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ORIGINAL ARTICLE

Suicidal ideation and associated factors by sex in Korean adults: a population-based cross-sectional survey

Young Ran Chin · Hyo Young Lee · Eun Sun So

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Abstract
Objective This study investigates suicidal ideation and its associated factors by sex in Korean adults, focusing on health behaviors and health status.
Methods Cross-sectional data of 6,969 adults (25–64 years) who completed the Fourth Korean National Health and Nutrition Examination Survey were analyzed.
Results In both sexes, those who were married, had higher educational attainment or were non-smokers experienced low stress and had good self-rated health showed lower suicidal ideation. Significant factors were age for men and subjective body image and sleep time for women. In men, those aged 45–54 years showed the highest suicidal ideation rate. The effects of stress and depression on suicidal ideation were higher in men than in women.
Conclusions The development of a suicide prevention program for Korean adults requires different approaches for each sex. For working men aged 45–54 years, it should focus on the management of work-related stress and depression. For women, it should be a community support program for those who are less educated, have no job or experience a great deal of stress and depression.

Y. R. Chin
Korea Health Industry Development Institute, Chungbuk, South Korea
e-mail: chinyr@khidi.or.kr

H. Y. Lee (✉)
Department of Health Administration, Dongseo University, San 69-1, Jurae-dong, Sasang-gu, Busan 617-716, South Korea
e-mail: princesa@hitel.net; princesa@gdsu.dongseo.ac.kr

E. S. So
Nursing Science, Seoul National University, Seoul, South Korea
e-mail: soeunjee@yahoo.com

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Introduction

Suicidal deaths are rapidly increasing in Korea. Suicide is ranked ninth among the causes of death in 1993, and fifth in 2003. In 2008, it was the fourth leading cause of death, accounting for 5.0% of all deaths (Statistics Korea 2009). Among the Organization for Economic Co-operation and Development (OECD) members, Korea's suicide rate was the highest, at 24.7 per 100,000 people in 2005 and 21.5 per 100,000 people in 2006 (OECD 2008).

Internationally, as well as in Korea, studies have been carried out to prevent and reduce suicides. These studies have commonly focused on completed suicides or suicide attempts. Relatively few studies have focused on suicidal ideation or suicide planning (Jeon et al. 2007; Vilhjalmsson et al. 1998). Since suicidal ideation logically and empirically precedes the processes leading to suicide (Kessler et al. 1999; Lee and Kim 2007), understanding suicidal ideation will be helpful in preventing a transition to the following processes. In Korea, although adults have the most quickly rising suicide rate (Khang et al. 2004; Oh et al. 2005), most studies have focused on adolescents and the elderly (Alexopoulos et al. 1999; Jeon et al. 2007). Considering adults' important roles in their family and country, their suicide has a greater effect on family and society when compared with the effect of members of the other age groups' suicide.

Researchers have reported that suicide is related to numerous potential factors in adults, including smoking, drinking alcohol, sleeping, depression, stress, self-rated health, subjective body image and socio-demographic background (Anne et al. 2007; Jung and Roh 2007; Park

2008). These factors may reveal different patterns based on sex, and social roles should differ by sex. These differences between men and women may result in different indicators of mental health status, including suicidal ideation, suicide attempts and suicide rate. Korea, like other East Asian societies, has maintained a culture characterized to a great extent by patriarchy and Confucianism, as evidenced by traditional norms governing the household division of labor, the high income gap between men and women (the income ratio of women to men is 0.52) and the low representation of women in national politics (United Nations Development Program [UNDP] 2010).

Several studies have provided clues about the causal pathways between suicidal ideation and associated factors (Berry et al. 2010; Kjellstrom et al. 2010; Taylor et al. 2007). These studies explained that mental health could be affected by educational attainment, occupation and other socio-demographic factors. Suicidal ideation can also be affected by health status (depression, stress, etc.) and health behaviors as well (Fig. 1).

Suicidal acts tend to occur along with other health behaviors and health status rather than alone (King et al. 2001). Some researchers have assumed that health behaviors and health status are closely connected with and lead to suicide and self destruction (Jessor 1991, 1998). Since health behaviors and health status can be monitored more easily than other factors, they can be utilized for a prognosis of suicidal ideation. Because of adults' important role in their family and society and the existence of gender role differences, the influence of suicidal ideation needs to be analyzed separately based on sex. However, there have been few studies focusing on this sex difference, especially in adults. Therefore, this study examines whether the association between suicidal ideation and related factors differs between men and women within a representative sample of Koreans. This study seeks to provide insight into adult suicides by investigating health behaviors and health status, based on sex, affecting suicidal ideation, and to use such information to develop an adult suicide prevention program.

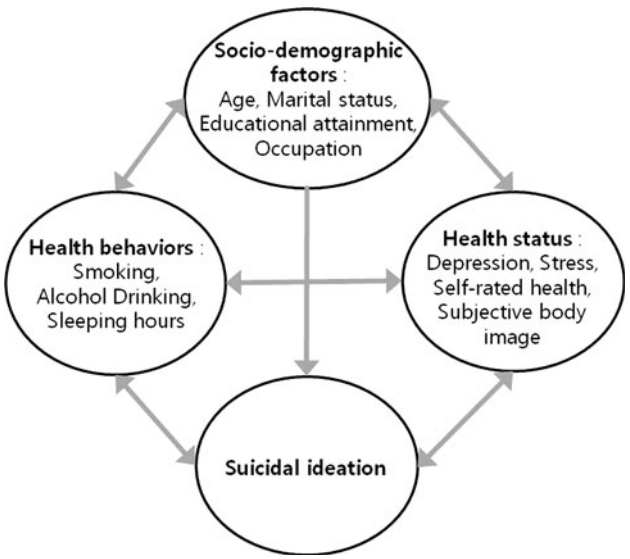

Fig. 1 Conceptual framework

The research questions studied were: (1) What are the differences in the incidence of suicidal ideation between sexes? (2) How do the factors affecting suicidal ideation, which were socio-demographic factors, health behaviors and health status, differ by sex (Fig. 1).

Methods

Study population

This study was a cross-sectional, descriptive study designed to explore the related factors associated with suicidal ideation among adults aged 25–64 years in Korea. Considering that men and women show differences in the rate of suicide and risk factors, possibly due to the difference in health behaviors and health status, as well as socio-demographic characteristics (Oh et al. 2005; Oner et al. 2007; Payne et al. 2008), the suicidal ideation-related factors were analyzed on a sex basis.

This study used the health interview data from the Fourth Korean National Health and Nutrition Examination Survey (KNHANES IV) conducted by the Korean Centers for Disease Control and Prevention (KCDC) from 2007 to 2008. KNHANES is a nationally representative survey that has been repeated since 1992. To select a representative sample of civilian, non-institutionalized Koreans, this survey used a stratified, multistage probability sampling design based on administrative district, place of residence (urban, rural) and residential pattern (apartment, non-apartment). The respondents' data were assigned weights to assure the equal probability of being sampled and to cover missing data.

Of a total of 14,338 subjects, 6,969 individuals who were adults aged 25–64 years were analyzed. This study excluded 7,531 subjects who were under 24 years old ($n = 4,463$) or over 65 years old ($n = 2,344$), and 562 subjects who did not respond to the health behavior variables and health status variables. Following the definition of age set by the World Health Organization's (WHO) suicide prevention and special programs, this study defined subjects aged 15–24 years as 'youth', 25 years and over as 'adults' and those 65 and over as 'elderly' (WHO 1996).

Measures

The questionnaire was developed by the advisory committee of the KCDC (2010). A structured interview about

health behaviors, health status and socio-demographic characteristics was performed by trained interviewers. For including suicidal ideation as an outcome variable, self-reported health indicators were used.

For measuring suicidal ideation, the question "Have you ever seriously thought about committing suicide in the past year?" was analyzed by using a 'yes' or 'no' answer as a dependent variable. Depression and stress were used to assess psychological health status. To evaluate these variables, subjects were asked whether they had been sad or depressed enough to affect their daily lives continuously for more than 2 weeks in the preceding year (yes, no), and whether they perceived themselves to be experiencing more stress than they normally did (yes, no).

Self-rated health was assessed by the question "How would you rate your health?" This variable was grouped into "unhealthy" (very poor, poor), "fair" (fair), and "healthy" (very good, good).

Among the independent variables used to investigate relationship with suicidal ideation, socio-demographic characteristics were sex (men, women), age, marital status (single, married, and divorced/widowed/separated), educational attainment (primary, middle, and high school or college), employment status (unemployed, employed); health behavior variables were smoking (non-smoker, ex-smoker, and current smoker), alcohol drinking (no alcohol consumption, alcohol consumer), sleep time (less than 5 h, 5–8 h and over 8 h); and health status variables were depression (yes, no), stress (yes, no), self-rated health (unhealthy, fair and healthy) and subjective body image (thin, normal and fat).

Average sleep time was assessed by asking "How many hours do you sleep in a day?" Respondents wrote their sleep time and were then divided into three categories (less than 5 h, 5–8 h and over 8 h).

Statistical analyses

Descriptive statistics and chi-squared tests were used to compare socio-demographic characteristics, health behaviors and health status by sex and suicidal ideation.

Logistic regression analyses were performed to explore the impact of socioeconomic characteristics, health behaviors and health status on suicidal ideation. In addition to this, two-step cluster analysis was used to identify the risk group for suicidal ideation. Subjects with missing data were excluded from all analyses. All statistical evaluations were conducted using SPSS 16.0.

Results

The general characteristics of the study's subjects are presented based on sex in Table 1. The 6,969 subjects included 2,957 men (42.4%) and 4,012 women (57.6%). Approximately, 19.0% of the women and only 10.8% of men had suicidal ideation. Their mean age was 44.14 ± 10.84 years. The difference between men and women was statistically significant in marital status, educational attainment, employment status, alcohol drinking, smoking and self-rated health. Men reported a significantly higher level of educational attainment than women, and had higher levels of employment status (86.7% of men compared to 50.8% of women), as expected. In addition to this, men were more likely than women to be current smokers (48.7% of men compared to 5.3% of women) and alcohol consumers (87.2% of men compared to 67.6% of women). On the other hand, women rated their health and their body image as "unhealthy" and "fat" more than men.

As presented in Table 2, women had more suicidal ideation than men in almost all surveyed aspects. Marital status revealed especially pronounced differences in suicidal ideation between men and women. Moreover, women over 45 years of age had more suicidal ideation than women in other age groups and men in all age groups. Men had more suicidal ideation in lower educational attainment groups and among 'employed' persons. For smoking, women who identified themselves as 'current smokers' showed the highest suicidal ideation rate. In men and women, the persons who felt stress had more suicidal ideation when compared with persons who did not feel stress. A different phenomenon occurred in suicidal ideation with 'depression'. Specifically, in men, individuals who did not feel depressed showed higher suicidal ideation (68.9%) than those experiencing depression, but in women, those who felt depressed showed higher suicidal ideation (39.8%). As for 'self-rated health', subjects who rated their health as 'unhealthy' had the highest suicidal ideation (32.4%) and this occurred to a greater degree in women. Furthermore, those who reported their body image as 'thin' and who had less than 5 h of sleep had the highest suicidal ideation in men and women.

Multiple logistic regressions were performed to examine the factors associated with suicidal ideation and the adjusted odds ratios (ORs) are presented, together with their 95% confidence intervals (CIs), in Table 2. For men, age, marital status, educational attainment, employment status, smoking, stress, depression and self-rated health were significantly related with suicidal ideation. For women, marital status, educational attainment, employment, average sleep time, current smoking, stress, depression, self-rated health and subjective body image were significantly related. The variables showing significant difference were age in men, and subjective body image and sleeping time in women. Men showed higher suicidal ideation at ages 35–64 years (OR = 2.52, CI = 1.50–4.25), especially at ages 45–54 compared to

Table 1 General characteristics of respondents by sex

Total	Men (%) 2,957 (42.4)	Women (%) 4,012 (57.6)	Total (%) 6,969 (100.0)
Suicidal ideation**			
Yes	318 (10.8)	761 (19.0)	1,079 (15.5)
No	2,639 (89.2)	3,251 (81.0)	5,890 (84.5)
Age (mean ± SD)	44.36 ± 10.79	43.98 ± 10.87	44.14 ± 10.84
25–34	621 (21.0)	930 (23.2)	1,551 (22.3)
35–44	906 (30.6)	1,204 (30.0)	2,110 (30.3)
45–54	776 (26.2)	1,034 (25.8)	1,810 (26.0)
55-64	654 (22.1)	844 (21.0)	1,498 (21.5)
Marital status**			
Single	412 (14.0)	275 (6.9)	687 (9.9)
Married	2,361 (80.5)	3,257 (81.6)	5,618 (81.1)
Divorced/widowed/separated	161 (5.5)	461 (11.5)	622 (9.0)
Educational attainment**			
Primary or less	370 (12.5)	875 (21.8)	1,245 (17.9)
Middle school	365 (12.4)	503 (12.5)	868 (12.5)
High school	985 (33.4)	1,459 (36.4)	2,444 (35.1)
College or more	1,230 (41.7)	1,174 (29.3)	2,404 (34.5)
Employment status**			
Unemployed	392 (13.3)	1,962 (49.2)	2,354 (34.0)
Employed	2,555 (86.7)	2,024 (50.8)	4,579 (66.0)
Alcohol drinking**			
No	378 (12.8)	1299 (32.4)	1,677 (24.1)
Yes	2,575 (87.2)	2,712 (67.6)	5,287 (75.9)
Smoking**			
Never smoker	487 (16.5)	3,577 (89.2)	4,064 (58.3)
Past smoker	1,028 (34.8)	222 (5.5)	1,250 (17.9)
Current smoker	1,441 (48.7)	213 (5.3)	1,654 (23.7)
Stress*			
No	2,163 (73.1)	2,849 (71.0)	5,012 (71.9)
Yes	794 (26.9)	1,162 (29.0)	1,956 (28.1)
Depression**			
No	2,810 (95.0)	3,263 (81.3)	6,073 (87.1)
Yes	147 (5.0)	749 (18.7)	896 (12.9)
Self-rated health**			
Unhealthy	462 (15.7)	908 (22.6)	1,370 (19.7)
Fair	1,203 (40.8)	1,659 (41.4)	2,862 (41.1)
Healthy	1,285 (43.6)	1,444 (36.0)	2,729 (39.2)
Subjective body image**			
Thin	580 (19.6)	445 (11.1)	1,025 (14.7)
Normal	1,191 (40.3)	1,603 (40.0)	2,794 (40.1)
Fat	1,183 (40.0)	1,963 (48.9)	3,146 (45.2)
Sleep time** (mean ± SD)	6.83 ± 1.28	6.88 ± 1.35	6.86 ± 1.32
<5 h	328 (11.1)	521 (13.0)	849 (12.2)
5 h–8 h	2,403 (81.3)	3,131 (78.1)	5,534 (79.5)
>8 h	224 (7.6)	357 (8.9)	581 (8.3)

* $p < 0.05$; ** $p < 0.01$ for the chi-square statistic for testing the difference between each levels

Table 2 The risk of suicidal ideation by general characteristics and health risk behaviors

	Suicidal ideation (%), men ($N = 2,957$)	OR (95% CI)	Suicidal ideation (%), women ($N = 4,012$)	OR (95% CI)	Suicidal ideation (%), total ($N = 6,969$)	OR (95% CI)
Age						
25–34	6.6**	1.00	16.9**	1.00	12.8**	1.00
35–44	10.3	2.24 (1.41–3.58)**	16.1	1.14 (0.87–1.50)	13.6	1.30 (1.03–1.63)*
45–54	12.5	2.52 (1.50–4.25)**	20.1	1.12 (0.81–1.55)	16.9	1.30 (1.00–1.69)
55–64	13.3	2.36 (1.31–4.25)**	23.9	1.09 (0.75–1.59)	19.3	1.22 (0.90–1.65)
Marital status						
Single	13.1**	1.00	19.3**	1.00	15.6**	1.00
Married	9.7	0.54 (0.34–8.44)**	17.7	0.59 (0.40–0.88)**	14.3	0.63 (0.48–0.83)**
Divorced/widowed/separated	21.7	0.85 (0.46–1.57)	28.2	0.84 (0.53–1.33)	26.5	0.95 (0.67–1.35)
Educational attainment						
Primary or less	18.4**	1.00	27.0**	1.00	24.4**	1.00
Middle school	15.6	0.86 (0.55–1.36)	21.9	0.78 (0.58–1.05)	19.2	0.81 (0.63–1.03)
High school	9.6	0.65 (0.42–0.99)*	17.9	0.68 (0.51–0.91)**	14.6	0.65 (0.52–0.83)**
College or more	7.7	0.56 (0.36–0.88)*	13.1	0.46 (0.33–0.64)**	10.4	0.45 (0.35–0.59)**
Employment status						
Unemployed	9.3**	1.00	17.8*	1.00	13.1**	1.00
Employed	20.2	0.53 (0.37–0.76)**	20.1	0.83 (0.69–0.99)*	20.1	0.68 (0.58–0.79)**
Alcohol drinking						
No	13.2	1.00	18.9	1.00	17.7**	1.00
Yes	10.4	0.88 (0.60–1.29)	19.0	1.05 (0.86–1.28)	14.8	0.99 (0.83–1.18)
Smoking						
Never smoker	7.6**	1.00	17.6**	1.00	16.4**	1.00
Past smoker	9.5	1.24 (0.80–1.93)	24.8	1.27 (0.88–1.82)	12.2	0.95 (0.77–1.17)
Current smoker	12.7	1.58 (1.04–2.39)*	36.2	1.51 (1.07–2.12)*	15.7	1.07 (0.89–1.29)
Stress						
No	6.3**	1.00	11.4**	1.00	9.2**	1.00
Yes	22.8	4.50 (3.42–5.90)**	37.4	3.72 (3.10–4.46)**	31.5	3.99 (3.43–4.63)**
Depression						
No	68.9**	1.00	14.2**	1.00	11.8**	1.00
Yes	45.6	4.88 (3.25–7.34)**	39.8	2.84 (2.34–3.45)**	12.9	3.33 (2.79–3.96)**
Self-rated health						
Unhealthy	23.2**	1.00	32.4**	1.00	29.3**	1.00
Fair	10.6	0.64 (0.46–0.89)**	16.9	0.71 (0.57–0.88)**	14.3	0.67 (0.56–0.80)**
Healthy	6.3	0.45 (0.31–0.64)**	13.0	0.62 (0.49–0.79)**	9.8	0.54 (0.45–0.66)**

Table 2 continued

	Suicidal ideation (%), men ($N = 2,957$)	OR (95% CI)	Suicidal ideation (%), women ($N = 4,012$)	OR (95% CI)	Suicidal ideation (%), total ($N = 6,969$)	OR (95% CI)
Subjective body image						
Thin	12.4	1.00	23.4**	1.00	17.2**	1.00
Normal	11.0	1.13 (0.80–1.61)	15.2	0.69 (0.51–0.92)*	13.4	0.85 (0.68–1.06)
Fat	9.6	0.91 (0.64–1.31)	21.1	0.90 (0.68—1.19)	16.8	0.95 (0.77–1.18)
Sleep time						
<5h	18.0**	1.00	29.4**	1.00	25.0**	1.00
5–8 h	9.5	0.70 (0.49–1.02)	16.8	0.69 (0.54–0.88)**	13.6	0.69 (0.57–0.85)**
>8h	13.4		23.0		19.3	

ORs were adjusted for residential area, age, marital status, educational attainment, employment status, housing tenure, alcohol drinking, smoking, stress, depression, self-rated health, subjective body image and sleep time

* $p < 0.05$; ** $p < 0.01$ for the chi-square statistic for testing the difference between each levels

25-34 years, and stress (OR = 4.50 in men vs. OR = 3.72 in women) and depression (OR = 4.88 in men vs. OR = 2.84 in women) had a greater effect on suicidal ideation than in women. Women, on the other hand, showed lower suicidal ideation when subjective body image was normal (OR = 0.69, CI = 0.51–0.92) and sleep time was 5–8 h (OR = 0.69, CI = 0.49–0.79).

A two-step cluster analysis split subjects into several homogeneous groups based on 11 related factors (Table 3). Men were divided into two groups and women were divided into six groups. Among men, Group 1 showed a higher 'suicidal ideation' rate than Group 2. Men who were old and had lower educational attainment showed a higher 'suicidal ideation' rate. Among women, Groups 4, 5 and 6 showed higher 'suicidal ideation' rates than other groups. Women in Group 4, who were young, had higher education, were alcohol drinkers and current smokers, and feeling stress and depression showed a higher 'suicidal ideation' rate. Group 5, comprising older women with lower educational attainment and 'unemployed' status who rated their health as 'unhealthy' and body as 'fat', showed a higher 'suicidal ideation' rate. Group 6 was composed of women, who had lower education, rated their health as 'unhealthy' or 'fair' and had a 'fat' body image showed a higher 'suicidal ideation' rate.

Discussion

This study investigated suicidal ideation and its associated factors by sex in Korean adults by using a large systematically randomized sample, focusing on health behaviors, health status and socio-demographic characteristics. Many factors were significantly related to suicidal ideation. In both sexes, those who were married, had higher educational attainment, were non-smokers, were under low stress and had good self-rated health showed less suicidal ideation. This result supported that high socioeconomic status could buffer poor mental health status. Significant factors affecting suicidal ideation were age for men and subjective body image and sleep time for women. In men, those aged 45-54 years showed the highest suicidal ideation rate. The effects of stress and depression on suicidal ideation were higher in men than in women. Women showed the lowest suicidal ideation rate when their subjective body image was normal. Also, women who slept 5–8 h showed a significantly lower suicidal ideation rate than those who slept less than 5 h.

The Republic of (South) Korea is ranked 64th among 182 nations on the 2010 United Nations Development Program (UNDP) index of gender empowerment, which summarizes women's economic autonomy and political participation in society (UNDP 2010). The differences between women and men in their expectations of social

Table 3 Grouping of suicidal ideation by general characteristics and health risk behaviors

	Men ($N = 2,957$)		Chi-square (p value)	Women ($N = 4,012$)						Chi-square (p value)
	Group 1	Group 2		Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Total (%, within gender)										
Yes	160 (8.9)	152 (13.8)		149 (13.1)	42 (12.9)	81 (12.8)	167 (26.3)	173 (28.8)	173 (28.8)	
Age										
25–34	610 (33.8)	–	2,106.61	412 (36.2)	308 (94.8)	45 (7.1)	151 (23.7)	–	–	3,489.9
35–44	887 (49.1)	2 (0.2)	(<0.001)	464 (40.7)	15 (4.6)	253 (40.1)	427 (67.1)	11 (1.8)	23 (3.7)	(<0.001)
45–54	308 (17.0)	457 (41.6)		245 (21.5)	2 (0.6)	192 (30.4)	56 (8.8)	166 (27.6)	355 (57.2)	
55–64	2 (0.1)	640 (58.2)		18 (1.6)	–	141 (22.3)	2 (0.3)	424 (70.5)	243 (39.1)	
Marital status										
Single	397 (22.0)	11 (1.0)	258.01	11 (1.0)	228 (70.2)	7 (1.1)	20 (3.1)	5 (0.8)	4 (0.6)	2,439.56
Married	1,337 (74.0)	1,000 (91.0)	(<0.001)	1,105 (97.0)	87 (26.8)	527 (83.5)	553 (86.9)	443 (73.7)	504 (81.2)	(<0.001)
Divorced/widowed/separated	73 (4.0)	88 (8.0)		23 (2.0)	10 (3.1)	97 (15.4)	63 (9.9)	153 (25.5)	113 (18.2)	
Educational attainment										
Primary or less	21 (1.2)	343 (31.2)	1,158.55	7 (0.6)	2 (0.6)	148 (23.5)	1 (0.2)	384 (63.9)	315 (50.7)	2,624.66
Middle school	68 (3.8)	290 (26.4)	(<0.001)	64 (5.6)	–	93 (14.7)	50 (7.9)	127 (21.1)	164 (26.4)	(<0.001)
High school	634 (35.1)	335 (30.5)		551 (48.4)	28 (8.6)	244 (387)	418 (65.7)	90 (15.0)	105 (16.9)	
College or more	1,084 (60.0)	131 (11.9)		517 (45.4)	295 (90.8)	146 (23.1)	167 (26.3)	–	37 (6.0)	
Employment status										
Unemployed	162 (9.0)	222 (20.2)	75.22	1,138 (99.9)	63 (19.4)	–	140 (22.0)	601 (100.0)	–	3,308.93
Employed	1,645 (91.0)	877 (79.8)	(<0.001)	1 (0.1)	262 (80.6)	631 (100.0)	496 (78.0)	–	621 (100.0)	(<0.001)
Alcohol drinking										
No	144 (8.0)	220 (20.0)	90.55	383 (33.6)	49 (15.1)	202 (32.0)	96 (15.1)	296 (49.3)	247 (39.8)	226.31
Yes	1,663 (92.0)	879 (80.0)	(<0.001)	756 (66.4)	276 (84.9)	429 (68.0)	540 (84.9)	305 (50.7)	374 (60.2)	(<0.001)
Past smoker	495 (27.4)	516 (47.0)	(<0.001)	69 (6.1)	22 (6.8)	12 (1.9)	75 (11.8)	34 (5.7)	7 (1.1)	(<0.001)
Current smoker	1,012 (56.0)	403 (36.7)		15 (1.3)	27 (8.3)	17 (2.7)	101 (15.9)	32 (5.3)	19 (3.1)	
Stress										
No	1,240 (68.6)	890 (81.0)	53.35	915 (80.3)	229 (70.5)	498 (78.9)	310 (48.7)	419 (69.7)	437 (70.4)	221.25
Yes	567 (31.4)	209 (19.0)	(<0.001)	224 (19.7)	96 (29.5)	133 (21.1)	326 (51.3)	182 (30.3)	184 (29.6)	(<0.001)
Depression										
No	1,750 (96.8)	1,010 (91.9)	35.01	975 (85.6)	304 (93.5)	557 (88.3)	458 (72.0)	433 (72.0)	482 (77.6)	140.8
Yes	57 (3.2)	89 (8.1)	(<0.001)	164 (14.4)	21 (6.5)	74 (11.7)	178 (28.0)	168 (28.0)	139 (22.4)	(<0.001)
Self-rated health										
Unhealthy	195 (10.8)	258 (23.5)	87.77	126 (11.1)	28 (8.6)	–	191 (30.0)	274 (45.6)	278 (44.8)	2,061.05
Fair	804 (44.5)	382 (34.8)	(<0.001)	531 (46.6)	161 (49.5)	–	405 (63.7)	190 (31.6)	343 (55.2)	(<0.001)
Healthy	808 (44.7)	459 (41.8)		482 (42.3)	136 (41.8)	631 (100.0)	40 (6.3)	137 (22.8)	–	

Table 3 continued

	Men ($N = 2,957$)		Chi-square (p value)	Women ($N = 4,012$)						Chi-square (p value)
	Group 1	Group 2		Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	
Subjective body image										
Thin	357 (19.8)	208 (18.9)	23.11	108 (9.5)	39 (12.0)	70 (11.1)	82 (12.9)	62 (10.3)	74 (11.9)	31.49
Normal	673 (37.2)	504 (45.9)	(<0.001)	446 (39.2)	144 (44.3)	296 (46.9)	245 (38.5)	212 (35.3)	247 (39.8)	(<0.001)
Fat	777 (43.0)	387 (35.2)		585 (51.4)	142 (43.7)	265 (42.0)	309 (48.6)	327 (54.4)	300 (48.3)	
Sleep time										
<5 h	156 (8.6)	165 (15.0)	53.48	76 (6.7)	11 (3.4)	79 (12.5)	73 (11.5)	147 (24.5)	126 (20.3)	188.03
Between 5 h and 8 h	1,545 (85.5)	820 (74.6)	(<0.001)	924 (81.1)	290 (89.2)	512 (81.1)	502 (78.9)	409 (68.1)	454 (73.1)	(<0.001)
>8 h	106 (5.9)	114 (10.4)		139 (12.2)	24 (7.4)	40 (6.3)	61 (9.6)	45 (7.5)	41 (6.6)	

roles and relationships are still large in Korea. Differences found between sexes regarding suicidal ideation and related factors reflected this.

In 2008, the suicide rate of Koreans aged between 25 and 64 years was 26.0 people per 100,000 population, 33.4 per 100,000 population for men and 18.7 per 100,000 population for women, with men showing a 1.8-fold higher suicide rate (Statistics Korea 2009). However, the suicidal ideation rate was 1.8 times higher in women (19.0%) than in men (10.8%), with the overall suicidal ideation rate being 15.5%. In a study that reported on the prevalence and risk factors for suicidal behaviors of adults aged 18–64 years across 17 countries—2 in Africa, 3 in the Americas, 3 in Asia and the Pacific, 7 in Europe and 2 in the Middle East, cross-national lifetime prevalence of suicidal ideation, plans and attempts accounted for 9.2% (S.E. = 0.1), 3.1% (S.E. = 0.1) and 2.7% (S.E. = 0.1), respectively (Nock et al. 2008). Although an absolute comparison cannot be made because of differences in the ages of the subjects, a similar tendency was found, in that, although the actual suicide rate is higher in men, suicidal ideation and attempts are higher in women (OR = 1.4) (Iribarren et al. 2000). In the Czech Republic, women were more than twice as likely to have had a prior parasuicide before committing suicide than men (Dzúrová et al. 2008). Korea's suicidal ideation rate of 15.5% is about 1.7 times higher than that of other countries (9.2%). This is not surprising, given the fact that Korea shows the highest suicide rate among the OECD countries (OECD 2008), with 0.3% of men and 0.1% of women who had suicidal ideation actually succeeding in suicide.

The finding that men aged 45–54 years had the highest suicidal ideation rate is consistent with data from the 17-country study excluding adults aged less than 25 years (Nock et al. 2008). The study of US adults (Strine et al. 2009) showed a high psychological distress rate in those aged 45–54 years and the study of South Australians (Taylor et al. 2007) showed similar patterns in the suicidal ideation rate. Dzúrová et al. (2008) also found that one quarter of people who committed suicide had prior experiences of parasuicide. The people who had committed suicide or parasuicide were the highest in the 45–54 age group. In addition to this, part-time workers have significantly higher anxiety than full-time workers (Shi et al. 2010) and feel more serious physiological distress (Strine et al. 2009). The larger effect of employment on suicidal ideation and attempts in men has also been demonstrated in several previous studies (Möller-Leimkühler 2003; Taylor et al. 2007; Turner and Turner 1999). Korean men are traditionally conditioned to give priority to their breadwinner role. Therefore, any conflict affecting their employment has greater adverse effects on the suicidal ideation of men when compared with women (Jeon et al.

2007). The high rate of suicidal ideation of participants aged 45–54 years may be related to increased job stress due to increased concerns about early retirement and uncertainty about the future (Jung and Roh 2007). Therefore, an implication of this result is that age-specific prevention should be considered for preventing suicide.

Unlike men, women who viewed their bodies as normal and who slept 5–8 h showed a lower suicidal ideation rate than those who thought they were thin (OR = 0.69) and who slept less than 5 h (OR = 0.69), respectively. Previous studies have shown that problems with sleep are common among persons with suicidal ideation (Roberts et al. 2001; Sabo et al. 1991). Shortened sleep appears to be more associated with an increased likelihood of suicidal ideation in the previous 12-month period in women than in men (OR = 1.8, CI = 1.2–2.6) (Goodwin and Marusic 2008). The results of this study are consistent with the relationship of sleep time in women with suicidal ideation. Subjective body image has generally been more meaningful to women than to men. Adolescents have shown a preference for a slim body image, and those who thought they were "fat" demonstrated a slightly higher suicidal attempt rate than those who thought they were normal (OR = 1.8, CI = 1.09–1.28) (Park 2008). Unlike adolescents, adults prefer a normal body image to a slim body image. The study of Zhao et al. (2009) showed that women who were underweight, overweight or obese and men who were underweight or obese had higher serious psychological distress rates. This result indicated that abnormal BMI or body image can be associated with mental health status in adults.

In adults of both sexes, those who were married (Hong et al. 2003; Khang et al. 2004; Nock et al. 2008; Taylor et al. 2007), had higher educational attainment (Khang et al. 2004; Nock et al. 2008; Oh et al. 2005), were non-smokers (Boden et al. 2008), were under lower stress, experienced less depression (Nock et al. 2008) and had good self-rated health (Kim 2006) showed a lower suicidal ideation rate. The study of McGuire et al. (2009), like our results, showed that non-smokers had less serious psychological distress. Ravens-Sieberer et al. (2009) showed that children and adolescents in Europe with low socioeconomic status had health problems. While Korean adolescents' risk factors for attempting suicide were depression (OR = 7.98), drug use (OR = 4.67), current smoking (OR = 3.19), stress (OR = 2.60) and current alcohol drinking (OR = 2.39) (Park 2008), alcohol drinking was not found to be related to suicide attempts in adults.

To study suicidal ideation as a dependent variable is essential for suicide prevention. An effective strategy for suicide prevention can be initiated after detecting factors related to suicidal ideation from the early stages of considering suicide. Our study avoided focusing on only one specific age group or one sex (e.g., adolescents, the elderly or women) and included all adult groups, allowing us to determine that the factors related to suicidal ideation differed by sex and conclude that these factors should be the key to suicide prevention. In conclusion, the development of a suicide prevention program for Korean adults requires different approaches for each sex. For working men aged 45–54 years, the suicide prevention program needs to focus on the management of work-related stress and depression. For women, it may be necessary to foster community support programs for those who are less educated, have no job, experience a great deal of stress and depression, and sleep less than 5 h per night.

There are few global questionnaires for measuring suicidal ideation. This seems to be a pattern similar to measures of stress and depression as well. Taylor et al. (2007) used four questions in the 28-item General Health Questionnaire (GHQ-28) for measuring suicidal ideation, such as: "Have you felt that life isn't worth living over the past 2 weeks?". The questions were scored from 0 to 4. For measuring serious psychological distress, Strine et al. (2009) used the Kessler-6-measures, which were a self-reported questionnaire. Our study is limited to single-item measurement of suicidal ideation, but it was associated with known factors in the expected ways.

This study will be of help in designing different systematic and effective suicide prevention approaches for men and women. However, several limitations to the current study should be considered when examining the results of this investigation. First, data were based on retrospective self-report and thus may be subject to underreporting and biased recall. The degree of suicidal ideation was not reflected in responses, since suicidal ideation was measured dichotomously by a "yes" or "no" answer to the question. Although the single-item measurement probably has limited reliability, self-reported health has proven to be a valid predictor of mortality and future morbidity, even after accounting for known demographic, social and medical risk factors (Idler and Benyamini 1997). Second, our data were cross-sectional, precluding any inferences regarding causation because of the possibility of reverse causality. We also examined the relationship between suicidal ideation and some variables (health behaviors, health status and socioeconomic variables) by sex; further study is required to identify the mechanisms by which suicidal ideation affects and is affected by these variables. Third, we assume that individual-level and group-level characteristics independently affect suicidal ideation. However, characteristics at these two levels may interact (Koller et al. 2009; Pikhartova et al. 2009), so contextual characteristics should be also considered in future studies. Additionally, we only showed the results for a limited number of factors, but in further studies, other factors should be considered such as

climate changes that could have a negative effect on mental health (Berry et al. 2010; Kjellstrom et al. 2010).

Conflict of interest The authors declare that they have no competing interests. The findings and conclusions in this article are those of the authors and do not necessarily represent the official position of the Korean Centers for Disease Control and Prevention.

References

Alexopoulos GS, Bruce ML, Hull J, Sirey JA, Kakuma T (1999) Clinical determinants of suicide ideation and behavior in geriatric depression. Arch Gen Psychiatry 56:1048–1053

Anne T, Eleonara G, Tiffany G, Laura F, Robert G (2007) Detecting determinants of suicide ideation: south Australian surveillance system results. Int J Public Health 52:142–152

Berry HL, Bowen K, Kjellstrom T (2010) Climate change and mental health: a causal pathways framework. Int J Public Health 55(2):123–132

Boden JM, Fergusson DM, Horwood LJ (2008) Cigarette smoking and suicidal behavior: results from a 25-year longitudinal study. Psychol Med 38:433–439

Dzúrová D, Vevera J, Motlová L, Dragomirecká E (2008) Analysis of parasuicide, psychiatric care and completed suicides, implications for intervention strategy (Czech Republic, 1996–2000). Int J Public Health 53(3):139–149

Goodwin RD, Marusic A (2008) Association between short sleep and suicide ideation and suicide attempt among adults in the general population. Sleep 31:1097–1101

Hong SC, Kim MD, Lee SY (2003) Suicide risk in relation to social class: a national register-based study of all suicides in Korea, 1999–2001. Health Soc Sci 14:249–271

Idler EL, Benyamini Y (1997) Self-rated health and mortality: a review of twenty-seven community studies. J Health Soc Behav 38:21–37

Iribarren C, Sidney S, Jacobs DR, Weisner C (2000) Hospitalization for suicide attempt and completed suicide: epidemiological features in a managed care population. Soc Psychiatry Psychiatr Epidemiol 35:288–296

Jeon GS, Jang SN, Rhee SJ, Kawachi I, Cho SI (2007) Sex differences in correlates of mental health among elderly Koreans. J Gerontol 62B:S323–S329

Jessor R (1991) Risk behavior in adolescence: a psychosocial framework for understanding and action. J Adolesc Health 12:597–605

Jessor R (1998) New perspectives on adolescent risk behavior. Cambridge University Press, Cambridge

Jung HY, Roh SH (2007) A study on factors influencing elderly suicide ideation: focused on the mediating effects of depression and stress on suicide ideation. J Korean Geriatr Soc 27:789–805

Kessler RC, Borges G, Walters EE (1999) Prevalence of and risk factors for lifetime suicide attempts in the National Comorbidity Survey. Arch Gen Psychiatry 56:617–626

Khang YH, Lynch JW, Kaplan GA (2004) Health inequalities in Korea: age- and sex-specific educational differences in the 10 leading causes of death. Int J Epidemiol 33:299–308

Kim HC (2006) Characteristics of suicide and suicide in adults on the type of study. Korean J Psychol Soc Issues 12:15–33

King RA, Schwab-stone M, Flisher AJ, Greenwald S, Kramer RA, Goodman SH et al (2001) Psychosocial and risk behavior correlates of youth suicide attempts and suicide ideation. J Am Acad Child Adolesc Psychiatry 40:837–846

Kjellstrom T, Butler AJ, Lucas RM, Bonita R (2010) Public health impact of global heating due to climate change: potential effects on chronic non-communicable diseases. Int J Public Health 55(2):97–103

Koller T, Morgan A, Guerreiro A, Currie C, Ziglio E et al (2009) Addressing the socioeconomic determinants of adolescent health: experiences from the WHO/HBSC Forum 2007. Int J Public Health 54(2):278–284

Korean Centers for Disease Control and Prevention. The Fourth Korean National Health and Nutrition Examination Survey (KNHANES IV). http://knhanes.cdc.go.kr. Accessed 11 March 2010

Lee HJ, Kim MH (2007) A path model for self-identity and hopeless to suicidal ideation of college students. J Korea Youth Res Assoc 14:243–264

McGuire LC, Strine TW, Vachirasudlekha S, Anderson LA, Berry JT, Mokdad AH (2009) Modifiable characteristics of a healthy lifestyle and chronic health conditions in older adults with or without serious psychological distress, 2007 Behavioral Risk Factor Surveillance System. Int J Public Health 54(S1):S84–S93

Möller-Leimkü hler AM (2003) The sex gap in suicide and premature death or: why are men so vulnerable? Eur Arch Psychiatry Clin Neurosci 253:1–8

Nock MK, Borges G, Bromet EJ, Alonso J, Angermeyer M, Beautrais A et al (2008) Cross-national prevalence and risk factors for suicidal ideation, plans and attempts. Br J Psychiatry 192:98–105

Oh JK, Cho Y, Kim CY (2005) Socio-demographic characteristics of suicides in South Korea. Health Soc Sci 18:191–210

Oner S, Yenilmez C, Ayranci U, Gunay Y, Ozdamar K (2007) Sexual differences in the completed suicides in Turkey. Eur Psychiatry 22:223–228

Organization for Economic Co-operation and Development (2008) OECD health data 2008. http://www.oecd.org/health/healthataglance. Accessed 10 August 2010

Park EO (2008) The influencing factors on suicide attempt among adolescents in South Korea. J Korean Acad Nurs 38:465–473

Payne S, Swami V, Stanistreet DL (2008) The social construction of sex and its influence on suicide: a review of the literature. J Men's Health 5:23–35

Pikhartova J, Chandola T, Kubinova R, Bobak M, Nicholson A, Pikhart H (2009) Neighbourhood socioeconomic indicators and depressive symptoms in the Czech Republic: a population based study. Int J Public Health 54(4):283–293

Ravens-Sieberer U, Torsheim T, Hetland J, Vollebergh W, Cavallo F et al (2009) Subjective health, symptom load and quality of life of children and adolescents in Europe. Int J Public Health 54(S2):S151–S159

Roberts R, Roberts C, Chen I (2001) Functioning of adolescents with symptoms of disturbed sleep. J Youth Adolesc 30:1–18

Sabo E, Reynolds C, Kupfer D, Berman S (1991) Sleep, depression, and suicide. Psychiatry Res 36:265–277

Shi Z, Taylor AW, Goldney R, Winefield H, Gill TK, Tuckerman J, Wittert G (2010) Int J Public Health. Online First™, 21 October 2010

Statistics Korea (2009) Annual Report on the Cause of Death Statistics. http://www.kosis.kr/. Accessed 10 August 2010

Strine TW, Dhingra S, Okoro CA, Zack MM, Balluz LS et al (2009) State-based differences in the prevalence and characteristics of untreated persons with serious psychological distress. Int J Public Health 54(S1):S9–S15

Taylor A, Grande ED, Gill T, Fisher L, Goldney R (2007) Detecting determinants of suicidal ideation: South Australian surveillance system results. Int J Public Health 52(3):142–152

Turner HA, Turner RJ (1999) Sex, social status, and emotional reliance. J Health Soc Behav 40:360–373

United Nations Development Program (2010) UNDP human development report 2009. New York

Vilhjalmsson R, Sveinbjarnardottir E, Kristjansdottir G (1998) Factors associated with suicide ideation in adults. Soc Psychiatry Psychiatr Epidemiol 33:97–103

World Health Organization (1996) Prevention of Suicide: Guidelines for the Formulation and Implementation of National Strategies. WHO

Zhao G, Ford ES, Li C, Strine TW, Dhingra S et al (2009) Serious psychological distress and its associations with body mass index: findings from the 2007 Behavioral Risk Factor Surveillance System. Int J Public Health 54(S1):S30–S36