



# Comparison of Baseline Characteristics between Community-based and Hospital-based Suicidal Ideators and Its Implications for Tailoring Strategies for Suicide Prevention: Korean Cohort for the Model Predicting a Suicide and Suicide-related Behavior

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In this cross-sectional study, we aimed to identify distinguishing factors between populations with suicidal ideation recruited from hospitals and communities to make an efficient allocation of limited anti-suicidal resources according to group differences. We analyzed the baseline data from 120 individuals in a community-based cohort (CC) and 137 individuals in a hospital-based cohort (HC) with suicidal ideation obtained from the Korean Cohort for the Model Predicting a Suicide and Suicide-related Behavior (K-COMPASS) study. First, their sociodemographic factors, histories of medical and psychiatric illnesses, and suicidal behaviors were compared. Second, diagnosis by the Korean version of the Mini International Neuropsychiatric Interview, scores of psychometric scales were used to assess differences in clinical severity between the groups. The results revealed that the HC had more severe clinical features: more psychiatric diagnosis including current and recurrent major depressive episodes (odds ratio [OR], 4.054;  $P < 0.001$  and OR, 11.432;  $P < 0.001$ , respectively), current suicide risk (OR, 4.817;  $P < 0.001$ ), past manic episodes (OR, 9.500;  $P < 0.001$ ), past hypomanic episodes (OR, 4.108;  $P = 0.008$ ), current alcohol abuse (OR, 3.566;  $P = 0.020$ ), and current mood disorder with psychotic features (OR, 20.342;  $P < 0.001$ ) besides significantly higher scores in depression, anxiety, alcohol problems, impulsivity, and stress. By comparison, old age, single households, and low socioeconomic status were significantly associated with the CC. These findings indicate the necessity of more clinically oriented support for hospital visitors and more socioeconomic aid for community-dwellers with suicidality.

**Keywords:** Suicide; Epidemiologic Studies; Cross-sectional Studies; Hospitals; Community Mental Health Centers; Korea

## INTRODUCTION

The World Health Organization has reported that over 800,000 people commit suicide each year (1). According to the Organisation for Economic Co-operation and Development (OECD), the Republic of Korea (hereafter, Korea) has shown the highest suicide rate among its member countries since 2003. In 2015, 13,513 people died from suicide in Korea (2). The fact that the suicide rate in Korea, which was 26.5 per 100,000 inhabitants in 2015 (2), is twice as high as the average suicide rate of all OECD nations, which was 13.1 per 100,000 inhabitants in 2013 (3), has drawn research interest (4). In Europe, a systemic review showed that the estimated cost per depression case was €3,826, and the cost of affective disorders amounted to €106 billion in 2004 (5); mortality ascribed to suicide accounted for about 4% of the costs of depression (6). In addition to the well-known long-lasting effects on the bereaved, suicide is a social problem in the economic perspective, as it is the second leading cause of death in people aged 15–29 years, the

age group that is entering or preparing to enter a community main workforce (1). Therefore, developing prevention and treatment strategies has become urgent, pressing research focus worldwide.

Not only developing an effective intervention for suicidal patients under hospital-level care but also reforming higher-level social systems is essential; intensive monitoring for patients under treatment of depression during high-risk periods of suicide would necessitate service reorganization and incremental expenditures (7). Ultimately, this approach shall involve a system-wise initiative with the engagement of policymakers and appropriate allocation of currently available economic and human resources. A study showed that a positive impact on suicide reduction, a 33% decrease in relative risk in the U.S. Air Force personnel was accomplished by policy changes in a military system (8). Moreover, current interventional programs and policies on suicide are often multifaceted and rarely evaluated (9); some of the treatments or prevention strategies are either not cost-effective or surely not perfect to prevent suicide (5). Therefore, taking substantial social expenditure into consideration, it is necessary to review the economic feasibility of present strategies as well. For adequate assignment of resources to the right places, efficacy evaluation, and eventually new policy making and strategy development, it is important to understand characteristics of the populations that we are fighting for. In the economic aspect, several studies have addressed the necessity of “tailored” intervention to meet particular needs according to different populations. These interventions would potentially be more effective if applied to specific groups, for example, with depression (10), with a lack of social support and low socioeconomic status (11), or in poverty (12).

To achieve this goal, it is critical to specify the characteristics of the target population on which suicide prevention is to be applied. Since suicidality usually accompanies psychiatric disorders, for establishing anti-suicidal strategies, people with suicidal behavior can be approached in a dichotomized way—a

group in a hospital setting and another in a community—although a clear-cut division is not possible. However, to the best of our knowledge, most studies about suicidal behavior have evaluated patients visiting hospitals or using their medical or insurance records. Even articles dealing with community-dwelling populations are mostly restricted to the elderly suicidal population, probably owing to increasing research interest due to a higher suicide rate among them (13). Few studies have examined characteristics of a general community-dwelling population with suicidality, irrespective of age, gender, medical or psychiatric conditions, or scrutinized their differences from a hospital-based study population. Science has developed by questioning conventional ideas taken for granted, and, in such a context, we raised a doubt on a view that hospital visitors and community dwellers might simply reflect a difference in severity of psychopathology. First, some of community-dwelling suicidal ideators with high clinical severity may prefer not to receive hospital care because of stigma surrounding psychiatric treatment; by contrast, hypochondriacal patients or personality disorder patients showing excessive attention-getting behavior may be found more among hospital visitors to a degree disproportionate to their clinical severity. Second, as suicidal ideation is included only in the diagnostic criteria of major depressive episode among entire psychiatric disorders, it cannot be presumed that suicidal ideators in the community are also clinically less severe in psychopathology other than depression such as anxiety, substance use, or impulsivity. Therefore, it is justifiable to perform a comparison study of these 2 groups but also necessary to verify what has been accepted without proof with scientific methods.

The present study used a dataset from the Korean Cohort for the Model Predicting a Suicide and Suicide-related Behavior (K-COMPASS) study to report baseline characteristics of hospital-based and community-based populations with suicidality and differences between the 2 groups. Further, we aimed to propose tailored strategies for suicide prevention depending on the elucidated features in each group.

**Table 1.** Proportion of subjects by study sites

CC			HC		
Community mental health centers	Location*	No. (%)	Hospitals	Location	No. (%)
Bucheon Community Mental Health Center	Bucheon	8 (6.7)	Soonchunhyang University Bucheon Hospital	Bucheon	17 (12.4)
Busanjin-gu Community Mental Health Center	Busan	1 (0.8)	Inje University Busan Paik Hospital	Busan	37 (27.0)
Cheonan Community Mental Health Center	Cheonan	19 (15.8)	Soonchunhyang University Cheonan Hospital	Cheonan	16 (11.7)
Dongdaemun-gu Community Mental Health Center	Seoul	18 (15.0)	Kyung Hee University Hospital	Seoul	15 (10.9)
Iksan Community Mental Health Center	Iksan	39 (32.5)	Wonkwang University Hospital	Iksan	24 (17.5)
Incheon Community Mental Health Center	Incheon	7 (5.8)	Gachon University Gil Medical Center	Incheon	10 (7.3)
Jongno-gu Community Mental Health Center	Seoul	25 (20.8)	Seoul National University Hospital	Seoul	18 (13.1)
Wonju Community Mental Health Center	Wonju	3 (2.5)	Wonju Severance Christian Hospital	Wonju	0 (0.0)
Total		120 (100.0)	Total		137 (100.0)

The hospital and community mental health center affiliated to each hospital is listed on the same row.

CC = community-based cohort, HC = hospital-based cohort.

\*Name of the city.

## MATERIALS AND METHODS

### Subjects

The K-COMPASS study is an ongoing multicenter project, consisting of 8 university hospitals distributed across Korea and 8 community mental health centers affiliated to the hospitals (Table 1). Services provided by community mental health centers in Korea include case management services, screening visits, rehabilitation day programs, supportive counseling, crisis intervention, psycho-education, and professional personnel training for mental health programs. Two concurrent cohorts of distinct suicidal populations were constructed according to the locations of origin from which the study attendees were recruited (Fig. 1). For the hospital-based cohort (HC), information was collected on suicidal attempters defined as those who attempted suicide within one month from the initial evaluation and suicidal ideators visiting emergency departments or outpatient psychiatric clinics or being treated in psychiatric wards in one of the participating hospitals between September 1, 2015 and March 30, 2017. Similarly, suicidal attempters and ideators were enrolled in the community-based cohort (CC) through the community mental health centers during the same period. They were recruited via various routes: Interviews of active members under case management in the centers, screening visits to underdeveloped areas and flophouses, and referrals from community service centers. Suicidal attempt was defined as a life-threatening behavior with the intent to end one's life; suicidal ideation was restricted to current, serious consideration to commit suicide discounting vague thoughts about death. In the present study, we analyzed initial evaluation data of suicidal ideators from the 2 cohorts. Individuals aged 15 years and over that were

able to read and understand the Korean language were included in the cohorts. Those with intellectual disability or organic brain damage were excluded from the study.

### Measurements

At the initial visit, the participants' baseline characteristics through an interview and psychiatric rating scales were collected. Their characteristics included 4 further-divided factors: 1) sociodemographic factors (age, gender, marital status, living status, education level, monthly household income, employment status, and health security status); 2) medical- and psychiatric-related factors (histories of medical illness, psychiatric illness, psychiatric treatment, and psychiatric admission in medical or psychiatric factors); 3) familial-related factors (histories of psychiatric treatment, suicidal attempt, and suicidal completion); and 4) suicidal-related factors (suicidal ideation, plan, attempt, and the number of suicidal attempts). All psychiatric residents, research nurses, and social workers acting as raters had a formal training session and consensus meeting for conducting the rater-administered scales. The research coordinators attended a monthly web-based video conference so that the quality of the study might be maintained. Psychiatric diagnosis was confirmed at the baseline assessment for the CC and within 1 week for the HC using the Korean version of the Mini International Neuropsychiatric Interview (K-MINI). The K-MINI is a semi-structured interview tool for psychiatric diagnosis according to the Diagnostic and Statistical Manual of Mental Disorder, Fourth Edition (DSM-IV) criteria and has been validated in Korean (14).

### Patient Health Questionnaire-9 (PHQ-9)

The PHQ-9 is a 9-item measure of depression reflecting the main

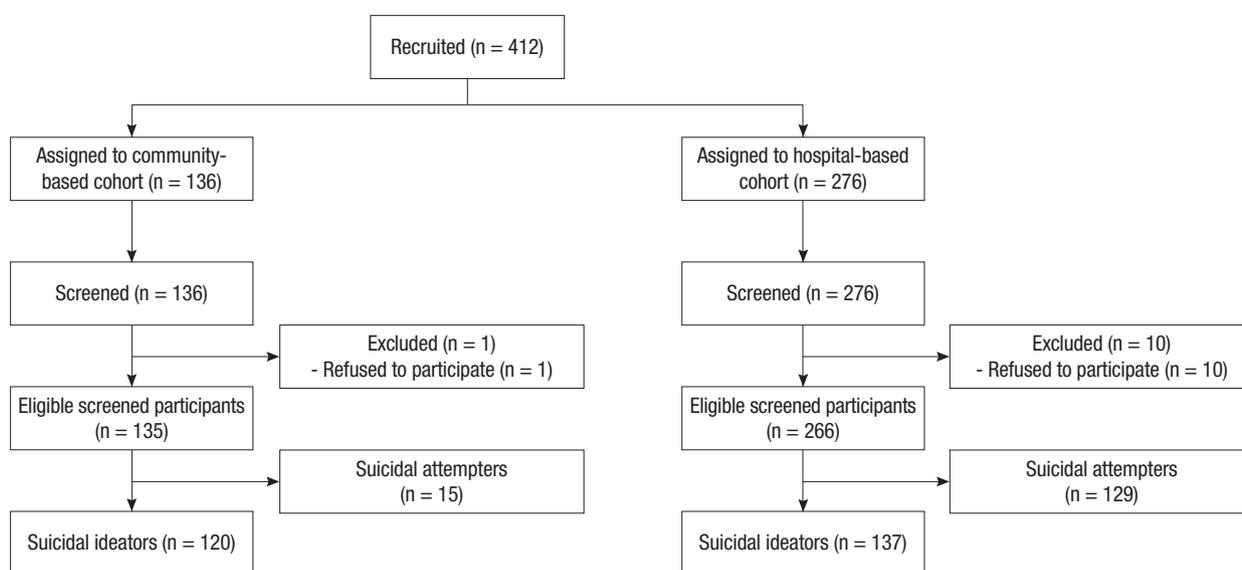


Fig. 1. K-COMPASS flow diagram of study selection process.

K-COMPASS = Korean Cohort for the Model Predicting a Suicide and Suicide-related Behavior.

symptoms of a major depressive episode in DSM-IV. Each item is scored from 0 to 3 based on symptom frequency, and thus the PHQ-9 score can range from 0 to 27 (15).

#### *Beck Anxiety Inventory (BAI)*

The BAI is a 21-item scale, which is considered the gold standard to measure the severity of anxiety symptoms, and is commonly used in several studies. The score of each item ranges from 0 to 3 based on the severity (16).

#### *Korean version of Alcohol Use Disorder Identification Test (AUDIT-K)*

The AUDIT is a 10-item self-report questionnaire widely used to identify alcohol use disorder. A total score of  $\geq 8$  indicates hazardous and harmful alcohol use as well as a possibility of alcohol dependence according to its guidelines (17,18).

#### *Barratt Impulsiveness Scale-11 (BIS-11)*

The BIS-11 is a 30-item self-applied measurement of impulsivity. The items are scored on a 4-point scale, and its total score indicates the degree of impulsivity (19).

#### *Early Trauma Inventory Self Report-Short Form (ETISR-SF)*

The ETISR-SF consists of 27 items divided into 4 domains of traumatic events—general trauma, physical abuse, emotional abuse, and sexual abuse that may have happened under the age of 18 years. Subjects are asked to choose only one event with the greatest impact on their life and are subsequently considered to have undergone early trauma only if they experienced intense fear, horror, or helplessness and, at the same time, underwent an out-of-body experience or felt like being in a dream (20).

#### *Social Relationships Scale (SRS)*

The SRS was developed for the Korean General Society Survey yearly conducted by the Survey Research Center at Sungkyunkwan University (21). To evaluate the level of stress from various social relationships, 4 questions are asked: “I get a lot of stress because of close family like a spouse, children, or parents,” “I get a lot of stress because of a lover or a boyfriend/girlfriend,” “I get a lot of stress because of a close friend,” and “I get a lot of stress because of a colleague or a boss in the workplace.” Each question was scored from 1 to 4 corresponding to the answers: “Strongly agree,” “Somewhat agree,” “Somewhat disagree,” and “Strongly disagree.”

#### *Stress Questionnaire for Korean National Health and Nutrition*

##### *Examination Survey-Short Form (Stress Questionnaire for KNHANES-SF)*

The Stress Questionnaire for KNHANES-SF evaluates perceived stress level. It is a self-rate scale composed of 1 stress-cause question and 9 items about stress level resulting from the event. The stress-cause question asks the respondent to choose one out of 6 categories of stressful life events during the last month: 1) work,

job or school; 2) interpersonal relationships (relationships with family or other significant people); 3) changes in relationships (death, birth, divorce, marriage, etc.); 4) illness or injury to oneself or others; 5) financial problems; and 6) unusual events (crime, natural disaster, accident, moving, etc.). The 9 items are rated on a 5-point scale from 0 (never) to 4 (very often) with the total score ranging from 0 to 36.

All scales originally in English had been translated into Korean, and their validity and reliability had been previously confirmed (15,16,18-20).

#### **Statistical analysis**

The characteristics of the participants, sociodemographic factors, medical or psychiatric factors, suicidal factors, and familial factors, were compared based on the cohorts using a Mann-Whitney test for continuous variables and a Pearson's  $\chi^2$  test or a Fischer's exact test for categorical variables. Comparisons of psychiatric diagnosis and clinical rating scales between 2 cohorts were performed using the same statistical methods. All statistical analyses were performed using SPSS version 21.0 for Windows (SPSS, Inc., Chicago, IL, USA). A  $P$  value  $< 0.05$  was considered statistically significant.

#### **Ethics statement**

The study protocol was reviewed and approved by the Seoul National University Hospital Institutional Review Board (H-1505-050-671) and Institutional Review Boards of all other participating study sites. Written informed consents were obtained either from study participants or from their legal guardians in case of adolescents under 19 years.

## **RESULTS**

### **Comparisons between the CC and the HC on sociodemographic factors**

Of the 135 community-dwellers and 266 hospital visitors enrolled for the K-COMPASS study, 257 participants were suicidal ideators: 120 community-dwellers (88.9%) and 137 hospital visitors (51.5%). Characteristics of sociodemographic factors in the 2 groups are presented in Table 2. Participants in the CC group were more likely to be older and particularly about 19.2 (the reciprocal of 0.052) times more likely to be aged 65 years and over. Nearly half the individuals in the CC group were previously married (46.7%) and living alone (51.7%) whereas a high proportion of the participants in the HC were never or currently married (79.5%) and living with family (79.6%). Regarding education level, more than half of the subjects had attended middle school or less (61.7%) and high school or higher (80.0%) for the CC and the HC, respectively. The subjects in the HC were more likely to be employed (odds ratio [OR], 2.219) and covered by the National Health Insurance (NHI) (OR, 4.165), and on aver-

**Table 2.** Sociodemographic factors according to the cohorts\*

Variables	CC (n = 120)	HC (n = 137)	P value <sup>†</sup>	OR <sup>‡</sup>
Age, yr	60.10 ± 18.71	36.94 ± 15.37	< 0.001	-
Age group (categorized), yr			< 0.001	-
15–19	1 (0.8)	17 (12.4)		
20–39	20 (16.7)	67 (48.9)		
40–59	33 (27.5)	38 (27.7)		
60–79	53 (44.2)	15 (10.9)		
≥ 80	13 (10.8)	0 (0.0)		
Age group (dichotomized), yr			< 0.001	0.052
15–64	59 (49.2)	130 (94.9)		
≥ 65	61 (50.8)	7 (5.1)		
Gender			0.343	0.787
Male	49 (40.8)	64 (46.7)		
Female	71 (59.2)	73 (53.3)		
Marital status			< 0.001	-
Never married	34 (28.3)	68 (49.6)		
Currently married	26 (21.7)	41 (29.9)		
Previously married				
Separated	6 (5.0)	3 (2.2)		
Divorced	20 (16.7)	18 (13.1)		
Widowed	30 (25.0)	6 (4.4)		
Cohabiting	4 (3.3)	1 (0.7)		
Living status			< 0.001	-
With family	50 (41.7)	109 (79.6)		
With nonfamily or institutionalized	8 (6.7)	9 (6.6)		
Alone	62 (51.7)	19 (13.9)		
Education level			< 0.001	-
Less than primary school	34 (28.3)	3 (2.2)		
Elementary school	24 (20.0)	4 (2.9)		
Middle school	16 (13.3)	21 (15.3)		
High school	34 (28.3)	78 (56.9)		
College or higher	12 (10.0)	31 (22.6)		
Monthly household income, million KRW	0.96 ± 1.20	2.75 ± 2.73	< 0.001	-
Monthly household income (categorized)			< 0.001	-
≤ 1 million	91 (75.8)	39 (28.5)		
1.01–2.00 million	18 (15.0)	33 (24.1)		
2.01–3.00 million	8 (6.7)	33 (24.1)		
3.01–4.00 million	0 (0.0)	13 (9.5)		
≥ 4.01 million	3 (2.5)	19 (13.9)		
Employment status			0.002	2.219
Unemployed	73 (60.8)	56 (41.2)		
Employed	47 (39.2)	80 (58.8)		
Health security status			< 0.001	4.165
NHI	75 (62.5)	118 (87.4)		
Medical aid <sup>§</sup>	45 (37.5)	17 (12.6)		

Values are presented as number (%) or mean ± SD.

CC = community-based cohort, HC = hospital-based cohort, OR = odds ratio, KRW = Korean Won, NHI = National Health Insurance, SD = standard deviation.

\*Numbers may not agree with the number of total subjects due to missing data; <sup>†</sup>Mann-Whitney test for continuous variables and Pearson's  $\chi^2$  test for categorized variables. Significant findings at  $P < 0.05$  are in bold; <sup>‡</sup>Relative to the CC; <sup>§</sup>Includes both class 1 and class 2 recipients in Medical Aid.

age, had about 3 times higher total household income than subjects in the CC group.

### Comparisons between the CC and the HC on medical-, psychiatric-, familial-, and suicidal-related factors

For medical or psychiatric-related factors (Table 3), the individuals in the CC were more likely to have a history of medical illness (OR, 4.651, the reciprocal of 0.215). However, those in the

HC were more likely to have a history of psychiatric illness (OR, 2.299) and a history of psychiatric treatment (OR, 5.373). For suicidal-related factors, the CC subjects showed higher associations in all suicidal-related factors, history of suicidal ideation (OR, 7.939), history of suicidal plan (OR, 1.914), and history of suicidal attempt (OR, 2.186). In addition, the number of suicidal attempts was significantly higher in the subjects in the HC than in the CC. Regarding familial factors, the participants in

**Table 3.** Medical-, psychiatric-, familial-, and suicidal-related factors according to the cohorts\*

Variables	CC (n = 120)	HC (n = 137)	P value <sup>†</sup>	OR <sup>‡</sup>
<b>Medical- and psychiatric-related factors</b>				
History of medical illness <sup>§</sup>			< 0.001	0.215
No	28 (23.7)	81 (59.1)		
Yes	90 (76.3)	56 (40.9)		
History of psychiatric illness <sup>  </sup>			0.004	2.299
No	42 (35.0)	26 (19.0)		
Yes	78 (65.0)	111 (81.0)		
History of psychiatric treatment			0.023	5.373
No	7 (9.0)	2 (1.8)		
Yes	71 (91.0)	109 (98.2)		
History of psychiatric admission			0.055	1.822
No	55 (70.5)	63 (56.8)		
Yes	23 (29.5)	48 (43.2)		
<b>Familial-related factors</b>				
History of psychiatric treatment			0.001	3.159
No	107 (89.2)	99 (72.3)		
Yes	13 (10.8)	38 (27.7)		
History of suicidal attempt			0.038	1.876
No	99 (82.5)	98 (71.5)		
Yes	21 (17.5)	39 (28.5)		
History of suicidal completion			0.439	0.647
No	7 (33.3)	17 (43.6)		
Yes	14 (66.7)	22 (56.4)		
<b>Suicidal-related factors</b>				
History of suicidal ideation			< 0.001	7.939
No	32 (26.7)	6 (4.4)		
Yes	88 (73.3)	131 (95.6)		
History of suicidal plan			0.012	1.914
No	80 (66.7)	70 (51.1)		
Yes	40 (33.3)	67 (48.9)		
History of suicidal attempt			0.002	2.186
No	63 (52.5)	46 (33.6)		
Yes	57 (47.5)	91 (66.4)		
Lifetime total number of suicidal attempts <sup>¶</sup>	1.59 ± 2.48	2.77 ± 8.76	0.019	-

Values are presented as number (%) or mean ± SD.

CC = community-based cohort, HC = hospital-based cohort, OR = odds ratio, SD = standard deviation.

\*Numbers may not agree with the number of total subjects due to missing data; <sup>†</sup>Mann-Whitney test for continuous variables and Pearson's  $\chi^2$  test or Fischer's exact test for categorized variables. Significant findings at  $P < 0.05$  are in bold; <sup>‡</sup>Relative to the CC; <sup>§</sup>Includes hypertension, diabetes mellitus, cancer, stroke, Parkinson's disease, cardiac disease, pulmonary disease, renal disease, ophthalmic disease, otologic disease, etc.; <sup>||</sup>Includes dementia, psychotic disorder, bipolar disorder, depressive disorder, anxiety disorder, somatoform disorder, adjustment disorder, substance-related disorder, intellectual disability, learning disorder, developmental disorder, and etc.; <sup>¶</sup>Only includes cases with a history of at least one suicidal attempt.

the CC were 1.876 times more likely to have familial history of suicidal attempt and 3.159 times more likely to have history of psychiatric treatment.

### Comparisons between the CC and the HC on DSM-IV diagnosis

Table 4 shows the associations of DSM-IV diagnosis based on K-MINI with the types of cohorts. The following psychiatric disorders were associated with the HC: current major depressive

episode (OR, 4.054), recurrent major depressive episode (OR, 11.432), current suicide risk (OR, 4.817), past manic episode (OR, 9.500), past hypomanic episode (OR, 4.108), current alcohol abuse (OR, 3.566), and current mood disorder with psychotic features (OR, 20.342). For current suicide risk, 70.1% of the participants in the CC group presented low or moderate risk; by contrast, a similar portion of them in the HC group (67.7%) showed high risk.

### Comparisons between the CC and HC groups using clinical rating scales

In comparisons using clinical rating scales (Table 5), the total scores of PHQ-9, BAI, AUDIT-K, BIS-11, Stress Questionnaire for KNHANES-SF, ETISR-SF, and the subscale scores about stress from family and people in the workplace in SRS were significantly higher in the HC than in the CC group. Based on their PHQ-9 and BAI scores, both groups presented depression and anxiety, especially moderate-to-severe depression and severe anxiety for the CC group and moderate depression and moderate-to-severe anxiety for the HC group (22,23). The AUDIT-K result indicates the presence of alcohol problems in the HC group only. The individuals in the HC group showed higher impulsivity from the BIS-11 score and were about twice as likely to have history of early trauma from ETISR-SF. The SRS revealed that the HC experienced more stress from specific circumstances such as relationships with close family and a colleague or a boss in the workplace. Considering various stress sources from the Stress Questionnaire for KNHANES-SF, interpersonal relationships were still a prominent cause of stress for the HC group whereas illness or injury of oneself or others or financial difficulty were main stressful events for the CC group.

## DISCUSSION

To our knowledge, this is the first cross-sectional study performing a direct comparison of characteristics of 2 suicidal populations, a CC and a HC, which aims to eventually and practically serve as a guide for efficient allocation of limited anti-suicidal resources according to the group differences. In comparison analyses using descriptive statistics, elderly people, single households, and those with low socioeconomic status comprised a larger percentage of the CC group than the HC group. The HC group presented clinically more severe features: on histories, more suicidal behaviors and psychiatric diagnosis confirmed by K-MINI and, on rating scales, higher scores of PHQ-9, BAI, AUDIT-K, and BIS-11. When stress related to social relationships using SRS was addressed, the HC group was under more stress from close family and workplace. By comparison, considering various stress sources in Stress Questionnaire for KNHANES-SF, the main causes of stress were illness or injury of oneself or others or financial difficulty for the CC group and interpersonal

**Table 4.** Comparison of the CC and the HC on K-MINI diagnosis

Variables	CC (n = 120)	HC (n = 137)	<i>P</i> value*	OR†
Major depressive episode, current			<b>&lt; 0.001</b>	4.054
No	72 (60.0)	37 (27.0)		
Yes	48 (40.0)	100 (73.0)		
Major depressive episode, recurrent			<b>&lt; 0.001</b>	11.432
No	99 (82.5)	40 (29.2)		
Yes	21 (17.5)	97 (70.8)		
Major depressive episode with melancholic features, current			0.698	1.118
No	91 (75.8)	101 (73.7)		
Yes	29 (24.2)	36 (26.3)		
Suicide risk, current			<b>&lt; 0.001</b>	4.817
No	33 (27.5)	10 (7.3)		
Yes	87 (72.5)	127 (92.7)		
Suicide risk, current‡			<b>&lt; 0.001</b>	-
Low	37 (42.5)	10 (7.9)		
Moderate	24 (27.6)	31 (24.4)		
High	26 (29.9)	86 (67.7)		
Manic episode, current			0.080	3.071
No	117 (97.5)	127 (92.7)		
Yes	3 (2.5)	10 (7.3)		
Manic episode, past			<b>&lt; 0.001</b>	9.500
No	118 (98.3)	118 (86.1)		
Yes	2 (1.7)	19 (13.9)		
Hypomanic episode, current			0.136	4.508
No	119 (99.2)	132 (96.4)		
Yes	1 (0.8)	5 (3.6)		
Hypomanic episode, past			0.008	4.108
No	116 (96.7)	120 (87.6)		
Yes	4 (3.3)	17 (12.4)		
Posttraumatic stress disorder, current			0.187	2.419
No	117 (97.5)	129 (94.2)		
Yes	3 (2.5)	8 (5.8)		
Alcohol dependence, current			0.462	1.325
No	107 (89.2)	118 (86.1)		
Yes	13 (10.8)	19 (13.9)		
Alcohol abuse, current			0.020	3.566
No	116 (96.7)	122 (89.1)		
Yes	4 (3.3)	15 (10.9)		
Mood disorder with psychotic features			<b>&lt; 0.001</b>	20.342
No	119 (99.2)	117 (85.4)		
Yes	1 (0.8)	20 (14.6)		

Values are presented as number (%).

K-MINI = Korean version of the Mini International Neuropsychiatric Interview, CC = community-based cohort, HC = hospital-based cohort, OR = odds ratio.

\*Pearson's  $\chi^2$  test. Significant findings at  $P < 0.050$  are in bold; †Relative to the CC; ‡1–5 points, Low; 6–9 points, Moderate;  $\geq 10$  points, High. The total points range from 0 to 33 for K-MINI current suicide risk.

relationships for the HC group.

In the present study, the results fell into 2 categories: clinical and social aspects. First, the finding that the clinical condition of subjects in the HC group was more serious than that of subjects in the CC group was partly expected because patients with more severe depression, anxiety, alcoholism, and impulsivity were more likely to be noticed and brought to hospitals by people around them instead of being referred to community mental health centers or visit psychiatric clinics by themselves to seek help for relieving their distress rapidly, usually for pharmacotherapy. However, it should be noted that all the levels of mea-

sured psychopathology other than depression in the HC group were also higher even though suicidal ideation was not a symptom required for diagnosis of psychiatric disorders related to anxiety, alcohol use, and impulse control problems; hospital visitors with suicidal ideation tended to have more severe, comorbid psychiatric conditions, which justifies screening for other mental disorders for them. It is noteworthy that the HC group had a relatively larger proportion of patients with a history of early trauma, too. Evidence continues to accumulate indicating that childhood trauma leaves a profound impact on brain development, which would result in the increased likelihood of

**Table 5.** Comparison of the CC and the HC on clinical rating scales

Variables	CC (n = 120)	HC (n = 137)	P value*	OR†
PHQ-9	14.52 (7.46)	19.07 (6.38)	< 0.001	-
BAI	23.36 (16.64)	33.30 (14.62)	< 0.001	-
AUDIT-K	5.69 (10.25)	8.82 (10.56)	< 0.001	-
BIS-11	67.70 (9.82)	71.59 (13.26)	0.006	-
ETISR-SF				
No	94 (78.3)	89 (65.0)	0.018	1.950
Yes	26 (21.7)	48 (35.0)	-	-
Domains			0.146	-
General trauma	14 (53.8)	14 (29.2)		
Physical abuse	3 (11.5)	8 (16.7)		
Emotional abuse	4 (15.4)	17 (35.4)		
Sexual abuse	5 (19.2)	9 (18.8)		
SRS				
Stress from close family	2.25 (1.29)	1.80 (0.93)	0.023	-
Stress from a lover or a boyfriend/girlfriend	3.34 (1.08)	3.31 (1.02)	0.574	-
Stress from a close friend	3.08 (1.16)	3.18 (1.06)	0.654	-
Stress from a colleague or a boss in the workplace	3.49 (1.05)	3.06 (1.19)	0.001	-
Stress Questionnaire for KNHANES-SF				
Total score	26.85 (10.56)	33.99 (8.78)	< 0.001	-
Categories			< 0.001	-
Work, job or school	4 (3.3)	22 (16.1)		
Interpersonal relationships (relationships with family or other significant people)	30 (25.0)	55 (40.1)		
Changes in relationships (death, birth, divorce, marriage, etc.)	6 (5.0)	6 (4.4)		
Illness or injury to oneself or others	41 (34.2)	30 (21.9)		
Financial problems	37 (30.8)	22 (16.1)		
Unusual events (crime, natural disaster, accident, moving, etc.)	2 (1.7)	2 (1.5)		

Values are presented as number (%).

CC = community-based cohort, HC = hospital-based cohort, OR = odds ratio, PHQ-9 = Patient Health Questionnaire-9, BAI = Beck Anxiety Inventory, AUDIT-K = Korean version of Alcohol Use Disorders Identification Test, BIS-11 = Barratt Impulsiveness Scale-11, ETISR-SF = Early Trauma Inventory Self Report-Short Form, SRS = Social Relationships Scale, Stress Questionnaire for KNHANES-SF = Stress Questionnaire for Korea National Health and Nutrition Examination Survey-Short Form.

\*Mann-Whitney test for continuous variables and Pearson's  $\chi^2$  test or Fischer's exact test for categorized variables. Significant findings at  $P < 0.05$  are in bold; †Relative to the CC.

psychopathology in adults through biological processes such as alterations in Hypothalamic-Pituitary-Adrenal (HPA) axis or reductions in platelet brain-derived neurotrophic factor (BDNF) (24). In addition, victims of childhood trauma have been reported to be vulnerable to psychiatric illnesses associated with impulsivity such as substance dependence and suicidal behavior (25), which is thought to be mediated by malfunction of brain inhibitory processes such as serotonergic hypofunction and HPA axis dysfunction, consequences of prolonged exposure to trauma (26). Our results appear to support this hypothesis that history of early trauma may contribute to development of suicidal ideation via psychopathology such as depression, alcoholism, and impulsivity.

In the social aspect, the second part of the results, we showed novel findings. In comparison with the HC group, senior citizens living alone with lower socioeconomic status comprised a larger percentage of the CC group. First, a recent study from Korea showed that people in late adulthood are more likely to perceive a psychiatric disorder as a stigma. Thus, their infrequent utilization of psychiatric resources is more strongly influenced by this perceived stigma than young or middle-aged groups (27). A prejudice against psychiatry may have been a treatment barrier for

mental illness. Partly, the outcome about age distribution depended on the way the subjects were recruited. Some of the subjects in the CC group were already members of community mental health centers at the time of enrollment. Adolescents or young adults might face difficulty going to the centers because of their schools or jobs, and thus they were less likely to be screened there. Instead, relatively old people without regular daytime occupations probably had more chances to participate in activities in the center, which could increase their possibility to be included in the CC group. Also, the recruiters visited flophouses where usually only one person resides; compared to adults, adolescents were highly unlikely to live alone. Second, people with low socioeconomic status who lack ability to pay the NHI are covered with the Medical Aid Program (MAP), which subsidize medical fees for those under financial difficulty. However, compared with the NHI, the MAP applies low permissible limit in medical expenses and, as a result, does not often provide a high quality of medical care. It is possible that the poor subjects in the CC group were unable to receive sufficient psychiatric care, which resulted in a greater proportion of uninsured individuals in this group. Alternatively, people with low income may have opted not to spend their money on psychiatric care; they

may have preferred to expend on non-psychiatric medical illnesses causing tangible, physical distress. Third, compared with the CC, the HC group had a lower proportion of single households, which implies that family members' involvement and encouragement make at-risk people enter and stay for psychiatric care in hospitals. This inference is in line with the literature reporting limited family support as a risk factor for nonadherence to psychotropic medications (28). In addition, a higher percentage of single households in the CC group (51.7%) than in the Korean general population (27.2%) (29) may reflect high rates of divorce in patients with depressive disorders (30) and their increased suicide rates due to social isolation (31). In addition, community social capital, which includes a concept of standards of reciprocity and mutual aid in a community among its various attributes, plays an important, positive role in mental health (32, 33). Regarding suicidality, regions with a high degree of community social capital were reported to have lower suicide rates (33). As community social capital stands for the importance of social relationship, living alone or absence of marital relationship is presumably associated with insufficient community social capital and consequently increased suicidality. The findings of the present study that the CC group had less stress from social relationships may ironically reflect their solitude as well.

All these suicidal people do need care of any kind, and the undertones of our findings in potential intervention are the possibility and importance of tailored approaches to managements of suicidal risk addressing the characteristics of a population. From the results in the HC group, for the suicidal population visiting hospitals, more clinically focused intervention would be essential to reduce suicidal risk considering their higher severity based on suicidal-related histories, psychiatric diagnosis, and clinical ratings. This inference is in line with a recent systemic review reporting that clozapine and lithium have substantial evidences of anti-suicidal effects, and pharmacotherapy and psychotherapy of depression, a major risk factor for suicide, plays an important role in suicide prevention (34). One of the important issues in Korean psychiatric service is neglect in psychotherapy. Because of low medical fees for psychotherapy, clinical scale-oriented hospital evaluation entailing cost, and excessive patient workload resulting from low medical insurance fee, pharmacotherapy is a general trend with the role of psychotherapy being ignored (35) especially in tertiary hospitals. Actualization of psychotherapeutic fees in the NHI for suicidal patients will boost use of psychotherapy contributing to reduction of suicide rates.

On the other hand, the outcomes from the CC group indicate that efficient investment of anti-suicidal resources targeting people that are older, maintain socially less connection, or have lower income would be profitable. First, because the CC group has an older population, proactive community outreach programs such as screening visits to senior citizens' community centers

or senior care centers will be effective in early identifying community-dwelling suicidal people and hopefully in involving them in hospital care. A suicide prevention campaign for elderly individuals especially deserves urgent attention because owing to the physical weakness associated with old age (reflected in the higher frequency of medical illnesses in the CC group in our study), even a suicidal attempt of low lethality such as drug/chemical overdose or use of a sharp object (36) may prove lethal for them. Second, the CC group has a higher proportion of people living alone, which implies their limited social interaction. To offer opportunities to develop social relationship such as participation in a community mental health center may be helpful for reducing suicidal risk; this will be achieved by investing financial resources to improve current facilities or build new ones and increase human resources to expand present programs or develop new activities. According to a recent systemic review, community-based interventions had the ability to reduce suicide, except for severely ill psychiatric patients, and, for the elderly, there was evidence that screening for depression along with follow-up at the community had an effect on reducing suicide risk (34). In addition, a study showed that culturally informed intervention on an underserved minority women with suicide risk had resulted in reducing suicidal ideation and depressive symptoms (37); therefore, it is inferred that social support projects, in particular, at a culturally similar community level will be potentially beneficial for suicide prevention. The third feature of the CC group is a larger proportion of unemployment, and thus improving their economic conditions has to be considered. Numerous studies have reported that suicide mortality was increased by unemployment in many developed countries (38,39), which implies that local community job fairs or governmental investment on employment promotion projects might be a good start point to reduce a suicide rate of the jobless people with suicidal ideation in the community. Our suggestion is in line with a proposal from a previous research endorsing financial support for the elderly to reduce their suicide rate since the economic standard resulted in a significant influence on the suicide rate in those aged 65 years or older (34). Furthermore, rationalization of the MAP for psychiatric treatment, a more direct way of providing economic support, will be necessary to deliver a quality of care as high as that of the NHI. However, despite the necessity of socioeconomic support, it has to be emphasized that those that are not receiving psychiatric treatment may need to be referred from community mental health centers to psychiatrists for evaluation or management, considering our finding that 40.0% suffered from current major depressive episode and 72.5% are currently at suicide risk.

The present study has several limitations. First, the cross-sectional nature of the study design does not allow any causal inference because the possibility of reverse causality. Second, the cohorts were heterogeneous themselves; the composition of

the 2 cohorts was likely to be affected by the proportions of recruitment channels, but the exact proportion of each channel was unavailable. In case of the HC group, the subjects recruited at emergency departments or psychiatric wards were more likely to have imminent suicidal risk, and yet those enrolled at outpatient clinics may have had less severe suicidality. Therefore, the clinical severity of the results might have depended, partly, on the recruiting way. For the CC group, the participants under case management may have had more psychiatric treatment history, those included through screening visits to underdeveloped areas may have belonged to a lower socioeconomic status, and those referred from other public agencies may have exhibited more acute symptoms. It is possible that the enrollment routes affected characteristics of the cohorts, and thus they did not reflect actual characteristics of the target populations. Third, we divided suicidal population as either hospital-based or community-based population; however, these 2 groups are not mutually exclusive. Some of the subjects in the HC could have been recruited to the CC group if they had been noticed in the community. On the contrary, subjects in the CC group, especially those under case management, have possibly ever received psychiatric treatment in a hospital; therefore, although they were included in the CC group, they may share similar characteristics with those in the HC group. Fourth, we suggested socioeconomic interventions on suicidality in a community population about which there is a paucity of studies, let alone randomized controlled trials, for example, whether employment promotion decreases suicidality. Fifth, all the medical centers in the study are tertiary hospitals, which usually have a more severe, refractory patient pool. The relatively high scores in the scales in the HC group may be due to a bias in our study samples. Sixth, although we selected the participating hospitals spread all over the country to not be regionally biased, they were not a statistically representative sample of the target population.

Despite these limitations, the present study presents meaningful findings that warrant more detailed comments. First, this is the first study to perform a direct comparison between hospital visitors and community-dwellers with suicidality on a nationwide scale. Second, this study included cities of various sizes throughout Korea to represent the target population for the CC group. The cities ranged from Iksan, Jeollabuk-do, a small city with a population of 301,337 to Seoul, a metropolis with a population of 9,931,412 as of February 2017, minimizing a bias in urbanization (40).

In conclusion, this cross-sectional, epidemiologic study identified the distinguishing characteristics of study samples: the HC group with clinically greater severity and the CC group with a larger percentage of old people living alone with low income. The finding indicates the necessity of more clinical support for hospital visitors and more socioeconomic aid for community-dwellers showing suicidality. Further studies using a large sam-

ple size are greatly required, and intervention emphasizing psychiatric treatment for the HC group and socioeconomic support for the CC group are warranted to confirm efficacy of tailored interventions on each group. Lastly, because studies on suicide prevention lack randomized-controlled trials (34), these gold-standard approaches are not only necessary but also urgent.

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## DISCLOSURE

The authors have no potential conflicts of interest to disclose.

## AUTHOR CONTRIBUTION

Conceptualization: Park CH, Lee JW, Kim S, Park JH, You S, Jeon HJ, Ahn YM. Data curation: Lee SY, Moon J, Shim SH, Paik JW, Kim SG, Cho SJ, Kim MH, Ahn YM. Formal analysis: Park CH. Funding acquisition: Ahn YM. Investigation: Park CH, Lee JW, Ahn YM. Writing - original draft: Park CH. Writing - review & drafting: Lee JW, Lee SY, Moon J, Shim SH, Paik JW, Kim SG, Cho SJ, Kim MH, Ahn YM.

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## REFERENCES

- World Health Organization. Suicide: fact sheet [Internet]. Available at <http://www.who.int/mediacentre/factsheets/fs398/en> [accessed on 4 May 2017].
- Statistics Korea. Annual report on the cause of death statistics 2015 [Internet]. Available at [http://kosis.kr/ups/ups\\_01List.jsp?pubcode=YD](http://kosis.kr/ups/ups_01List.jsp?pubcode=YD) [accessed on 4 May 2017].
- Organisation for Economic Co-operation and Development. OECD Health Statistics 2016. Paris, Organisation for Economic Co-operation and Development, 2016.
- Kwon JW, Chun H, Cho SI. A closer look at the increase in suicide rates in South Korea from 1986–2005. *BMC Public Health* 2009; 9: 72.
- Miret M, Ayuso-Mateos JL, Sanchez-Moreno J, Vieta E. Depressive disorders and suicide: epidemiology, risk factors, and burden. *Neurosci Biobehav Rev* 2013; 37: 2372-4.
- Salvador-Carulla L, Bendeck M, Fernández A, Alberti C, Sabes-Figuera R, Molina C, Knapp M. Costs of depression in Catalonia (Spain). *J Affect Disord* 2011; 132: 130-8.
- Valenstein M, Eisenberg D, McCarthy JE, Austin KL, Ganoczy D, Kim HM, Zivin K, Piette JD, Olfson M, Blow FC. Service implications of providing intensive monitoring during high-risk periods for suicide among VA patients with depression. *Psychiatr Serv* 2009; 60: 439-44.
- Knox KL, Litts DA, Talcott GW, Feig JC, Caine ED. Risk of suicide and related adverse outcomes after exposure to a suicide prevention programme in the US Air Force: cohort study. *BMJ* 2003; 327: 1376.
- Sareen J, Isaak C, Katz LY, Bolton J, Enns MW, Stein MB. Promising strategies for advancement in knowledge of suicide risk factors and prevention. *Am J Prev Med* 2014; 47: S257-63.
- Maniam T, Chinna K, Lim CH, Kadir AB, Nurashikin I, Salina AA, Mariapun J. Suicide prevention program for at-risk groups: pointers from an epidemiological study. *Prev Med* 2013; 57 Suppl: S45-6.
- Yoon TH, Noh M, Han J, Jung-Choi K, Khang YH. Deprivation and suicide mortality across 424 neighborhoods in Seoul, South Korea: a Bayesian spatial analysis. *Int J Public Health* 2015; 60: 969-76.
- Iemmi V, Bantjes J, Coast E, Channer K, Leone T, McDaid D, Palfreyman A, Stephens B, Lund C. Suicide and poverty in low-income and middle-income countries: a systematic review. *Lancet Psychiatry* 2016; 3: 774-83.
- Lapierre S, Erlangsen A, Waern M, De Leo D, Oyama H, Scocco P, Gallo J, Szanto K, Conwell Y, Draper B, et al. A systematic review of elderly suicide prevention programs. *Crisis* 2011; 32: 88-98.
- Yoo SW, Kim YS, Noh JS, Oh KS, Kim CH, Namkoong K, Chae JH, Lee GC, Jeon SI, Min KJ, et al. Validity of Korean version of the mini-international neuropsychiatric interview. *Anxiety Mood* 2006; 2: 50-5.
- An JY, Seo ER, Lim KH, Shin JH, Kim JB. Standardization of the Korean version of screening tool for depression (Patient Health Questionnaire-9, PHQ-9). *J Korean Soc Biol Ther Psychiatry* 2013; 19: 47-56.
- Yook SP, Kim JS. A clinical study on the Korean version of Beck Anxiety Inventory: comparative study of patient and non-patient. *Korean J Clin Psychol* 1997; 16: 185-97.
- Babor TF, Higgins-Biddle JC, Saunders JB, Monteiro MG. The Alcohol Use Disorders Identification Test: Guidelines for Use in Primary Care. 2nd ed. Geneva, World Health Organization, 2001.
- Chang JW, Kim JS, Jung JG, Kim SS, Yoon SJ, Jang HS. Validity of alcohol use disorder identification test-Korean revised version for screening alcohol use disorder according to diagnostic and statistical manual of mental disorders, fifth edition criteria. *Korean J Fam Med* 2016; 37: 323-8.
- Heo SY, Oh JY, Kim JH. The Korean version of the Barratt Impulsiveness Scale, 11th version: its reliability and validity. *Korean J Psychol Gen* 2012; 31: 769-82.
- Jeon JR, Lee EH, Lee SW, Jeong EG, Kim JH, Lee D, Jeon HJ. The early trauma inventory self report-short form: psychometric properties of the Korean version. *Psychiatry Investig* 2012; 9: 229-35.
- Lee MA, Kim SH, Park JH, Sim EJ. Factors of suicidal ideation and behavior: social relationships and family. *Korea J Popul Stud* 2010; 33: 61-84.
- Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med* 2001; 16: 606-13.
- Julian LJ. Measures of anxiety: State-Trait Anxiety Inventory (STAI), Beck Anxiety Inventory (BAI), and Hospital Anxiety and Depression Scale-Anxiety (HADS-A). *Arthritis Care Res (Hoboken)* 2011; 63 Suppl 11: S467-72.
- Jeon HJ, Kang ES, Lee EH, Jeong EG, Jeon JR, Mischoulon D, Lee D. Childhood trauma and platelet brain-derived neurotrophic factor (BDNF) after a three month follow-up in patients with major depressive disorder. *J Psychiatr Res* 2012; 46: 966-72.
- Roy A. Childhood trauma and impulsivity. Possible relevance to suicidal behavior. *Arch Suicide Res* 2005; 9: 147-51.
- Braquehais MD, Oquendo MA, Baca-García E, Sher L. Is impulsivity a link between childhood abuse and suicide? *Compr Psychiatry* 2010; 51: 121-9.
- Park JE, Cho SJ, Lee JY, Sohn JH, Seong SJ, Suk HW, Cho MJ. Impact of stigma on use of mental health services by elderly Koreans. *Soc Psychiatry Psychiatr Epidemiol* 2015; 50: 757-66.
- Lanouette NM, Folsom DP, Sciolla A, Jeste DV. Psychotropic medication nonadherence among United States Latinos: a comprehensive literature review. *Psychiatr Serv* 2009; 60: 157-74.
- Statistics Korea. 2016 Korean social index [Internet]. Available at [http://kostat.go.kr/portal/korea/kor\\_nw/2/6/1/index.board?bmode=read&aSeq=359629](http://kostat.go.kr/portal/korea/kor_nw/2/6/1/index.board?bmode=read&aSeq=359629) [accessed on 4 May 2017].
- Merikangas KR. Divorce and assortative mating among depressed patients. *Am J Psychiatry* 1984; 141: 74-6.
- Hooghe M, Vanhoutte B. An ecological study of community-level correlates of suicide mortality rates in the Flemish region of Belgium, 1996–2005. *Suicide Life Threat Behav* 2011; 41: 453-64.
- Kunst AE, van Hooijdonk C, Droomers M, Mackenbach JP. Community social capital and suicide mortality in the Netherlands: a cross-sectional registry-based study. *BMC Public Health* 2013; 13: 969.
- Putnam RD, Leonardi R, Nanetti RY. Making Democracy Work: Civic Traditions in Modern Italy. Princeton, NJ, Princeton University Press, 1993.
- Zalsman G, Hawton K, Wasserman D, van Heeringen K, Arensman E, Sarchiapone M, Carli V, Höschl C, Barzilay R, Balazs J, et al. Suicide prevention strategies revisited: 10-year systematic review. *Lancet Psychiatry* 2016; 3: 646-59.

35. Park JI, Oh KY, Chung YC. Psychiatry in Korea. *Asian J Psychiatr* 2013; 6: 186-90.
36. Park CH, Yoo SH, Lee J, Cho SJ, Shin MS, Kim EY, Kim SH, Ham K, Ahn YM. Impact of acute alcohol consumption on lethality of suicide methods. *Compr Psychiatry* 2017; 75: 27-34.
37. Zhang H, Neelarambam K, Schwenke TJ, Rhodes MN, Pittman DM, Kaslow NJ. Mediators of a culturally-sensitive intervention for suicidal African American women. *J Clin Psychol Med Settings* 2013; 20: 401-14.
38. Kuroki M. Suicide and unemployment in Japan: evidence from municipal level suicide rates and age-specific suicide rates. *J Socio Econ* 2010; 39: 683-91.
39. Breuer C. Unemployment and suicide mortality: evidence from regional panel data in Europe. *Health Econ* 2015; 24: 936-50.
40. Ministry of the Interior (KR). Resident registration population statistics [Internet]. Available at [http://rcps.egov.go.kr:8081/jsp/stat/ppl\\_stat\\_jf.jsp](http://rcps.egov.go.kr:8081/jsp/stat/ppl_stat_jf.jsp) [accessed on 4 May 2017].