1 (lowest)	2,576	27.7	**Depression symptoms**		
Quartile 2	2,322	25.0	No	7,772	83.7
Quartile 3	2,209	23.8	Yes	1,513	16.3
Quartile 4 (highest)	2,178	23.5			

*Odds ratios were estimated using GEE analyses.
†Others included divorced, widowed, and separated.
‡CAGE (Cut-down, Annoyed, Guilty, Eye-opener)

Table 7 shows the baseline proportions of suicidal ideation in 2011. Among the 9,285 subjects, the number who reported suicidal ideation was 1,192 (12.8%). The number who experienced parental loss in childhood was 1,814 (19.5%) individuals. Among these, 286 (15.8%) reported suicidal ideation. Young adults (9.6%), middle-aged (14.3%), and elderly (12.8%) people had experienced suicidal ideation. The proportions of gender were 10.5% men and 14.6% women. For suicidal ideation, the differences of characteristics were significant for all variables except possible alcoholism using CAGE.

Table 7. Baseline proportions of suicidal ideation (2011)

Variables	Total	Suicidal ideation				*p*-value
		No		Yes		
	N=9,285	n=8,093	87.2%	n=1,192	12.8%	
Parental loss						
No	7,471	6,565	87.9	906	12.1	<.0001
Yes	1,814	1,528	84.2	286	15.8	
Age (years)						
Mean ± SD	56.1±16.4	55.9±16.6		5.1±14.9		
Young adults (19-39 years)	1,835	1,659	90.4	176	9.6	<.0001
Middle-aged (40-64 years)	4,076	3,492	85,7	584	14.3	
Elderly (≥65)	3,374	2,942	87.2	432	12.8	
Gender						
Men	4,015	3,594	89.5	421	10.5	<.0001
Women	5,270	4,499	85.4	771	14.6	
Education						
Primary or less	3,162	2,695	85.2	467	14.8	<.0001
Middle or high school	3,871	3,345	86.4	526	13.6	
College or more	2,252	2,053	91.2	199	8.8	
Marital status						
Married	6,457	5,741	88.9	716	11.1	<.0001
Unmarried	840	748	89.1	92	11.0	
Others†	1,988	1,604	80.7	384	19.3	
Household income						
Quartile 1 (lowest)	2,576	2,119	82.3	457	17.7	<.0001
Quartile 2	2,322	1,982	85.4	340	14.6	
Quartile 3	2,209	1,977	89.5	232	10.5	
Quartile 4 (highest)	2,178	2,015	92.5	163	7.5	
Area of residence						
Metropolitan	3,900	3,346	85.8	554	14.2	0.000
Urban	3,022	2,637	87.3	385	12.7	
Rural	2,363	2,110	89.3	253	10.7	
Employment status						
No	4,270	3,629	85.0	641	15.0	<.0001
Yes	5,015	4,464	89.0	551	11.0	
Subjective health status						
Good	5,061	4,552	89.9	509	10.1	<.0001
Moderate	2,071	1,779	85.9	292	14.1	
Poor	2,153	1,762	81.8	391	18.2	
Smoking status						
No	7,416	6,490	87.5	926	12.5	0.048
Yes	1,869	1,603	85.8	266	14.2	
CAGE‡						
No	8,649	7,546	87.3	1,103	12.8	0.400
Yes	636	547	86.0	89	14.0	
Chronic disease						
No	4,267	3,846	90.1	421	9.9	<.0001
Yes	5,018	4,247	84.6	771	15.4	
Unmet healthcare needs						
No	9,101	7,953	87.4	1,143	12.6	<.0001
Yes	184	135	73.4	49	26.6	
Depression symptoms						
No	7,772	7,022	90.4	750	9.7	<.0001
Yes	1,513	1,071	70.8	442	29.2	

Note: p-values are based on chi-squared test statistic.
†Others included divorced, widowed, and separated.
‡CAGE (Cut-down, Annoyed, Guilty, Eye-opener)

Table 8 summarizes total ORs on suicidal ideation and childhood parental loss experience. Parental loss was associated with suicidal ideation (OR = 1.189; 95% CI: 1.041–1.358). Women showed significantly higher rates of suicidal ideation than did men (OR = 1.261; 95% CI: 1.079−1.474). Those with middle or high school compared to college or more education (OR =1.367; 95% CI: 1.146–1.629) showed significantly higher rates of suicidal ideation. Those in the lowest income quartile (OR = 2.170; 95% CI: 1.772–2.656), with poor health status (OR = 1.268; 95% CI: 1.072–1.500), and with depression symptoms (OR = 4.416; 95% CI: 3.906–4.993) were strongly associated with suicidal ideation.

Table 8. Association between parental loss in childhood and suicidal ideation in adulthood

Variables	OR*	95% CI	*p* -value
Parental loss			
No	1.000		
Yes	1.189	(1.041 – 1.358)	0.011
Year	0.484	(0.452 – 0.518)	<.0001
Age	0.973	(0.967 – 0.978)	<.0001
Gender			
Men	1.000		
Women	1.261	(1.079 – 1.474)	0.004
Education			
Primary or less	1.205	(0.953 – 1.523)	0.120
Middle or high school	1.367	(1.146 – 1.629)	0.001
College or more	1.000		
Marital status			
Married	1.000		
Unmarried	0.708	(0.561 – 0.893)	0.004
Others†	1.219	(1.058 – 1.404)	0.006
Household income			
Quartile 1 (lowest)	2.170	(1.772 – 2.656)	<.0001
Quartile 2	1.655	(1.381 – 1.983)	<.0001
Quartile 3	1.288	(1.080 – 1.536)	0.005
Quartile 4 (highest)	1.000		
Area of residence			
Metropolitan	1.393	(1.201 – 1.616)	<.0001
Urban	1.208	(1.037 – 1.407)	0.015
Rural	1.000		
Employment status			
No	1.161	(1.027 – 1.311)	0.017
Yes	1.000		
Subjective health status			
Good	1.000		
Moderate	1.144	(0.981 – 1.333)	0.086
Poor	1.268	(1.072 – 1.500)	0.006
Smoking status			
No	1.000		
Yes	1.553	(1.318 – 1.829)	<.0001
CAGE‡			
No	1.000		
Yes	1.202	(0.966 – 1.495)	0.098
Chronic disease			
No	1.000		
Yes	1.480	(1.280 – 1.712)	<.0001
Unmet healthcare needs			
No	1.000		
Yes	1.621	(1.199 – 2.193)	0.002
Depression symptoms			
No	1.000		
Yes	4.416	(3.906 – 4.993)	<.0001

*Odds ratios were estimated using GEE analyses.
†Others included divorced, widowed, and separated.
‡CAGE (Cut-down, Annoyed, Guilty, Eye-opener)

The effects of childhood parental loss on suicidal ideation by gender are shown in Table 9. The ORs by gender indicated that neither men nor women were significantly more likely to engage in suicidal ideation (OR = 1.194; 95% CI: 0.955−1.494 for men and OR = 1.163; 95% CI: 0.985–1.373 for women).

Regarding the men, those with the lowest education compared to those with the highest education level were not significantly more likely to engage in suicidal ideation (OR = 1.179; 95% CI: 0.844−1.647). Rates of suicidal ideation for those in the lowest (OR = 2.164; 95% CI: 1.543–3.035) and second lowest (OR = 1.627; 95% CI: 1.217–2.175) income quartiles differed significantly compared to the highest quartiles. Unemployed men were more likely to engage in suicidal ideation compared to employed men (OR = 1.412; 95% CI: 1.141−1.747).

Meanwhile, regarding the women, those with middle or high school education compared to the highest education level were significantly more likely to engage in suicidal ideation (OR = 1.375; 95% CI: 1.080−1.750). Risk of suicidal ideation differed significantly in the lowest (OR = 2.024; 95% CI: 1.570–2.610) and second lowest (OR = 1.600; 95% CI: 1.266–2.021) income quartiles compared to the highest income quartiles. Unemployed women were not more likely to engage in suicidal ideation compared to employed women (OR = 0.957; 95% CI: 0.829−1.104).

Table 9. Effect of childhood parental loss on adulthood suicidal ideation by gender

Variables	Men		Women	
	OR*	95% CI	OR*	95% CI
Parental loss				
No	1.000		1.000	
Yes	1.194	(0.955 – 1.494)	1.163	(0.985 – .373)
Year	0.490	(0.438 – 0.548)	0.478	(0.439 – 0.521)
Age	0.981	(0.972 – 0.991)	0.968	(0.961 – 0.975)
Education				
Primary or less	1.179	(0.844 – 1.647)	1.277	(0.930 – 1.754)
Middle or high school	1.224	(0.947 – 1.582)	1.375	(1.080 – 1.750)
College or more	1.000		1.000	
Marital status				
Married	1.000		1.000	
Unmarried	1.146	(0.828 – 1.587)	0.377	(0.259 – 0.549)
Others†	1.548	(1.194 – 2.008)	1.159	(0.976 – 1.376)
Household income				
Quartile 1 (lowest)	2.164	(1.543 – 3.035)	2.024	(1.570 – 2.610)
Quartile 2	1.627	(1.217 – 2.175)	1.600	(1.266 – 2.021)
Quartile 3	1.114	(0.833 – 1.490)	1.418	(1.135 – 1.771)
Quartile 4 (highest)	1.000		1.000	
Area of residence				
Metropolitan	1.240	(0.966 – 1.592)	1.468	(1.219 – 1.768)
Urban	1.132	(0.880 – 1.455)	1.256	(1.036 – 1.522)
Rural	1.000		1.000	
Employment status				
No	1.412	(1.141 – 1.747)	0.957	(0.829 – 1.104)
Yes	1.000		1.000	
Subjective health status				
Good	1.000		1.000	
Moderate	1.157	(0.902 – 1.482)	1.129	(0.931 – 1.370)
Poor	1.335	(1.008 – 1.769)	1.242	(1.009 – 1.530)
Smoking status				
No	1.000		1.000	
Yes	1.380	(1.136 – 1.677)	2.553	(1.933 – 3.372)
CAGE‡				
No	1.000		1.000	
Yes	1.268	(0.988 – 1.626)	1.307	(0.788 – 2.169)
Chronic disease				
No	1.000		1.000	
Yes	1.465	(1.150 – 1.867)	1.481	(1.237 – 1.774)
Unmet healthcare needs				
No	1.000		1.000	
Yes	1.218	(0.709 – 2.090)	1.839	(1.274 – 2.654)
Depression symptom				
No	1.000		1.000	
Yes	3.967	(3.206 – 4.907)	4.593	(3.949 – 5.342)

*Odds ratios were estimated using GEE analyses.
†Others included divorced, widowed, and separated.
‡CAGE (Cut-down, Annoyed, Guilty, Eye-opener)

Table 10 shows the effect ORs by age group indicated that middle-aged people were significantly more likely to engage in suicidal ideation (OR = 1.260; 95% CI: 1.031–1.540). However, young adults and the elderly were not (Table 10).

In young adults (19-39 years), women were associated with suicidal ideation more than men (OR = 2.271; 95% CI: 1.347–3.827). Rates of suicidal ideation for those in the lowest (OR = 2.033; 95% CI: 1.000–4.133) and second highest (OR = 1.456; 95% CI: 1.037–2.044) income quartiles differed significantly from those in the highest quartile. The unemployed in the young age group were not more likely to engage in suicidal ideation compared to the employed group (OR = 0.981; 95% CI: 0.697–1.379). Young adults who experienced parental loss with depression symptoms were strongly associated with suicidal ideation (OR = 6.932; 95% CI: 4.767–10.081).

Meanwhile, in the middle-aged group (40-64 years), women were significantly more likely to engage in suicidal ideation than men (OR = 1.422; 95% CI: 1.126−1.795). Those with the lowest education compared to those with the highest education level were not significant in suicidal ideation (OR = 1.179; 95% CI: 0.923−1.506). Household income quartiles differed significantly. The lowest income quartile compared to the highest quartile was highly likely to engage in suicidal ideation (OR = 2.323; 95% CI: 1.763–3.060). In addition, the second lowest income quartile was significantly more likely to engage in suicidal ideation (OR = 1.753; 95% CI: 1.386–2.218). Unemployed individuals were less likely to engage in suicidal ideation (OR = 1.075; 95% CI: 0.903–1.279). Middle-aged people who had experienced parental loss with depression symptoms

were highly likely to engage in suicidal ideation (OR = 4.374; 95% CI: 3.611–5.298).

In the elderly group (≥ 65 years), women were not more likely to engage in suicidal ideation than men (OR = 0.983; 95% CI: 0.779–1.240). Elderly people with lower education levels were not significant in suicidal ideation (OR = 0.943; 95% CI: 0.609–1.460). Those in the lowest income quartile compared to the highest income quartile were more likely to engage in suicidal ideation (OR =1.572; 95% CI: 1.004–2.462). Unemployed individuals were more likely to engage in suicidal ideation compared to employed individuals (OR = 1.403; 95% CI: 1.143−1.723). Elderly people who had experienced parental loss with depression symptoms were strongly associated with an increased risk of suicidal ideation (OR = 4.202; 95% CI: 3.532–5.000).

Table 10. Effect of childhood parental loss on adulthood suicidal ideation by age group

Variables	Young age (19-39 years)		Middle aged (40-64 years)		Elderly (≥ 65 years)	
	OR*	95% CI	OR*	95% CI	OR*	95% CI
Parental loss						
No	1.000		1.000		1.000	
Yes	1.224	(0.762 – 1.967)	1.260	(1.031 – 1.540)	1.113	(0.924 – 1.341)
Year	0.354	(0.279 – 0.450)	0.436	(0.393 – 0.484)	0.570	(0.516 – 0.630)
Age	1.021	(0.977 – 1.067)	0.984	(0.973 – 0.996)	0.944	(0.928 – 0.959)
Gender						
Men	1.000		1.000		1.000	
Women	2.271	(1.347 – 3.827)	1.422	(1.126 – 1.795)	0.983	(0.779 – 1.240)
Education**						
Less~ high school	1.126	(0.811 – 1.563)	1.179	(0.923 – 1.506)	0.943	(0.609 – 1.460)
College or more	1.000		1.000		1.000	
Marital status						
Married	1.000		1.000		1.000	
Unmarried	0.733	(0.511 – 1.050)	1.246	(0.843 – 1.841)	2.109	(0.959 – 4.638)
Others†	1.001	(0.463 – 2.165)	1.398	(1.132 – 1.725)	1.302	(1.066 – 1.591)
Household income						
Quartile 1 (lowest)	2.033	(1.000 – 4.133)	2.323	(1.763 – 3.060)	1.572	(1.004 – 2.462)
Quartile 2	1.228	(0.801 – 1.882)	1.753	(1.386 – 2.218)	1.165	(0.735 – 1.847)
Quartile 3	1.456	(1.037 – 2.044)	1.261	(1.002 – 1.587)	1.001	(0.610 – 1.644)
Quartile 4 (highest)	1.000		1.000		1.000	
Area of residence						
Metropolitan	1.110	(0.677 – 1.818)	1.314	(1.049 – 1.645)	1.363	(1.105 – 1.682)
Urban	1.105	(0.664 – 1.837)	1.159	(0.917 – 1.465)	1.178	(0.948 – 1.463)
Rural	1.000		1.000		1.000	
Employment status						
No	0.981	(0.697 – 1.379)	1.075	(0.903 – 1.279)	1.403	(1.143 – 1.723)
Yes	1.000		1.000		1.000	
Subjective health status						
Good	1.000		1.000		1.000	
Moderate	2.242	(1.496 – 3.361)	1.148	(0.943 – 1.397)	0.816	(0.639 – 1.042)
Poor	1.618	(0.805 – 3.252)	1.279	(1.012 – 1.616)	1.050	(0.827 – 1.332)
Smoking status						
No	1.000		1.000		1.000	
Yes	1.878	(1.099 – 3.211)	1.484	(1.167 – 1.887)	1.729	(1.342 – 2.226)
CAGE‡						
No	1.000		1.000		1.000	
Yes	1.186	(0.678 – 2.074)	1.192	(0.903 – 1.574)	1.153	(0.699 – 1.901)
Chronic disease						
No	1.000		1.000		1.000	
Yes	1.532	(1.035 – 2.270)	1.370	(1.148 – 1.636)	1.323	(0.977 – 1.791)

*Odds ratios were estimated using GEE analyses.
**For age group, primary or less (n=0) and middle aged or high school of education (n=0) were combined due to low sample size.
†Others included divorced, widowed, and separated.
‡CAGE (Cut-down, Annoyed, Guilty, Eye-opener)

Table 10. continued

Variables	Young age (19-39 years)		Middle aged (40-64 years)		Elderly (≥ 65 years)	
	OR*	95% CI	OR*	95% CI	OR*	95% CI
Unmet healthcare needs						
No	1.000		1.000		1.000	
Yes	1.885	(0.691 – 5.143)	1.398	(0.875 – 2.234)	1.798	(1.158 – 2.790)
Depression symptom						
No	1.000		1.000		1.000	
Yes	6.932	(4.767 – 10.081)	4.374	(3.611 – 5.298)	4.202	(3.532 – 5.000)

*Odds ratios were estimated using GEE analyses.
**For age group, primary or less (n=0) and middle aged or high school of education (n=0) were combined due to low sample size.
†Others included divorced, widowed, and separated.
‡CAGE (Cut-down, Annoyed, Guilty, Eye-opener)

VI. Discussion

1. Discussion of study methods

Previous studies have focused on the short-term effect of parental loss in childhood on mental health. Brent et al. reported on depression symptoms in youth related to parental loss through following up on the onset of depression from the point of parental loss.[32] The prospective study design from the exposure point appears to be suitable for identifying the effect of parental loss, but in reality, it is difficult to follow up on a substantial number of study participants for longer periods (i.e., until they are middle-aged or older). A possible alternative is to collect the data on parental loss retrospectively.

The present study used KOWEPS data with information on parental loss in childhood and on current status of depression symptoms in adulthood. Parental loss information was gathered by a retrospective question relying on recall, and the temporality of the two variables was secured. However, the time gap between exposure and outcome was varied, with a range from several years to decades, which may have diluted the bereavement effect. In the present study, stratified analyses were performed, because young adults were most recently exposed to parental loss. However, another methodological consideration is that only KOWEPS participants were included, and a considerable number of people with parental loss may not have taken part in KOWEPS.

Thus, it is hard to exclude the possibility of selection bias. Taken together, the long-term effect of parental loss in childhood observed in the present study may be underestimated, but the present study showed a significantly positive association. Therefore, the true effect of parental loss might be larger than the risks shown in the present study.

To investigate the impact of parental loss in childhood more precisely, there may be a need to recruit people with parental loss experiences. However, this method will be far more challenging, because those people with parental loss are more likely to have lower socioeconomic status and less likely to participate in a study. In this context, KOWEPS was suitable to investigate the impact of parental loss, because it is nationally representative data containing a substantial number of people with lower socioeconomic status in the Republic of Korea. Nonetheless, KOWEPS, a panel study, might not be appropriate to test the present hypotheses. The reason is that parental loss in childhood as an independent variable has a fixed effect, whereas a longitudinal analysis has an advantage when the association between two time-varying variables is tested. However, through conducting a GEE analysis, time-varying covariates that can affect depression symptoms and suicidal ideation each year could be considered. Further studies are needed to estimate the risk more accurately, but the present study is meaningful, in that the most available and nationally representative data were used.

2. Discussion of the results

The present study investigated whether parental loss in childhood was associated with depression symptoms and suicidal ideation in adulthood.

Among the study population in 2006 (n=13,671), 26.2% (n=3,577) were suffering from depression symptoms. Those who experienced parental loss in childhood were 18.7% (n=2,566). Among the total population (n=9,285) in 2011, the proportions of suicidal ideation were 12.8% (n=1,192). Those who experienced parental loss in childhood were 19.5% (n=1,814). Also adults who have experienced bereavement were 1.185 times more likely to show depressive symptoms and had a 1.189 times higher risk of suicidal ideation.

According to a previous study, adult depression was suggested to be related to childhood depression.[53] A depressive childhood was related to the initial psychological diagnosis after the parents' death, and it was suggested to be caused by their separation from their parents in the course of their growth. However, because this study was based on the KOWEPS's findings, which used adults over the age of 19 as subjects, data about childhood depression due to parental loss was unavailable.

The study of Stroebe et al. has shown that the bereaved are at the highest risk for death during the six months after a family loss and that the risk remains high for several years.[35] However, previous studies have mostly investigated the progression of depression and suicidal ideation in bereaved youth several months after the loss of their

parents,[32] and most subjects were children or young adults. In addition, adversity such as parental loss in childhood was much less investigated whether it was associated with depression and suicidal ideation in adulthood or not.

Women are more sensitive to parental loss compared to men.[54] The results show that men adults who had experienced parental loss were 1.189 times more likely to show depressive symptoms and women adults with parental loss experiences were 1.174 times more likely to have depression. However, the risk of suicidal ideation was not as significant in both men and women. According to stratified analyses by age group, the risk of depression was 1.229 times higher in the middle-aged group and 1.184 times higher in the elderly. The risk of suicidal ideation was 1.260 times higher in the middle-aged group. However, this study found no evidence that parental death increased the risk of mental health problems in the young age group.

It is possible that the high level of depression in the middle-aged group was directly related to the adverse environmental effects of parental loss during their growth. However, it is more likely that relatively recent indirect factors also influenced the increased risk of depression. For instance, the bereaved offspring must live under a lot of stress, as they must take care of both their remaining parent and their children at the same time.

Comijs et al.'s study suggested that depressive symptoms were found among (OR=1.80, 95% CI=1.21–2.69) 55 to 85 years subjects who experienced childhood adversity.[55] The results of this study show that among the elderly who experienced

parental loss in childhood, 26.2% reported depression symptoms. In general, particularly early in bereavement, most people suffer from acute psychological distress.

According to a nationally representative sample study, 3.5% of 5 to 16 years had experienced the death of a parent or sibling in Great Britain. Of the children younger than 18 years, 3.4% experienced the death of a parent and 4.2% have no parent in the United States.[56,57] Unlike the aforementioned study, this study found that 18.7% have experienced the death of a parent, which is a huge difference compared to the aforementioned study. Subjects (children vs. adults) could be attributed to the difference. Also compared to the earlier study, middle-aged or elderly subjects in this study are likely to have experienced parental death due to national crisis, such as war, plague.

Khan et al.'s study found that approximately half a million people committed suicide in Asia, leaving 12 million family members to experience loss and grief.[58] Statistics of the Ministry of Health and Welfare in Korea reported that 699 households were parentless families in 2011. The leading causes were identified as parental loss (36.8%) and parental divorce (27.4%).[59] Beck found that 27% of the subjects with high depression scores on a depression inventory showed a significantly higher incidence of orphanage before the age of 16 compared with the non-depressed group.[60]

People who experience hardship in childhood may develop learned helplessness or difficulty in establishing attachments, making them more vulnerable to depressive symptoms when they experience stressful life events. In this regard, the present study is consistent with this, as childhood adversity caused by a disrupted family would be more

likely to increase the risk of adult depression.

Kendler et al.'s study predicted that for a hypothetical parental loss event at age 10, the risk of major depression increases dramatically and then returns relatively quickly to baseline at age 25.[40] Within the bereaved group, depression between 9 and 21 months was associated with the loss of a mother rather than a father (41.9% vs. 13.7%) and a previous history of any psychiatric disorder (57.1% vs. 32.9%).[32] In addition, Gilman and Kawachi confirmed that the lifetime risk of depression in adults was associated with parental divorce.[46] Due to the different characteristics of men and women, parental divorce during childhood is associated with lifetime suicide attempt or suicidal ideation within a year before the measurement only among women.[61,62]

However, because this study did not take divorce and gender into account, this study were not able to examine the derived differences from elements such as divorce and gender. Since divorce rates have been increasing substantially, we would like to stress that we urgently need to conduct studies on the mental health of children and adolescents and see the mental effects that divorce has on grown adults.

A British Cohort Study suggested that children from bereaved or disrupted families experience increased socioeconomic disadvantages, such as education, income, and employment (no qualifications and professional or managerial occupation).[42] Bereavement (such as due to the suicide of a parent) may have an impact on traumatic events, and then it may influence mental health and economic difficulties from adolescence to adulthood. Individuals who experience parental loss during their

childhood are more likely to be raised by others due to the economic burden. In this study, we were able to demonstrate a link between childhood adversity and adulthood depression symptoms.

3. Strengths and Limitations

The present study has several strengths. First, our data gained significance by extracting a large nationwide representative sample, which increased the generalizability of the results of this study. Second, bereavement-related mental health studies have been conducted overseas. Most of the studies in bereavement up to this point have examined specific groups. However, this study included all kinds of adult groups in the sample. Third, depression symptoms were follow up for eight years (from 2006 to 2013) for a long-term effect, and suicidal ideation was followed up for three years (from 2011 to 2013). Although level of suicidal ideation was included in 2011, which resulted in a relatively shorter period of follow up, the results are still valuable, in that few studies have reported that childhood adversity affects future suicidal ideation in adulthood. Finally, after the confounders were adjusted, this study found that adults who experienced parental loss in childhood had different rates of depression symptoms and suicidal ideation depending on age group and gender.

Despite this study's strengths, several limitations should be considered. First, the subjects enrolled in KOWEPS were not immediately enrolled after parental loss. Thus, the present study may be under the influence of selection bias. The actual risk of mental health problems is likely to be greater, because people suffering from severe illnesses or socioeconomic problems were not likely to participate in the survey.

Second, a review study[68] found that children were influenced by several mediating factors, such as age, individual attributes, level of family support, social environment, and economic factors. However, because of the limitation of the KOWEPS, the present study did not investigate sleep problems, physical activity, or social factors that could partly explain depression symptoms or suicidal ideation.

4. Major contribution and Policy implication

It has been discovered that parental loss increases the risk of depressive symptoms in middle-aged and elderly people. Parental loss also increases the risk of suicidal ideation in middle-aged people. This indicates that the potential mental effect of childhood bereavement is uncovered in middle age after being suppressed for many years.

This can be explained by three separate reasons.

First, childhood mental issues could turn up in middle age due to a lack of proper treatment and management in childhood. Thus, the issue may be repressed throughout adolescence and discovered afterward. This possibility does not conflict with short-term studies that assert that one experiences acute depression symptoms right after bereavement and returns to baseline as time passes. As indicated by the Kendler et al. study, the mental impact from childhood bereavement returns to baseline once a certain period of time passes.[40]

Second, from another perspective, the symptoms may be derived from environmental factors that may have been caused by bereavement in the growth period. For instance, level of education, financial wellbeing, etc. may be the real reasons for these symptoms. On this point, mental health problems that appear in middle age may be caused by something other than childhood bereavement itself. However, as revealed by the British Cohort Study, socioeconomic disadvantages in childhood are associated with

the formation of adult depression symptoms, because bereaved children experience increased socioeconomic disadvantages, such as poor education, low income, and employment (no qualifications and professional or managerial occupation).

Finally, we must keep in mind that such mental health issues that appear in middle age can be extended to the elderly. The results of this study demonstrate that the risk of depression symptoms due to childhood bereavement in the elderly is similar to that of the middle-aged. This implication suggests that mental health issues from middle age extend to old age and should not be ignored. Several studies illustrate that Asians do not prioritize recognizing the symptoms of depression, and people with depressive symptoms are less likely to visit mental health professionals due to the stigma of mental illness.[63,64]

According to an OECD survey, Koreans' consumption of antidepressants is one-third the OECD average.[65] This can be attributed to the fact that a considerable number of depression patients refuse medical treatment because they worry about their treatment leaving a record. Kim et al. identified that among those who reported depression symptoms, only 17.4% received professional mental health consultation.[66] These cultural and social factors make it difficult for people to seek out mental health services. Thus, it is fundamental to eliminate social prejudice against psychotherapy.

According to previous studies, among suicide ideators, suicide planning is associated with a high risk of attempt. Indeed, 60% of transitions from ideation to planning and attempt occur within the first year after onset of ideation.[67] Especially, death

by suicide is more common after repeated attempts than the first attempt.[68] Such results confirm that suicidal ideation is a definite factor leading to suicide.

The results of the present study confirmed that the risk of suicidal ideation is high in middle age. Since suicidal ideation is a personal and repressed mental event, suicidal ideation is hard to spot on the surface unless the patient attempts suicide. Therefore, measuring how many times a patient thinks of suicide is not an easy task. Especially, questions about suicidal thoughts are acquired through consulting with a medical expert about mental issues or through some form of investigation. Regardless of one's depressive mental status, when confronted with suicidal ideation, people rarely seek help from experts. Thus, mental issues are constantly repressed, and such accumulated repression can lead to radical behavior, causing harm to society as a whole.

Despite being on the decline, the suicide rate among Koreans still ranks the highest among OECD members.[4] Therefore, on top of raising awareness about suicide, there is currently a sustained corporate effort to prevent suicide. Despite various suicide management programs started because of increasing pressure from suicide figures, there has been no noticeable improvement.

The national suicide prevention project in Finland conducted psychological autopsies of suicide attempters. The number of suicides was at its highest in 1990. They established multiple levels based on the fundamental issues and risk factors related to suicide. Consequently, they achieved an over 40% decrease in suicide mortality in twenty years.[69] In Japan, by training gatekeepers that are useful in suicide prevention and

providing the appropriate mental diagnoses, Japan started reinforcing their collaborative effort with civilian organizations. The seriousness of this public health issue has been leading to the production of various policies not only in Japan.[70]

This public health concern is not solely our own. We intend to work as an effective medium to provide a solution to this problem as well as highlight several key pieces of information in the personal and government contexts. On a personal level, one must ask for help from others so one can receive emotional support or expert consulting. One must try to prevent the situation from deteriorating and to alleviate one's current symptoms.

This study identified that without immediate care, traumatic events can have tragic consequences despite the passage of time. In addition, this study found that preventative management and active treatment are vital to mental health. Therefore, countries need to be vigilant about carrying out preventive management and active treatment of mental health problems caused by parental loss. In addition, we must highlight that when it comes to targeting mental health services, targeting individuals is more effective than targeting a general population. Based on our result that indicates that early childhood mental issues can influence adulthood, new policies and strategies should be designed to operate differently depending on the age group to which the patient belongs.

Using the aforementioned results as evidence, public mental health-related policies should provide comprehensive medical care and mental health management to reduce health risks in individuals with complex and challenging disorders.

VII. Conclusion

This study found that parental death in childhood was associated with the risk of adulthood depression symptoms and suicidal ideation. Adults who experienced childhood bereavement had a higher risk of depressive symptoms and suicidal ideation. The risk of depression symptoms was statistically significant for both men and women, and it was significantly higher in middle-aged and elderly people.

In particular, adults with childhood bereavement experiences had a higher risk of suicidal ideation even after being adjusted for depressive symptoms in addition to other confounders. However, men and women were not at a significantly higher risk of suicidal ideation, but middle-aged adults were.

In conclusion, we have confirmed that parental death in childhood has mental effects that carry on into adulthood. These findings may be important for reducing mental health problems through early interventions. Therefore, the results of this study will help policy development of family support programs for bereaved families.

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Appendix

Further details about the identification for analyses of age of subjects when parental loss are provided in the Appendix Tables.

Table A1. Baseline characteristics of study subjects who experienced parental loss for depression symptom analyses (2006)

Table A2. Baseline characteristics of study subjects who experienced parental loss for suicidal ideation analyses (2011)

Figure A1. Years passed after parental loss and CES-D score (Total)

Figure A2. Years passed after parental loss and CES-D score (Young adults)

Figure A3. Years passed after parental loss and CES-D score (Middle-aged)

Figure A4. Years passed after parental loss and CES-D score (Elderly)

Figure A5. Years passed after parental loss and CES-D score (Men)

Figure A6. Years passed after parental loss and CES-D score (Women)

Table A1. Baseline characteristics of study subjects who experienced parental loss for depression symptom analyses (2006)

Variables	Total	Depression symptoms				*p*-value
		No		Yes		
	N=2,556	n=1,671	65.4%	n=885	34.6%	
Age of subject when parental loss						
0-12 years	1,677	1,079	64.3	598	35.7	0.140
13-17 years	879	592	67.3	287	32.7	
Age (years)						
Mea ±SD	60.0±15.4	62.8±14.8		62.8±13.6		
Young adults (19-39 years)	478	372	77.8	106	22.2	<.0001
Middle-aged (40-64 years)	1,132	784	69.3	348	30.7	
Elderly (≥65)	946	515	54.4	431	45.6	
Gender						
Men	1,141	818	71.7	323	28.3	<.0001
Women	1,415	853	60.3	562	39.7	
Education						
Primary or less	1,179	652	55.3	527	44.7	<.0001
Middle or high school	1,064	758	71.2	306	28.8	
College or more	313	261	83.4	52	16.6	
Marital status						
Married	1,792	1,283	71.6	509	28.4	<.0001
Unmarried	176	131	74.4	45	25.6	
Others†	588	257	43.7	331	56.3	
Household income						
Quartile 1 (lowest)	853	421	49.4	432	50.6	<.0001
Quartile 2	706	454	64.3	252	35.7	
Quartile 3	563	411	73.0	152	27.0	
Quartile 4 (highest)	434	385	88.7	49	11.3	
Area of residence						
Metropolitan	1,125	713	63.4	412	36.6	0.002
Urban	781	550	70.4	231	29.6	
Rural	650	408	62.8	242	37.2	
Subjective health status						
Good	1,161	947	81.6	214	18.4	<.0001
Moderate	371	239	64.4	132	35.6	
Poor	1,024	485	47.4	539	52.6	
Employment status						
No	1,390	800	57.6	590	42.5	<.0001
Yes	1,166	871	74.7	295	25.3	
Smoking status						
No	1,911	1,253	65.6	658	34.4	0.761
Yes	645	418	64.8	227	35.2	
CAGE‡						
No	2,363	1,545	65.4	818	34.6	1.000
Yes	193	126	65.3	67	34.7	
Chronic disease						
No	1,335	1,022	76.6	313	23.5	<.0001
Yes	1,221	649	53.2	572	46.9	
Unmet healthcare needs						
No	2,358	1,606	68.1	752	31.9	<.0001
Yes	198	65	32.8	133	67.2	

Note: p-values are based on chi-squared test statistic.
†Others included divorced, widowed, and separated.
‡CAGE (Cut-down, Annoyed, Guilty, Eye-opener)

Table A2. Baseline characteristics of study subjects who experienced parental loss for suicidal ideation analyses (2011)

Variables	Total	Suicidal ideation				*p*-value
		No		Yes		
	N=1,814	n=1,528	84.2%	n=286	15.8%	
Age of subject when parental loss						
0-12 years	1,200	999	83.2	201	16.8	0.124
13-17 years	614	529	66.2	85	13.8	
Age (years)						
Mean, SD	62.0±14.8	62.2±15.0		61.1±13.8		
Young adults (19-39 years)	168	146	86.9	22	13.1	0.024
Middle-aged (40-64 years)	707	575	81.3	132	18.7	
Elderly (≥65)	939	807	85.9	132	14.1	
Gender						
Men	780	681	87.3	99	12.7	0.002
Women	1,034	847	81.9	187	18.1	
Education						
Primary or less	903	757	83.8	146	16.2	0.259
Middle or high school	715	598	83.6	117	16.4	
College or more	196	173	88.3	23	11.7	
Marital status						
Married	1,215	1,044	85.9	171	14.1	0.017
Unmarried	70	58	82.9	12	17.1	
Others†	529	426	80.5	103	19.5	
Household income						
Quartile 1 (lowest)	720	595	82.6	125	17.4	0.011
Quartile 2	484	396	81.8	88	18.2	
Quartile 3	338	293	86.7	45	13.3	
Quartile 4 (highest)	272	244	89.7	28	10.3	
Area of residence						
Metropolitan	721	591	82.0	130	18.0	0.017
Urban	559	468	83.7	91	16.3	
Rural	534	459	87.8	65	12.2	
Employment status						
No	952	792	83.2	160	16.8	0.225
Yes	862	736	85.4	126	14.6	
Subjective health status						
Good	748	652	87.2	96	12.8	0.016
Moderate	496	409	82.5	87	17.5	
Poor	570	467	81.9	103	18.1	
Smoking status						
No	1,457	1,235	84.8	222	15.2	0.211
Yes	357	293	82.1	64	17.9	
CAGE‡						
No	1,687	1,420	84.2	267	15.8	0.895
Yes	127	108	85.0	19	15.0	
Chronic disease						
No	626	546	87.2	80	12.8	0.014
Yes	1,188	982	82.7	206	17.3	
Unmet healthcare needs						
No	1,771	1,495	84.4	276	15.6	0.249
Yes	43	33	76.7	10	23.3	
Depression symptom						
No	1,401	1,241	88.6	160	11.42	<.0001
Yes	413	287	69.5	126	30.5	

Note: p-values are based on chi-squared test statistic.
†Others included divorced, widowed, and separated.
‡CAGE (Cut-down, Annoyed, Guilty, Eye-opener)

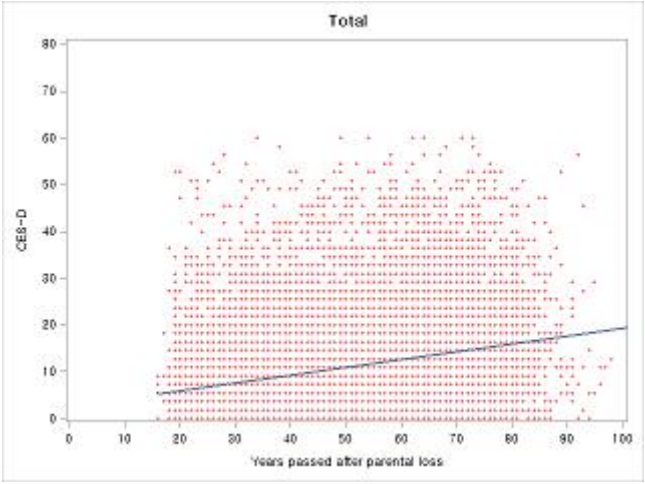

Figure A1. Years passed after parental loss and CES-D score (Total)

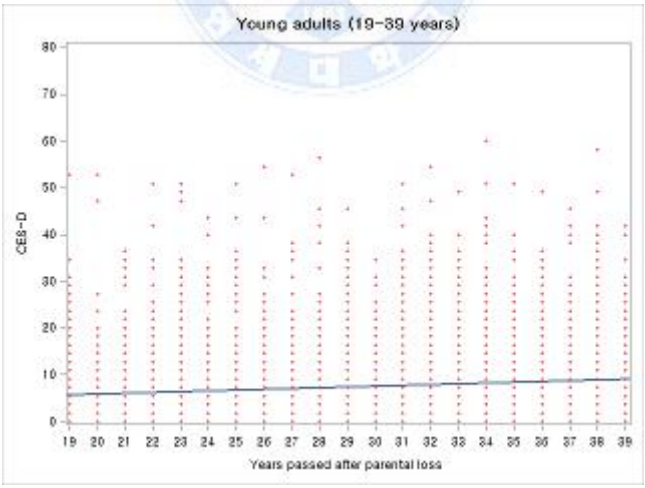

Figure A2. Years passed after parental loss and CES-D score (Young adults)

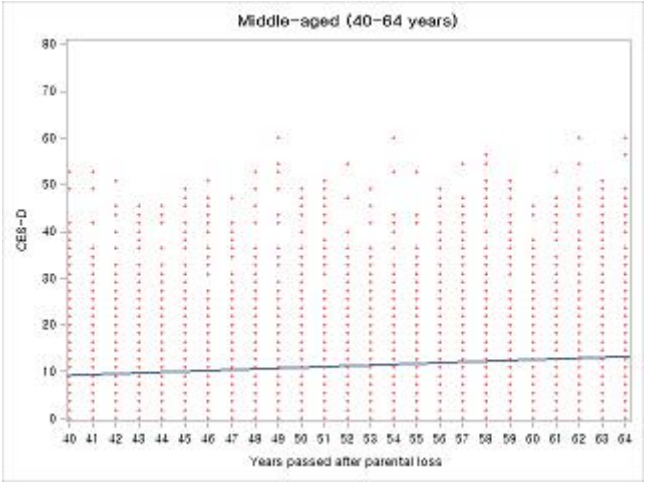

Figure A3. Years passed after parental loss and CES-D score (Middle-aged)

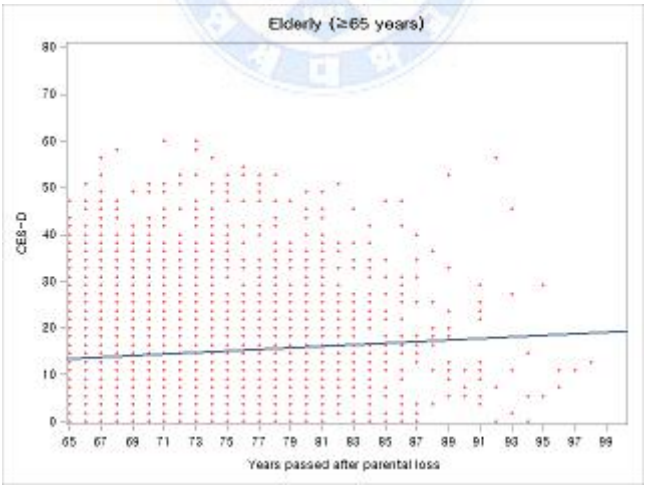

Figure A4. Years passed after parental loss and CES-D score (Elderly)

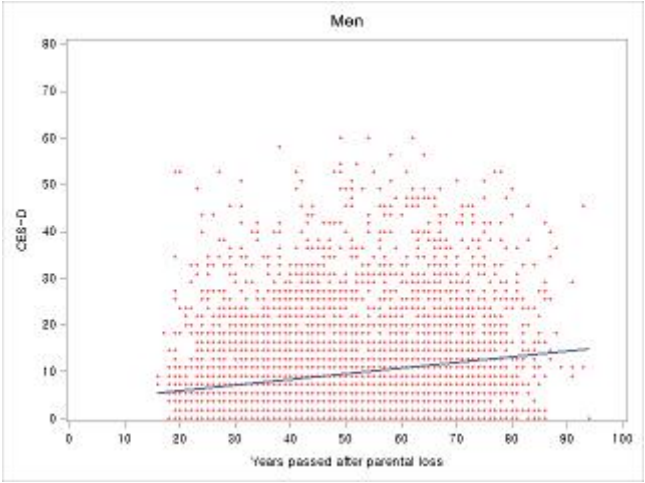

Figure A5. Years passed after parental loss and CES-D score (Men)

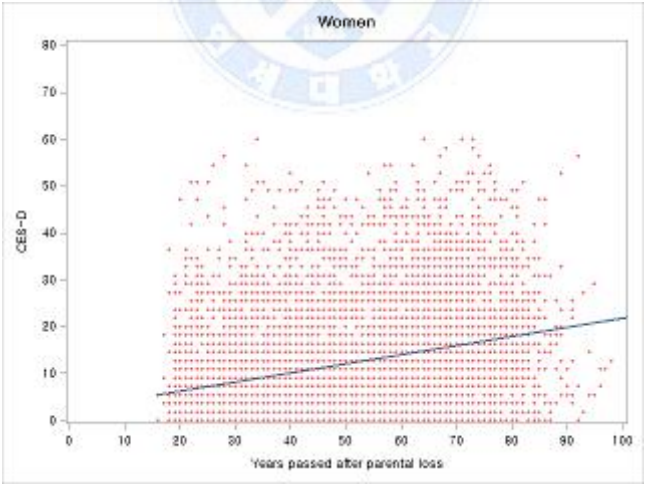

Figure A6. Years passed after parental loss and CES-D score (Women)

KOREAN ABSTRACT

어린 시절 부모사망이 성인의 정신건강에 미치는 영향

배경: 선행 연구들은 어린 시절 부모 사별과 어린이, 청소년의 정신건강에 미치는 영향에 초점을 맞추고 있다. 어린 시절 부모 사별과 관련한 연구들의 대부분은 단기 영향을 조사하였고, 장기 영향을 관찰한 연구들은 부족한 실정이다. 따라서 어린 시절 부모 사망이 성인이 되었을 때 정신 건강에 어떠한 영향을 미치는지에 대해서는 잘 알려져 있지 않다.

목적: 이 연구의 목적은 어린 시절 부모 사망이 성인에서 우울증과 자살 생각의 위험을 높이는지 조사하는 것이다.

방법: 이 연구는 한국복지패널 (2006–2013) 자료를 이용하였고, 어린 시절 (0–17 세) 부모 사망은 설문지를 통해 후향적으로 조사되었다. 우울증은 역학연구센터 우울척도 (CES–D) 한국판으로 측정하여 16 점 이상인 경우를 우울증으로 정의하였으며, 84,012 개(13,671 명)의 관찰치가 분석에 이용되었다.

자살 생각은 2011 년부터 2013 년까지 추적되었고, 자살 생각 분석에는 26,986 개(9,285 명)의 관찰치가 포함되었다. 분석은 일반화추정방정식(GEE)을 이용하였고, 어린 시절 부모 사망에 따른 성인의 우울증 및 자살 생각 각각의 위험은 오즈비와 95% 신뢰구간으로 표현하였다.

결과: 2006년도 연구 대상자 (n=13,671) 중에서, 우울증을 겪고 있는 사람은 26.2% (n=3,577)이었고, 어린 시절 부모 사망을 경험한 사람은 18.7% (n=2,566)이었다. 부모 사망은 우울증과 관련성이 있었다 (오즈비 1.185, 95% 신뢰구간 1.114–1.260). 성별을 층화한 후에, 우울증의 위험은 부모 사망을 경험한 남성과 여성 모두에서 유의하였고 (남성: 1.189, 1.076–1.314; 여성: 1.174, 1.086–1.268), 연령별로는 중년층 (1.229, 1.115–1.354)과 노인층 (1.184, 1.089–1.287) 에서 유의하게 나타났다.

2011년도 연구 대상자(n=9,285) 중에서, 자살생각을 한 사람은 12.8%(n=1,192)이었고, 어린 시절 부모 사망을 경험한 사람은 19.5%(n=1,814)이었다. 부모 사망은 자살 생각과 관련이 있었다(1.189, 1.041–1.358). 성별을

층화한 후에, 자살 생각의 위험은 부모 사망을 경험한 남성과 여성에서 모두 유의하지 않았다(남성: 1.194, 0.955–1.494; 여성: 1.163, 0.985–1.373). 연령별로는 중년층에서는 유의하였으나(1.260, 1.031–1.540), 청년층과 노인층에서는 유의하지 않았다.

결론: 어린 시절 부모사망은 성인의 우울증 및 자살생각의 위험을 높이는 것으로 나타났다. 우울증의 위험은 남녀 각각에서 모두 통계적으로 유의하였고, 연령별로는 중년층과 노년층에서 유의하였다. 자살생각의 위험은 성별 분석에서 남녀 각자 유의성이 없었으며, 중년층에서만 관련이 있었다. 따라서 우리는 어린 시절에 부모 사망으로 인한 충격이 성인이 된 후에도 정신건강에 영향을 미친다는 것을 확인하였다. 이러한 점에서 이 연구가 사별한 가족의 관리를 위한 가족지지 프로그램을 개발하는 것이 정책적으로 필요할 것으로 사료된다.

핵심어: 부모 사망, 우울증, 자살생각, 종적연구