# Determinants of an individual's suicide intention

# in South Korea

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## Executive Summary

This study has examined a variety of variables that influence an individual's suicide intention, and analyzed the impact of these variables. The data are from the 2014 wave of the Korea Welfare Panel Survey (KoWePS). I analyze data on 13,687 out of 17,134 survey participants.

The dependent variable of my study is suicide intention such as suicidal thoughts and behaviors. The independent variables are classified into three categories: socio-demographic, psychological and mental health. Socio-demographic variables are gender, age, education, marital status, and income. Psychological variables are self-esteem, satisfaction with life, and religion. Mental health variables are depression, alcohol use, and smoking.

I used a logistic regression model to test the effect of independent variables because the dependent variable is binary. Gender, income and marital status in the socio-demographic factors, satisfaction with life in psychological factors, and depression, alcohol use and smoking in mental health factors are significantly related with suicide intention.

The result of this study shows that we need to consider all three categories of factors: socio-demographic factors, psychological factors, and mental health factors. In order to mitigate individuals' suicide intention, this study indicates that it is necessary to treat mental health factors such as depression, alcohol use, and smoking. It is also important to promote satisfaction with life, to assist the low-income, and to consider gender related factors. This paper will be used to help establish the governmental policies for suicide prevention and intervention.

## Introduction

For eleven years in a row, South Korea has been ranked number one among OECD (Organization for Economic Cooperation and Development) countries for its suicide rate, according to the Statistics Korea. South Korea has a relatively high suicide rate not only among developed nations but among nations in general. The average suicide rate among all OECD countries, according to 2013 data published by Statistics Korea, was 12.0 people out of 100,000. In comparison, South Korea's suicide rate was 28.7 people per 100,000. Although the suicide rate across OECD countries has decreased since 1985, it has risen since 2000 in South Korea.

**Figure 1. Suicide rate of OECD countries**
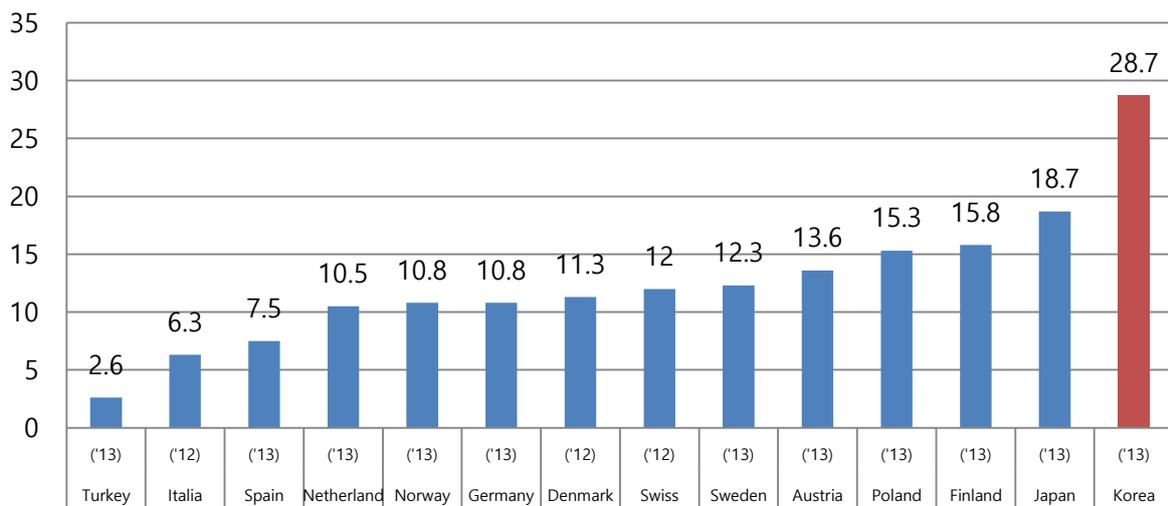


*Source: Statistics Korea, Cause of Death 2014

The suicide rate per 100,000 people in South Korea has increased significantly throughout the past few decades, notably more since 2001. In 2011, there was a peak (31.7 people); since then, the suicide rate has been decreasing somewhat. In 2014, there were 27.3 suicides, a 4.1% decline from the previous year (28.5 people) and the lowest in 6 years since 2008's 26.0 people, according to the Cause of Death 2014 report published by Statistics Korea.

**Figure 2. Suicides Rate in South Korea**
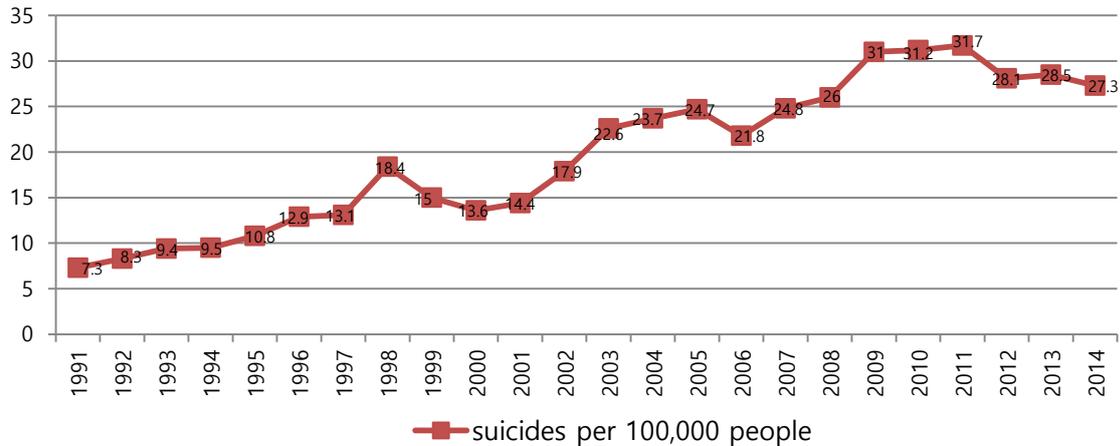


*Source: Statistics Korea (www.kostat.go.kr)

The Korean government has established and implemented two comprehensive suicide prevention measures to cope with the high suicide rate. The first was the National Suicide Prevention 5-year Plan (2004-2008). The plan included twelve projects such as mental health consultation, early detection of depression, therapy and follow-up management for suicide attempts, education about suicide, production of suicide-related statistics, and counseling by internet for preventing suicide, among others. In spite of the plan, suicides greatly increased in 2008, following the global financial crisis triggered by the Lehman Brothers bankruptcy. Thus, in 2009 the Korean government implemented a second plan in order to prevent and decrease suicides of people. This second plan included ten projects such as campaign for improving public awareness about suicide, strengthening the response capacity of individuals and communities to the risk of suicide, and providing public mental health services, among other measures. In this plan, various causes of suicide were considered, such as family breakdowns, bad credit, divorce, unemployment, loneliness, and bullying in school.

In addition, the "ACT FOR THE PREVENTION OF SUICIDE AND THE CREATION OF CULTURE OF RESPECT FOR LIFE (Suicide Prevention Act)" was

enacted in 2011 and began to be implemented in 2012. This act provides a legal basis for promoting suicide prevention measures and securing enough funding for suicide policy promotion.

In spite of these policies and the new legislation, South Korea's goal to reduce the suicide rate to less than 20 people per 100,000 has not been achieved yet. Moreover, the number of people who attempted suicide has increased, even though the number of suicides has decreased somewhat after 2011. According to data of National Emergency Department Information System, 19,279 people in 2010 attempted suicide but, suicide attempts increased to 21,795 people in 2012 and 25,748 people in 2013 (Lee et al, 2014).

There are many criticisms of the first and second five-year plans. As the first plan was designed based on recognition that the depression leads to suicide, the importance of socio-economic factors was overlooked and thus social measures were insufficient to support people facing the economic crisis (Lee, 2015). Like the first plan, the second plan's support measures for coping with the economic crisis were still not sufficient. In other words, the social safety net was inadequate in supporting seniors, family and youth who face the economic crisis (Lee & Kim, 2013; Lee, 2015).

The Korean government announced in 2015 that the Ministry of Health and Welfare is developing the third National Suicide Prevention 5-year Plan. However, the third plan has not been published so far. To supplement national initiatives and policies that have attempted to address the issue, it is necessary to more clearly identify what leads people to think about suicide, taking into account that multiple factors cause South Korea's high suicide rate. In this study, based on a survey by the Korea Welfare Panel Study in 2015, I will analyze which factors are linked to suicidal intention (suicidal thoughts, suicide plans

and attempts). And this analysis may be used to help establish the third National Suicide Prevention Plan priorities.

## Literature Review

### Suicidal thoughts and behaviors

Reynolds (1987) defines suicide plans as an intermediate stage between suicidal thoughts and suicide attempts. He distinguishes the concept of suicidal thoughts and suicide plans by describing four phases of suicide: suicidal thoughts, suicidal plans, suicide attempts and completed suicide. While suicidal thoughts are thoughts of the death itself and wanting to die, suicide plans include specific ways or measures how to kill oneself and assesses the feasibility of suicide.

Furr et al. (2001) and Westefeld et al. (2005) point out that suicidal thoughts and plans are regarded as a major predictor of committing suicide. Suicidal thoughts and plans often lead to suicide, even though not everyone thinking of suicide does commit suicide (Kim & Lee, 2014).

Suicide attempts are actions where a person tries to injure themselves in order to kill themselves. The U.S. National Institute of Mental Health estimates that there are eleven nonfatal suicide attempts for every suicide completion, which implies that even nonfatal suicide attempts are the strongest predictor of eventual suicide (Graubard, 2013). Suominen et al. (2004) estimate that about 10-15% of attempters eventually kill themselves. The suicidal risk is highest during the first year after the first suicide attempt because almost 16% of person who attempt suicide try to kill themselves within one year (Kim, 2012).

According to previous studies, various factors affect individuals' suicidal thoughts and behaviors. These studies can be grouped into three perspectives: socio-demographic, psychological, and mental health perspective.

**Socio-demographic perspective**

From the socio-demographic perspective, variables such as gender, age, education, marital status, and income are considered as predictors of suicidal thoughts and behaviors.

Lee (2013) reports that suicide rate of men is higher than that of women in South Korea, but women are more likely to think suicide and attempt suicide more often than men. The rate of nonfatal self-injury, the strongest predictor of eventual suicide, is consistently higher among women (Nock et al, 2008).

Noh & Lee (2013) say that the youth and the elderly are more likely to think suicide than the middle aged. According to data in 2013 by Statistics Korea, suicide mortality is significantly higher in the elderly over 65 years (69.8 people per 100,000). In particular, the suicide rate of people aged over 80 (138.1 people per 100,000) is two times higher than that of the average of the elderly over aged 65.

Noh & Lee (2013) report that the people who did not complete high school exhibits a higher frequency of suicide thoughts than the people with more than a high school education. In contrast to suicide thoughts, it is reported by Statistics Korea in 2013 that the ratio of high school graduates among total of suicide attempts is the highest, followed by the group of people who do not complete high school.

Looking at marital status, individuals who experienced a family breakdown such as divorce, bereavement or separation have been reported to be more likely to commit suicide than married individuals (Zhang, J. et al, 2009). It is also reported that suicide rate of married

persons was the lowest, but that of widowed or divorced persons is the highest in 2013 (MHW, 2013).

Hintikka et al. (1998) report personal income is strongly related to suicide behaviors by analyzing the change of suicide rate in boom times and recessions. Chuang and Huang (1997) analyze that economic factor like income give more affect on suicide behavior than social factors such as birth rate or divorce rate. Viren (1999) shows suicide behaviors in adults have a positive correlation with income.

**Psychological perspective**

From the psychological perspective, factors such as self esteem and subjective satisfaction with life are examined as predictors of suicide intention.

Self-esteem is one of the major factors associated with suicide (Kim, 2008; Yoon, 2010). Pinto and Whisman (1996) report that self-esteem of youths experiencing suicidal thoughts is low compared to other youths, and youths who have low self-esteem are more likely to attempt suicide than other youths. Self-esteem also has a significant effect on suicidal thoughts in adult, including the elderly (Hwang & Kim, 2008; Yum, 2014).

It is reported that subjective satisfaction with life affects suicidal thoughts and behaviors (Hwang & Kim, 2008; Oh, 2012). Personal satisfaction with life varies in accordance with the values and goals people pursue. It is relative and subjective. Therefore, it is necessary to review subjective satisfactions as one of the factors that may affect suicidal intention.

Jung (2008) argues that Durkheim's anomic suicide theory that reflects an individual's moral confusion and lack of social direction is still effective. In particular, religion creates connections among people (group attachment) and norms of behavior which result in lower suicide rates. It is also reported that religion has negative correlation with

suicide because activities in religious meetings or experience through religious rites relieve suicide thoughts and depression (Park & Huh, 2012).

## Mental health perspective

From a mental health perspective, it is reported that variables such as depression, alcohol use and smoking, are strongly related with suicide thoughts and behaviors.

Chui et al. (2004) report that there is a high incidence of depressive disorder in suicide cases. The prevalence of depressive disorder in suicide deaths cases is reported by 33.9% (Seo et al, 2012), and reported by 46.2% in suicide attempts cases (Seok et al, 1982).

Alcohol use has been reported to be directly related to suicidal thoughts and behaviors. The greater someone's alcohol consumption, the higher is the frequency of suicidal thoughts (Yoon et al, 2010). Kwon et al. (2012) report that, among groups that attempt suicide, the group that use the alcohol is likely to succeed to commit suicide by using more lethal methods than the group that do not use the alcohol.

It is reported that smoking is also related with suicide intention. Smokers express stronger suicidal thoughts, and actually show a higher incidence of suicide behaviors (Malone, K. M. et al, 2003; Sohn, 2014). As smoking rate increases in South Korea, suicide attempts also increase (Lee, 2013; Yang & Joo, 2011; Kim & Lee, 2014).

## A synthesis of the three perspectives

As suicidal thoughts and behaviors have been shown to be influenced by socio-demographic, psychological, and mental health factors, an analysis of the effect on individual's suicide intention in South Korea should take into account the socio-demographic, psychological and mental health factors shown as Table 1.

**Table 1. A synthesis of the three perspectives and predicted effect on suicide intention**

| Factor | Variables | Predicted effect on suicide intention |
|---|---|---|
| Socio-demographic perspective | Female | Positive |
| | The elderly | Positive |
| | High Education | Negative |
| | Married | Negative |
| | High Income | Negative |
| Psychological perspective | High self-esteem | Negative |
| | High Satisfaction with life | Negative |
| | No Religion | Positive |
| Mental Health perspective | High Depression | Positive |
| | Alcohol Use | Positive |
| | Smoking | Positive |

## Research Design

The aim of this paper is to analyze which factors affect individuals' suicide thoughts and behaviors, and to identify the factors with the largest impact. As discussed above, South Korea's suicide rate was 28.7 people per 100,000, which was more than twice the average suicide rate of OECD countries in 2013. I examine three groups of factors that are expected to influence suicidal intentions: socio-demographic, psychological and mental health.

### Data Collection

I use data from the 2014 wave of the Korea Welfare Panel Survey (KoWePS), conducted by the Korea Institute for Health and Social Affairs (KIHASA). This annual survey has been conducted since 2006. It is a national-level survey of a representative sample of the household and members over aged 15 (middle and high school students are

excluded). This survey is assessed periodically by Statistic Korea according to the Statistic Law. The survey data include economic activity status, income and debt, property, living conditions, social insurance, degree of education, daily habits, family relationship, and mental health including suicide thoughts and behaviors.

In the 2014 wave, the sample size of households is 7,053, and that of household members over aged 15 is 17,134. The sample of the survey is representative of 90 percent of population estimates provided by the 2005 Korea Census; it excludes individuals from islands and special facilities. In this study, I use data on 13,687 respondents out of 17,134 respondents in the sample because some household members do not complete the survey.

Among the 13,687 respondents in my data, 611 state having a suicide intention (4.5%). 12,647 (92.4%) respondents report having no suicide intention. 429 (3.1%) respondents do not respond to the suicide-related questions.

These data are based on interviews, not observations of actual suicide thoughts and behaviors. Goldney RD et al. (1991) indicate that adults underreport suicidal thoughts that occurred when they were adolescent. The extent of underreporting or overreporting of suicidal thoughts and behaviors cannot be determined (Alex E et al, 2011).

Demographic information on those who do not answer suicide-related questions might provide some of their specific features. The non-response rate of male (4.7%) is higher than female (1.9%). The under 30 aged group's non-response rate (8.7%) is higher than those of other age groups (≤4.0%). The higher educated groups show relatively higher non-response rate (≥4.1%) than the less than high school group (1.9%). Regarding marital status, the non-response rate of never-married group (8.5%) is higher than other groups such as married, widowed or divorced groups (≤2.3%).

**Table 2. Demographic information on those who answer suicide-related questions**

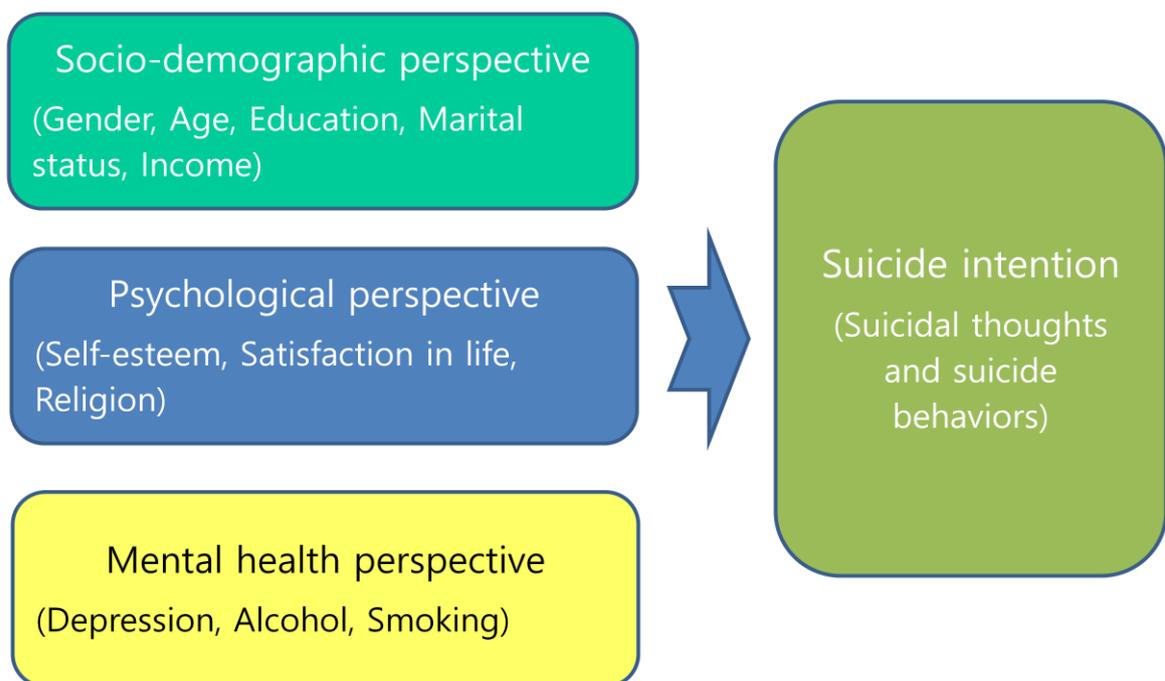| Characteristic | Suicide intention | | | | | | Chi2 |
|---|---|---|---|---|---|---|---|
| | Yes | % | No | % | No responded | % | |
| **Gender** | | | | | | | |
| Male | 231 | 3.8 | 5,535 | 91.5 | 285 | 4.7 | 97.0735*** |
| Female | 380 | 5.0 | 7,112 | 93.1 | 144 | 1.9 | |
| **Age group (yrs)** | | | | | | | |
| 15-29 | 27 | 1.9 | 1,281 | 89.5 | 124 | 8.7 | 317.5611*** |
| 30-39 | 35 | 1.9 | 1,750 | 94.2 | 73 | 3.9 | |
| 40-49 | 67 | 2.9 | 2,178 | 93.6 | 81 | 3.5 | |
| 50-59 | 119 | 5.6 | 1,972 | 92.1 | 51 | 2.4 | |
| 60-69 | 120 | 5.9 | 1,902 | 92.9 | 26 | 1.3 | |
| 70-79 | 169 | 6.2 | 2,544 | 92.8 | 30 | 1.1 | |
| ≥ 80 | 74 | 6.5 | 1,020 | 89.6 | 44 | 3.9 | |
| **Education** | | | | | | | |
| Less than high school | 376 | 6.6 | 5,243 | 92.0 | 109 | 1.9 | 187.8857*** |
| High school graduate | 159 | 4.2 | 3,508 | 93.0 | 123 | 3.3 | |
| College graduate | 22 | 1.7 | 1,254 | 94.0 | 54 | 4.1 | |
| University graduate or higher | 54 | 1.9 | 2,642 | 93.0 | 143 | 5.0 | |
| **Marital status** | | | | | | | |
| Married | 288 | 3.4 | 8,113 | 94.5 | 189 | 2.2 | 458.1466*** |
| Widow | 151 | 7.2 | 1,903 | 91.2 | 33 | 1.6 | |
| Divorce | 91 | 13.3 | 577 | 84.6 | 14 | 2.1 | |
| Separation | 9 | 10.5 | 75 | 87.2 | 2 | 2.3 | |
| Never married | 72 | 3.2 | 1,979 | 88.3 | 191 | 8.5 | |
| **Income+** | | | | | | | |
| Less than10 | 384 | 7.4 | 4,678 | 89.6 | 160 | 3.1 | 174.4553*** |
| 10-19 | 173 | 3.1 | 5,247 | 93.8 | 176 | 3.2 | |
| 20-29 | 40 | 2.1 | 1,795 | 95.0 | 55 | 2.9 | |
| 30 or higher | 14 | 1.4 | 927 | 94.7 | 38 | 3.9 | |
| **Total** | **611** | **4.5** | **12,647** | **92.4** | **429** | **3.1** | |

+ : Korean Won in Million

*** : P<0.01

A higher non-response rate of certain groups might underestimate the prevalence of suicidal thoughts and behaviors. However, non-response bias is often a problem, where the response rate of a survey is very low in proportion of population. The response rate in this survey is relatively high at 96.9 percent. It means the representativeness of the sample is so high that the results of this study can be generalized. Thus, I treat the values of non-respondents as missing values in this study.

**Variables**

**Figure 3. Dependent variable and Independent variables**



Socio-demographic perspective
(Gender, Age, Education, Marital status, Income)

Psychological perspective
(Self-esteem, Satisfaction in life, Religion)

Mental health perspective
(Depression, Alcohol, Smoking)

Suicide intention
(Suicidal thoughts and suicide behaviors)

Dependent variable

The dependent variable is suicide intention, that is suicidal thoughts and suicide behaviors. As discussed in literature review, suicidal thoughts and suicide behaviors are essentially associated with committing suicide. Suicidal thoughts and plans are regarded as major predictors of suicide. Even though not everyone who has suicidal thoughts and plans

does commit suicide, suicidal intentions often lead to suicide. For each suicide completion, there are eleven nonfatal suicide attempts. This implies that suicide attempts also are the strongest predictor of committing suicide. In the first year after the first suicide attempt, almost 16 percent of person who attempt suicide try to kill themselves. Eventually, about 10-15 percent of suicide attempters lead kill themselves.

I use responses to questions about suicide intention as a dependent variable. In the 2014 wave, all members of households were asked whether they had thought seriously about trying to kill themselves at any time during their life. Those respondents who reported having had suicidal thoughts were then asked whether they had made any plans to commit suicide and whether they had attempted to kill themselves at any time. In the case that respondents answered "Yes" to one of these questions, it is determined that there is suicide intention.

Independent Variables

I test how three categories of independent variables affect the dependent variable. The three categories are: socio-demographic, psychological and mental health variables. Socio-demographic variables are gender, age, education, marital status, and income. Psychological variables are self-esteem, satisfaction in life, and religion. Mental health variables are depression, alcohol use, and smoking.

The first category of independent variables consists of socio-demographic variables.

Based on the literature review, I hypothesize that women are more likely to have suicide intention than men, and older age group to have more suicide intentions than younger age group. I expect less educated individuals to have suicide intention. Married people are less likely to have suicide intentions than people who are single, divorced or widowed. The higher income, the lower the expected incidence of suicide intention.

**Table 3. Hypotheses on Socio-demographic variables**

| Independent variables | Definition | Hypothesis |
|---|---|---|
| Gender (dummy variable) | Male or female | Female are more likely to have suicide intention |
| Age | Age groups | The older groups are, the more suicide intention |
| Education | Level of educational attainment | The less educated, the more suicide intention |
| Marital status | Married, divorced, widowed, separation, or never married | The married people have less suicide intention |
| Income | Annual household Income per household member | The higher income, the lower likelihood of having suicide intention |

The second category of independent variables consists of psychological variables.

The self-esteem scale used in this study is measured by utilizing the Rosenberg self-esteem scale (User's guide 2015). Self-esteem scale is a 10-item scale, which is measured with a four-point scale. It scores ranges from 10 to 40. The higher the score, the greater the self-esteem. I hypothesize that the higher self-esteem, the lower suicide intention.

**Table 4. Hypotheses on Psychological variables**

| Independent variables | Definition | Hypothesis |
|---|---|---|
| Self-esteem | The extent of self-esteem | The higher self-esteem, the lower suicide intention |
| Satisfaction with life | The extent of satisfaction with life | The higher satisfaction with life, the lower suicide intention |
| Religion (Dummy variable) | Having or non having religion | The individuals who have religion are less likely to have suicide intention |

Satisfaction with life is measured with a five-point scale, which indicated general satisfaction with physical health, economic issues and social relationship. The higher the score, the greater the satisfaction with life. It is hypothesized that the higher satisfaction with life, the less suicide intention.

In case of religion, respondents are divided by having religion or not. I assume that the individuals who have religion are less likely to have suicide intentions based on the previous studies.

The third category of independent variables consists of mental health.

Depression is measured by using the CES-D (The Center for Epidemiological Studies-Depression Scale). The CES-D is a 20-item scale for epidemiological research developed by the U.S. National Institute of Mental Health. It scores ranges from 0 to 60. The higher scores reflect greater levels of depressive symptoms while lower scores reflect lower levels of symptoms. It is hypothesized that the higher score of CES-D, the higher suicide intention.

**Table 5. Hypotheses on Mental health variables**

| Independent variables | Definition | Hypothesis |
|---|---|---|
| Depression | The extent of depression | The higher score of CES-D, the higher suicide intention |
| Alcohol use | The extent of alcohol use | The higher score of AUDIT, the higher suicide intention |
| Smoking (Dummy variable) | Smoking or non-smoking | The individuals who smoke are more likely to have suicide intention |

Alcohol Use Disorder is measured by using the AUDIT (The Alcohol Use Disorders Identification Test). The AUDIT is a 10-item screening tool developed by the World Health Organization. It is to assess alcohol consumption, drinking behaviors, and alcohol-related problems. It scores ranges from 0 to 40. The higher scores reflect greater level of hazardous or harmful alcohol use while lower scores reflect lower levels of alcohol use. It is hypothesized that the higher score of AUDIT, the higher suicide intention.

In case of smoking, respondents are divided by whether or not they smoke. I hypothesize that the individuals who smoke are more likely to have suicide intention.

### Analysis Methods

I use a logistic regression model in order to test the effect of the independent variables because the dependent variable is a dummy variable. Logistic regression, also called a logit model, is used to model dichotomous outcome variables.

## Analysis and Findings

This study analyzes the factors that influence suicide intentions such as suicidal thoughts and suicide behaviors. A logistic regression model was used to determine the effect of independent variables on the suicide intentions.

### Summary Statistics

Socio-demographic characteristics of the study are as follows. First of all, female (7,636 persons, 55.8%) are more than male (6,051 persons, 44.2%). For age, People in their seventies are the largest group (2,743 persons, 20.0%). People aged eighty and above make up the smallest group (1,138 persons, 8.3%).

**Table 6. Socio-demographic characteristics of the study**

| Independent Variables | Number | % |
|---|---|---|
| **Gender** | | |
| Male | 6,051 | 44.2 |
| Female | 7,636 | 55.8 |
| **Age group (yrs)** | | |
| 15-29 | 1,432 | 10.5 |
| 30-39 | 1,858 | 13.6 |
| 40-49 | 2,326 | 17.0 |
| 50-59 | 2,142 | 15.7 |
| 60-69 | 2,048 | 15.0 |
| 70-79 | 2,743 | 20.0 |
| ≥80 | 1,138 | 8.3 |
| **Education** | | |
| Less than high school | 5,728 | 41.9 |
| High school graduate | 3,790 | 27.7 |
| College graduate | 1,330 | 9.7 |
| University graduate or higher | 2,839 | 20.7 |
| **Marital status** | | |
| Married | 8,590 | 62.8 |
| Widow | 2,087 | 15.3 |
| Divorce | 682 | 5.0 |
| Separation | 86 | 0.6 |
| Never married | 2,242 | 16.4 |
| **Income (₩, Million)** | | |
| Less than 10 | 5,222 | 38.2 |
| 10-19 | 5,596 | 40.9 |
| 20-29 | 1,890 | 13.8 |
| 30 or higher | 979 | 7.2 |
| **Total** | **13,687** | **100.0** |

In extend of education, the less than high school group is the largest group (5,728 persons, 41.8%), the college graduate group is the smallest one (1,330 persons, 9.7%). In marital status, married group accounts for more than half (8,590 persons, 62.8%), separation group is few (86 persons, 0.6%). In terms of income, income below 20 million won group is

the largest one (5,596 persons, 40.9%), 30 million won or higher income group is the smallest one (9.79 persons, 7.2%).

Psychological characteristics of respondents in this study are as follows. Self-esteem ranges from 11 to 37 points. The mean of self-esteem is 21.9 (SD = 2.56). Satisfaction with life ranges from 1 point to 5 points. The mean of satisfaction with life is 3.5 (SD = 0.68). For religion, the group that has a religion (7,148 persons, 52.2%) is more than the group that has no religion (6,539 persons, 47.8%).

**Table 7. Psychological characteristics of the study**

| Independent Variable | | Number | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|---|
| Self-esteem | | 13,259 | 21.9 | 2.56 | 11 | 37 |
| Satisfaction with life | | 13,261 | 3.5 | 0.68 | 1 | 5 |
| Religion | Have a religion | 7,148 (52.2%) | | | | |
| | Have no religion | 6,539 (47.8%) | | | | |

Mental health characteristics of respondents in this study are as follows. Depression ranges from 20 to 60 points. The mean of depression is 34.7 (SD = 6.21). Alcohol use is ranged from 0 point to 40 points. The mean of alcohol use is 15.3 (SD = 4.89). Smoking group (2,599 persons, 19.0%) is smaller than non-smoking group (11,088 persons, 81.0%).

**Table 8. Mental health characteristics of the study**

| Independent Variable | | Number | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|---|
| Depression | | 13,259 | 34.7 | 6.22 | 20 | 60 |
| Alcohol use | | 6,347 | 15.3 | 4.89 | 10 | 40 |
| Smoking | Yes | 2,599 (19.0%) | | | | |
| | No | 11,088 (81.0%) | | | | |

**Logistic Regression**

Seven of the independent variables in the logistic regression model have a substantial impact on suicide intention of individuals. Table 9 represents the marginal effects of my model. Marginal effects reflect the change in the probability of y=1 given a one unit change in the independent variable x. Marginal impacts are reported for seven explanatory variables. The average of probability of suicide intention is 4.5 percent.

**Table 9.  Marginal impact**

| Independent Variables | | Marginal impact | Std. Err. |
|---|---|---|---|
| Socio-demographic perspective | Female | .0093*** | 0.009 |
| | Age | .0001 | 0.000 |
| | Education | -.0004 | 0.002 |
| | Marital Status | .0015* | 0.001 |
| | Income+ | -.0087*** | 0.003 |
| Psychological perspective | Self-esteem | .0027 | 0.000 |
| | Satisfaction | -.0098*** | 0.002 |
| | Religion | .0005 | 0.002 |
| Mental health perspective | Depression | .0044*** | 0.001 |
| | Alcohol Use | .0008*** | 0.001 |
| | Smoking | .0067** | 0.003 |

*: p<.1, **: p<.05, ***: p<.01; The average probability is 4.5%.

+: Income is transformed by log to correct the positive skew and downsize the scale.

Socio-demographic perspective

Looking at the socio-demographic perspective, gender, marital status and income have a substantial impact on suicide intention. Gender has a positive and statistically significant relationship with suicide intention (p<0.01). Females are 0.9 percent more likely to have suicide intention than males. Figure 4 represents predictive margins of gender with 95 percent confidence intervals (CIs).

**Figure 4. Predictive Margins of Gender with level 95% CIs**
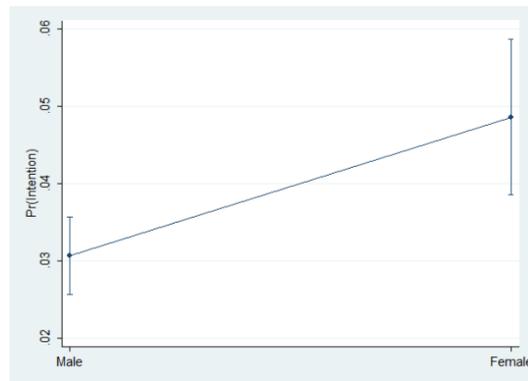


Marital status has a positive and weakly statistically significant relationship with suicide intention (p<0.1). Single (Never-married) are most likely to have suicide intention, followed by separation, divorce and widow. Individuals who experienced divorce, widow or separation are more likely to have suicide intention than married individuals as shown on Figure 5.

**Figure 5. Predictive Margins of Marital Status with level 90% CIs**
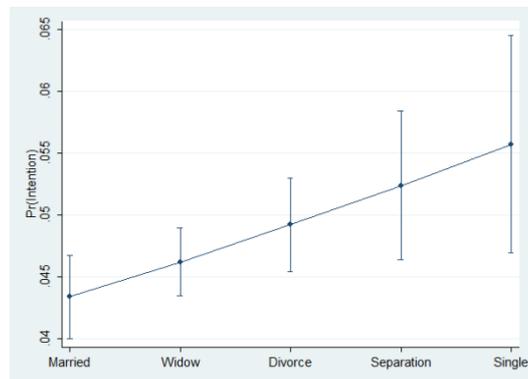


Household annual income per household member has a negative and statistically significant relationship with suicide intention (p<0.01). As the income increase by ten million won, suicide intention appears to be reduced by 0.2 percent. Figure 6 supports my hypothesis: The higher income, the lower likelihood of having suicide intention. It indicates that economic factor such as household annual income would negatively impact the suicidal

thoughts and behaviors.

**Figure 6. Predictive Margins of Household Income with level 95% CIs**
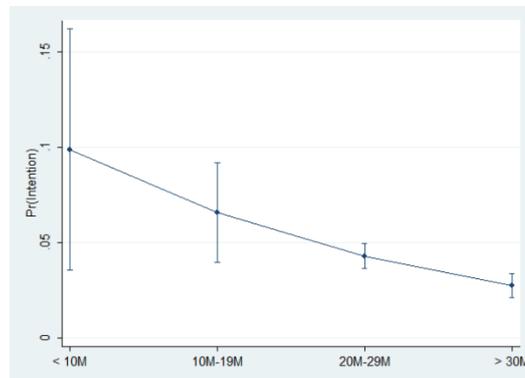


As opposed to the literature review, age and education in socio-demographic perspective are not significant statistically with suicide intention in my model.

Psychological perspective

For psychological perspective, satisfaction with life has a negative and statistically significant relationship with suicide intention ($p < 0.01$). Whenever satisfaction rises one point, suicide intention is reduced by 1.0 percent. Figure 7 shows that when satisfaction is low, the higher the possibility of suicide. The mean of satisfaction with life of respondents is 3.5. Figure 7 indicates that the probability of having suicide intention is higher from individuals with lower satisfaction than the mean.

**Figure 7. Predictive Margins of Satisfaction with level 95% CIs**
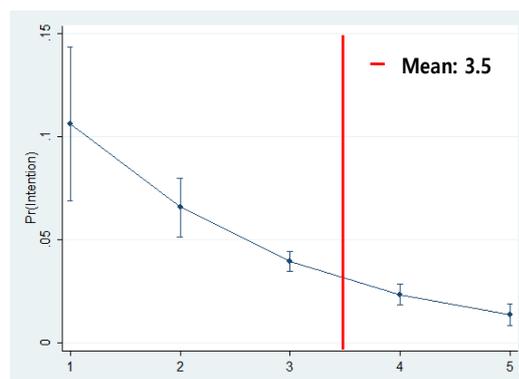
Self-esteem and religion in psychological perspective that I thought of as important factors are not statistically significant with suicide intention in my study.
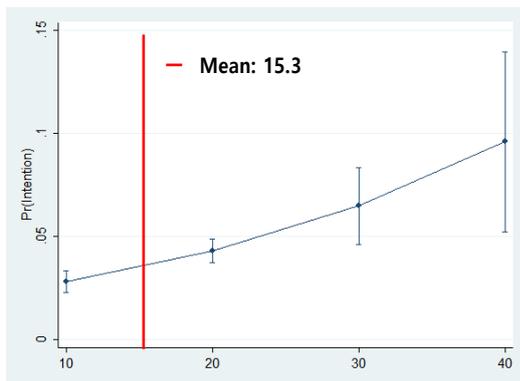
Mental health perspective

All explanatory variables in mental health perspective have influence on suicide intention. Depression has a positive and statistically significant relationship with suicide intention ($p<0.01$). As depression rises one point, the suicide intention is increased by 0.2 percent. The mean of depression scale is 34.7. The probability of having suicide intention is increased rapidly when the value of depression scale is more than the mean as shown on Figure 8.

**Figure 8. Predictive Margins of Depression with level 95% CIs**
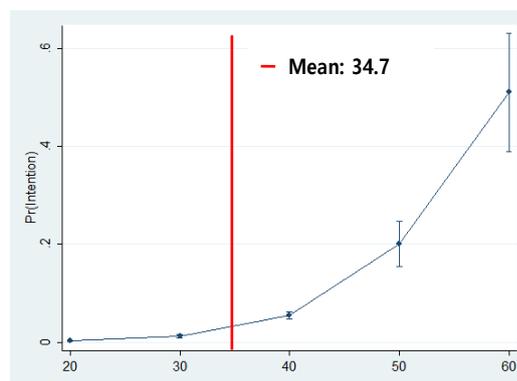


Alcohol use also has a positive and statistically significant relationship with suicide intention ($p<0.01$). As AUDIT point rise by one point, the suicide intention is increased by 0.1 percent. The mean of AUDIT scale is 15.3. Figure 9 shows that the probability of having suicide intention is higher from individuals with higher AUDIT points than the mean.

Smoking has a positive and statistically significant relationship with suicide intention ($p<0.05$). Non-smokers have a lower probability of getting suicide intention by 0.7 percent than smokers as shown on Figure 10.

**Figure 9. Predictive Margins of Alcohol Use (95% CI)**      **Figure 10. Predictive Margins of Smoking (95% CI)**
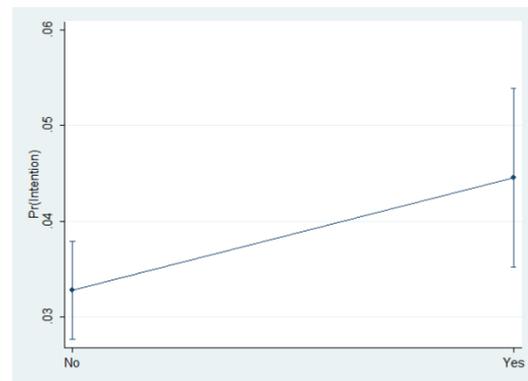


## Limitations

The findings in this study are subject to at least three main limitations.

First, this paper does not consider a relationship between suicide intention and suicide success. The previous studies estimated that almost 16% of person who attempt suicide try to kill themselves within one year, and about 10-15% of attempters eventually kill themselves. However, this study does not deal with the relationship between suicide intention and suicide success.

Second, it is not measured on the frequency or severity of suicidal thoughts and behaviors in the study. Suicide intention is just measured in the presence of suicidal thoughts and behaviors. There is a limitation that quantity or quality of suicidal thoughts and behaviors are not considered in this study.

Last, psychological and mental health measures do not necessarily correspond in time to the time when the individual has suicide intentions. In other words, at the time the individuals considered or attempted suicide, it is not clear what their psychological and mental health traits were.

## Conclusions

This paper has examined a variety of variables that may have an effect on individuals' suicidal thoughts and behaviors, and the relative impact of variables.

As a result of the study, some of the variables previous researchers noted as significantly relevant are not significant statistically. The variables such as religion, age or self-esteem that I thought would be of importance have no correlation with dependent variables. However, gender, marital status and income in the socio-demographic factors, satisfaction with life in psychological factors, and depression, alcohol use and smoking in mental health factors are significantly related with suicide intention.

The result of this study shows that we need to consider all three categories of perspective (socio-demographic perspective, psychological perspective, and mental health perspective) in order to mitigate individuals' suicide intention. This study indicates that it is necessary to treat individuals' mental health factors such as depression, alcohol use, and smoking. It is also important to promote satisfaction with life, to assist the low-income, and to consider gender related factors.

The interpretation of results should consider this study's limitations: this study does not deal with the relationship between suicide intention and suicide success, this paper does not consider the frequency or severity of suicidal thoughts and behaviors, and it is not clear what their psychological and mental health traits were when the individual has suicide intention. A future study should be designed to overcome these limitations.

Suicide is one of the major social problems in South Korea. Korean government tried to solve this problem, but the previous policies have been estimated not to be successful. At the time that the Ministry of Health and Welfare of South Korea is

developing the third National Suicide Prevention 5-year Plan, this paper will be used to help

establish the policies for suicide prevention and intervention.

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