

Characteristics of Korean Suicide: A Case-control Psychological Autopsy Study*

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The pattern of psychological and clinical risk factors for suicide among Korean population is an important issue. This study aimed to identify the risk factor characteristics for Korean suicides. This case-control psychological autopsy (PA) study compared 56 suicide deceased with 36 living controls matched by age and gender. Semi-structured interviews were conducted with family members, cohabitants, and the next of kin of the subjects. Data were collected on a wide range of potential risk and protective factors, including demographic, life event, clinical and psychological variables. The relative contribution of these factors to suicide was examined using a binary logistic regression model. As a result, several factors were found to significantly and independently contribute to suicide: adjustment to work and school, trusting people, problem with cohabitants, unhappiness in childhood, history of past suicide attempts, psychiatric illness, psychological stress from life events, and difficulties with life in the aspect of object and duration. Though both case group and control group have life events and difficulties such as financial problem, relationship conflicts, and so on over the ratio of 90%, the level of stress in the case groups was significantly much more severe. Besides, psychological strain was found to play an important role in suicide. Risk factors for suicide in Korea are definitely similar to those in the West, China, and Japan.

Keywords: Korea, suicide, psychological autopsy, psychological strain

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I. INTRODUCTION

Suicide has become one of the most common topics reported in the news media in Korea. According to the *Statistical results of deaths and the causes of deaths* by Statistics Korea (2011), 32.1 out of 100,000 people committed suicide in 2010, which is an increase from 2009. Korea is still one of the countries with the highest suicide rates in the world. Especially, suicide is the number one cause of death among individuals in their twenties as well as among female teens and males in their thirties.

Individuals at risk for suicide require integrated treatment involving social and economical aspects, since suicide is intricately related to social, economical, and cultural factors, such as conflicts among family and social members, long work hours, unemployment, bankruptcy, debt, health problems, and strife-ful social culture in addition to individual psychological stress, drug abuse, and psychiatric reasons that include emotional depression-related disorders. Therefore, research about efficient measurement that can objectively apprehend the fundamental causes of suicidal deaths and severity of the problems is needed. Moreover, studies in Korea should consider psychological autopsy of suicidal deaths based on academic results of the world including Europe, North America, and Japan (Korean Association for Suicide Prevention 2009).

Psychological autopsy explores the causes of suicides based on comprehensive and retrospective-information about the suicide. Hence, when somebody commits suicide, psychological autopsy scientifically investigates what made the person to take his/her own life by gathering all available information, including interviews with acquaintances and the suicide notes (Jae 2004). The psychological autopsy inquires specifically about 'why' suicide occurred. Although the kinds of deaths such as suicide, homicide, natural death and accidental death are manifested clearly by distinctive evidences (e.g., characteristics in crime scene, physical features of corpse, suicidal methods) psychological autopsy can effectively explain the reason of the behavior of suicide and its causes. That is, when the death involves unclear motive or suspicion, even if the kind of death is clearly judged, psychological autopsy makes it possible to identify the view of life,

emotional change, motives, and existence of any actual hazard, among others, of individuals who commit suicide. Next, it can give the socio-psychological explanation of how the person died and why the person died at that time. Lastly, in many cases, only psychological autopsy can solve the uncertain cause of death of death (Moon 1991a, 275).

The practical roles of psychological autopsy, which involve investigating integrated causes of suicides, can be applied very usefully in various fields. In forensic medicine, psychological autopsy can examine the relevance between the ambiguous death and suicide and in health sciences, it can support the research on suicide and the strategic activities necessary to prevent suicide in country or local community. Besides, legally, it can help reconstitute the possible causes of suicide, possibly proving the legal error in either a civil or a criminal case concerning suicide. For example, if it is proved that the work procedure and work load of a certain group caused stress enough to result in suicide, the group takes the civil responsibility (Bartol and Bartol 2005).

Especially, crime scenes require deciding whether the death was suicidal, homicidal, natural death and accidental death. About 5~20% of ambiguous deaths are left without accurate causes of death, and the ambiguity problem usually arises at the uncertain differences among suicide, homicide, natural death and accidental death. Doctors who conduct autopsies decide on the causes of death without considering the intention of the death, which could be problematic. This autopsy system, which has potential troubles in Korea, should be complemented by including psychological autopsy when determining the kind of death in order to make it more accurate (Choi 2003; Sin 2005).

Several studies have been conducted in Korea. Min (2009) has conducted a three-year research on suicide attempts through the post and visits of individuals with suicidal ideations. Nurses visited 463 suicide attempters who agreed with case supervision out of 662 who were received in emergency room and analyzed by risk management team. Ministry of Health and Welfare as well as Korean Association for Suicide Prevention developed Korean psychological autopsy model, analyzed specific contributors to suicide, and applied them practically to suicide and crime prevention (Min 2009).

Countries with highly developed suicide prevention, such as Finland and the United States, also reaped practical effectiveness from nationwide suicide

prevention plan that includes the psychological autopsy. Finland conducted psychological autopsy on 1,379 suicide cases for about one year from April, 1987 and established national suicide prevention exercise strategy based on those results. Through this, people and experts realized the severity of suicide problems and agreed about the necessity to develop national business of suicide prevention. As a result, suicide rate in 1996 had decreased by more than 20% compared to that of 1990, which was the highest rate ever. In the United States, psychological autopsy has been used actively on the suicides at local community to advice police, prosecution, court, the military and prisons, leading to a dramatic decrease in the suicide rate from 19 in 1990 to 14 per 100,000 in 2000 (Sin 2005). Recently, the Ministry of Health and Welfare suggested conducting psychological autopsy on suicidal deaths to develop and spread suicide prevention program based on the second 5-year plan of suicide prevention released in 2009.

More specifically, the results of psychological autopsy have found that almost every individual who had committed suicide had suffered from mental illness (Robins et al. 1959). The subsequent consecutive research in Seattle by Dorpat and Ripley (1960) reported the same result. Most findings on psychological autopsy have shown that mental illness is a necessary but not sufficient condition for suicide. The most common mental disorders associated with suicides are mood disorder and substance use disorder (Isometsa 2001; Robins et al. 1959).

Since 1990, psychological autopsy work has gradually spread to Asia, in addition to North America and Europe. For example, it has been utilized in Israel since 1990, Taiwan since 1995, India since 1999, China since 2002, and Hong Kong since 2004. Japan started psychological autopsy investigation business in 2003 and found that 46% individuals with suicidal ideations suffered from depression, 26% from schizophrenia, 3% from substance use disorder, and 3% from others. Chieu (2004), who conducted research in China, proposed that mood disorder and attempted suicide or previous self-injury are suicide risk factors while Lee (2002) reported that psychiatric history and low social assimilation in males, that is, feeling of isolation and exclusion caused by lack of social skills, are important contributors to suicide (Lee, Chang, and Cheng 2002). In Korea, Moon (1991a) introduced psychological autopsy as one way to verify suicide, and Choi (2003) partially

presented some cases of psychological autopsy conducted in and out of the country. Sin (2005) discussed methodology and ethical consideration needed to conduct psychological autopsy in the field.

However, it is difficult to implement psychological autopsy in Korea because of mental shock of family and acquaintances, sense of guilt, self-protection from social prejudice about suicide, and fear of social exposure. In Korea, China, and Japan, people tend to hide the fact that one of family members commit suicide, which makes it difficult to perform psychological autopsy and is culturally different from western culture, including the UK, the US, and Finland where people actively respond to psychological autopsy research procedure to prevent suicide. Fortunately, detectives from district police station systematically investigate the cause of unnatural death, including suspicious death, suicide, homicide, and accidental death, with the assistance of the family, friends, and doctor. The investigation process related to unnatural death is well established through disclosing the medical cause of all unnatural deaths after an autopsy by either district police station or National Institute of Scientific Investigation (NISI). Due to the investigation system, computer network program in criminal justice has developed systematically to report the method, reason, location of suicide, and medication taken when committed suicide, integrating information from hospital records, autopsy result, family interviews, medical examiner's result, and criminal analysis report. Therefore, this article explores the risk factors for suicide by selective in-depth interview of family and acquaintances based on network data and unnatural case processing system of the National Police.

II. METHOD

1. Subjects

Table 1 shows the socio-demographical features of case-control groups. The results indicated no differences between case and control groups in demographic features, such as age, gender, and residence. To compare case and control groups, age and gender were matched. Specifically, no significant difference in average age were found between the case group ($M=44.47$)

Table 1. General features of subjects

	group		
	case (n=56)	control (n=36)	Hypothesis tests
Age M (SD)	44.47(14.63)	42.26(15.38)	$t=0.70$ $P=.94$
Sex			
male	40(44)	24(66.6)	$\chi^2=.383$
female	15(16.5)	12(33.4)	$P=.536$
Marital Status			
married	13(23.2)	12(33.4)	$\chi^2=6.24$ $P=.181$
bereavement	4(7.1)	4(11.1)	
separated	10(.17.8)	2(5.5)	
divorced	5(8.9)	7(19.4)	
single	23(41)	11(30.5)	
Residential Types			
own or spouse's	14(15.4)	13(14.3)	$\chi^2=6.93$ $P=.074$
lease	30(33)	2(24.2)	
parents'	9(9.9)		
others	2(2.2)	1(1.1)	
Living Types			
alone	19(33.9)	15(41.6)	$\chi^2=7.82$ $P=.451$
with spouse, cohabitant or family	36(64.2)	19(52.7)	
with friends or relatives	1(1.7)		
others	1(1.7)	2(5.5)	
Religion			
yes	13(23.2)	16(44.4)	$\chi^2=3.60$ $P=.165$
no	39(69.6)	20(55.5)	
no response	3(5.3)	1(2.7)	

and control group ($M=42.66$). For gender, case group consisted of 44% males and 16.5% females, and control group consisted of 66.6% males and 33.4% females. Concerning marital status, 23.2% were married and 41% were single in case group and 33.4% were married and 30.5% were single in control group. For residential types, 15.4% of participants in the case group or their spouses were homeowners while 33% of individuals in case group were leasing a place. In the control group, 14.3% owned and 24.2% rented

Table 2. Characteristics of suicide behavior in case group

suicide variables(N=56)						
suicide loca- tion N(%)	home 37(66.1)	school/work 2(3.6)	public places 5(8.9)	hospital 2(3.6)	others 10(17.9)	
people around N(%)	no one 43(76.8)	in the same room 2(3.6)	in the same house 3(5.4)	near 7(12.5)	no response 1(1.8)	
resistance against in- tervention of suicide attempt N(%)	no intervention 38(67.9)	passive resistance 13(23.2)	active resistance 4(7.1)	no response 1(1.8)		
help request behavior N(%)	no contact 21(37.5)	attempt to contact but no request 33(58.9)	help request 1(1.8)	no response 1(1.8)		
beforehand hint of sui- cide N(%)	no hint 21(37.5)	indirect hint 17(30.4)	explicit hint 17(30.4)	no response 1(1.8)		
hint time of suicide N(%)	< 1 hour 9(16.1)	< a day 15(26.8)	< a week 7(12.5)	< 10 days 3(5.4)	10 days < 4(7.1)	no hint 18(32.1)
hint method of suicide N(%)	no 3(5.4)	phone call 12(21.4)	suicide note/diary 18(32.1)	suicide attempt experience 2(3.6)	text message 8(14.3)	verbal expression 13(23.2)
expression of suicidal intent to ex- perts, doctors N(%)		no 50(89.3)	yes 4(7.1)	no response 2(3.6)		
expression of reason of suicide N(%)		no 26(46.4)	yes 28(50)	no response 2(3.6)		
evaluation of suicide risk N(%)	no 6(10.7)	low 22(39.3)	high 27(48.2)	no response 1(1.8)		
reason of suicide date choice N(%)	no 52(92.9)		yes 3(5.4)	no response 1(1.8)		

Table 2. (continued)

		suicide variables(N=56)						
drinking before suicide N(%)		no 24(42.9)	yes 31(55.4)	no response 1(1.8)				
alcohol con- sumption be- fore suicide(- glass for <i>Soju</i> standard) N(%)		less than 4 3(9.6)	between 4 and 10 11(35.4)	more than 10 18(58)				
drug abuse N(%)		no 45(80.4)	yes 10(17.9)	no response 1(1.8)				
suicidal method N(%)	psychoactive drug poisoning	liquid substance poisoning	gas poisoning	hanging	leaping	no response		
	1(1.8)	9(16)	3(5.4)	37(66.1)	2(3.6)	4(7.1)		
suicidal rea- son N(%)	domestic problems	relation- ship	bereave- ment	physical illness	finance, job abuse, violence	mental/ psycho- logical relations	inter- personal relations	
	7(12.5)	5(8.9)	2(3.6)	11(19.6)	16(28.6)	4(7.1)	10(17.9)	1(1.8)

the apartment/house. Concerning living arrangements, 64.2% in case group lived with spouse or cohabitant and 33.9% lived alone while 52.7% in control group lived with spouse, cohabitant, or family member and 41.6% lived alone. Lastly, 23.2% individuals in case group and 44.4% in control group were religious.

2. Case group

First, cases evidently judged as suicide are selected among unnatural cases through various references such as investigative data, coroner's report, and profiler's report from January, 2009 until April, 2011 only, and then possible subjects from suicide cases available to approach needed data and primary informants were selected through the case review. The criterion for selecting suicide cases were confirmation of recent address and family's identity (recent address check for family, friends, or acquaintances) and availability

of interview after agreement on informants when the case was finally ruled as suicide, except for cases of foreigners or when the address was impossible to check. All cases occurred in certain areas including *Gangwon*, *Chungbuk*, *Gyeongbuk*, *Gyeonggi*, and *Jeju*, and they were chosen in order of the most frequent occurrences of suicide based on 'Current state and statistics of suicide' from Statistics, Korea in 2010.

Table 2 indicates general characteristics of suicide behavior of suicidal deaths. Individuals at risk for suicide tend to choose familiar places when attempting suicide and their home (66.1%) was the most frequent location. Concerning whether suicide attempters requested help from people prior to or after the suicide attempt, 37.5% did not have any kind of contact and 58.9% tried to contact but did not request any special help. Furthermore, 60.7% out of all signaled their suicidal intent to people around. However, only 1.8% asked help explicitly.

Prior to the suicide, 60.8% expressed directly or indirectly their attempt to commit suicide and 42.9% implied their attempt a day before. Overall, 32.1% left suicidal note or diary, 23.2% expressed their intention directly to doctor, family, or friends, and 14.3% sent text message to family members and close friends. Only 7.1% talked about their suicidal intent to psychiatrists or counselors before suicide and 50% revealed their reason for suicide. Furthermore, 55.4% were drunk before suicide and among them, 93.4% had more than 4 glasses of *Soju*, which counts for more than 50% of total cases were in drunken condition. The most frequently used method of suicide, suffocation, including hanging, comprised 66.1% while liquid substance poisoning, such as herbicide, comprised 16%. Financial and vocational problems accounted for 28.6%, being the highest reason for suicide followed by physical illness at 19.6% and mental/psychological problems at 17.9%. However, in many cases, several factors, such as family conflict and financial difficulty or husband's alcoholism and debt, influenced the individuals' decision to commit suicide. Control group

Cases ruled as homicide were selected as control group and compared to suicidal deaths. Natural deaths due to chronic diseases were excluded. Information needed for psychological autopsy in homicide cases was collected mainly from investigating the data of unnatural cases, and the interview form was the same as for suicide cases. Control group consists of

people with similar demographic properties compared to case group and were consciously sampled according to the closest location to the place of suicides which were identified by investigation data of unnatural cases.

3. Procedure

1) Data collection

We chose sample cases passed at least 3 months and 1 year from committing suicide after reviewing the criminal justice network at police station and investigation data of unnatural cases. Contact information of informants, such as friends, family, cohabitant, and ex-husband, were identified through investigating the data of unnatural cases of the suicides. First, we contacted informants by phone and after 3 days, we sent a mail made by crime analysis team at the National Police Agency that explained the confidentiality, anonymity, research purpose, and background of the research.

2) Interview

All interviews took place at places where the informants felt comfortable or their residence, and psychological autopsies were processed only when they signed the interview agreement. Prior to conducting the psychological autopsies, interviewers informed participants about their identity and role and then proceeded with the interview agreement, explaining the confidentiality and anonymity guarantee and approximate duration of the interviews. Moreover, they notified the participants that the interviews will be recorded only when they agree to it. The investigation involved face-to-face interview between investigator and informants. The informant had to select one person from immediate family, including spouse, parents, siblings, and children, and when necessary, we chose ex-cohabitant, lover, coworker, or friends, considering their contact frequency with suicide victims before the suicide.

Interviews were carried with the help of professional agents specialized on victim care and counseling (the National Police Agency, hearing inspection commissioner office) due to the difficulty of conducting psychological autopsy in Korea, since family members tend to hide the facts related to suicide history occurred in the relatives and family whereas families in western

societies, including the US, tend to respond actively to the psychological autopsy procedure. Interviews, in form of a free talk style, took about 20 minutes and semi-structured interviews took about 1 and a half hour. In semi-structured interview, interviewers read prepared questions and recorded informants' responses. The questions referred to psychological autopsy results report made by Ministry of Health and Welfare in 2009. Interviews of selected homicidal deaths were carried out in the same way as suicidal deaths, and we chose the control group that shares similar demographic properties and comes from the closest locations to those where suicidal deaths occurred, based on investigating the data of unnatural cases.

This psychological autopsy research considered all ethical aspects, including appropriate interview method and time with examinee, confidentiality, and guarantee of anonymity, agreement to participation, building mutual respect and trust between participants and researcher and support for the bereaved family (Sin 2005). Other works on psychological autopsy have also considered factors related to examinees, such as decision regarding the selection of interviewees as well as time and method of interview. To accomplish this, we contacted examinees by sending them mail by the National Police Agency and calling them 3 days later, arranging the interview 3 to 12 months after the suicide in order to give them enough time to accept the bereavement (Beskow, Runneson, and Asagard 1979; Brent et al. 1998). According to Cooper (1999), prior to initiating the interview, researcher received written agreement from the participants, gave them chance to consider stress and emotional pain that they can experience by participating in the research, briefly introduced himself/herself, his/her research career, the purpose and background of the research, expressed the gratitude for participating, and promised confidentiality and guarantee of anonymity.

4. Measures

1) Reference documents

In order to acquire information needed for psychological autopsy, we first examined previous data of unnatural cases, such as all sorts of suicide records, police records, and psychiatric and autopsy records at hospital, and

then collected the statements from at least one person, including family and acquaintances of suicides, through interview.

2) Psychological autopsy reports

Semi-structured interview contained questions about situation of individuals who committed suicides at the time of suicide, their life histories, life events, quality of life, physical illness or treatment situation, mental health problems, help request related to mental health, family structure and family situation, according to the psychological autopsy report style from Ministry of Health and Welfare (2009). Especially, life events were listed in 77 categories, including work, school events, financial events, interpersonal relation events, residence related events, domestic events, illness or accident related events, and company management related events. Informants were told to write down life events that the victims of suicide experienced 1 year before suicide and to answer whether the events were good or bad to them and how much and how long the events affected them.

3) Statistical analysis

Data were analyzed through SPSS WIN 15.0 program. The χ^2 -test and *t*-test analyses were applied to socio-demographical data, such as gender, living types, residential types, age, and religion. General characteristics of subjects were calculated using frequency and percentage. The case and control groups were compared on educational level and vocational characteristic, social relation characteristic, physical and psychiatric characteristic, self-injury behavior characteristic and life events and difficulty characteristic using odds ratio (OR) and χ^2 -test.

III. RESULTS

This exploratory research focused on comparing and analyzing the characteristics of each group based on the information gathered and on exploring the statistical variates and differences in the quality of case-group in Korea. Specifically, educational level and vocational characteristic, social relation characteristic, physical and psychiatric characteristic, self-injury

Table 3. Educational level and vocational features of case and control group

	group		
	case (n=56)	control (n=36)	odds ratio(95% CI)
Educational level(Educational years) M(SD)	11.10(3.47)	12.08(3.01)	$t=1.47$ $P=.14$
Job ⁰ no	29(60.4)	19(38.8)	1.40(.54-3.43)
If yes, the job he/she wanted ¹ no	31(55.3)	17(47.2)	.63(.27-1.48)
Adjustment at school or work ² no problems	14(25)	22(39.2)	1.0
evident problems	20(35)	1(1.7)	31.49(3.78-261.10)*
presumption of problems	19(33)	1(1.7)	2.29(.86-6.07)
Concerns of career in the future ³ yes	41(73.2)	11(30.5)	8.47(3.20-22.40)***
Monthly income (KRW) ⁴ < 500,000	13(23.2)	11(19.6)	1.0
510,000 ~ 1,500,000	26(46.4)	14(38.8)	1.57(.55-4.41)
1,500,000 ~ 2,500,000	5(8.9)	9(25)	.47(.12-1.82)
2,510,000 <	3(5.3)	2(5.5)	1.26(.17-9.02)
no response	9(16.0)	-	-
Unemployment period ⁵ > 6 months	30(53.5)	24(66.6)	1.0
7 ~ 12 months	5(8.9)	1(2.7)	4.00(.43-36.57)
12 month <	20(35.7)	9(25)	1.77(.68-4.60)
no information	1(1.7)	-	-

CI. Confidence interval

Reference categories: ⁰yes, ¹yes, ²no adjustment problem, ³no, ⁴less than KRW 500,000, ⁵less than six months

Note. * $p < .05$ ** $P < .01$ *** $P < .001$

behavior characteristic and life events, and difficulty characteristic variables were included and then each odds ratio (OR) and χ^2 -test of between groups were applied to all variables. For integrative and meaningful data analysis, we first show the results of statistical analysis fragmentarily and focus on basic

Table 4. Social relation features of case-control group

	group		odds ratio(95% CI)
	case (n=56)	control (n=36)	
Trustworthy person who can talk about concerns ¹			
yes	20(35.7)	28(77.7)	1.0
no	36(64.2)	8(22.2)	.159(.016-.61)***
Friendship relation ²			
alone	31(55.3)	8(22.2)	1.0
1 - 3 persons	16(28.5)	10(27.7)	.41(.13-1.25)
more than 4 persons	8(14.2)	18(50)	.11(.037-.35)***
Missing data	1(1.7)	-	-
Problems with cohabitant ³			
no	24(42.8)	19(52.7)	1.0
yes	32(57.1)	17(47.2)	1.49(.64-3.45)
If yes, how severe problems are ⁴			
no or trivially	24(42.8)	16(44.4)	1.0
slightly	5(8.9)	5(13.8)	.66(.166-2.68)
somewhat	12(21.4)	11(30.5)	.72(.259-2.04)
severely	15(26.7)	4(11.1)	2.50(.70-8.91)
Problems like worrying, sadness, disappointment, anger with people ⁵			
no or trivially	12(21.4)	14(38.8)	1.0
slightly	13(23.2)	11(30.5)	.55(.08-3.43)
severely	31(55.3)	11(30.5)	.32(.03-3.22)
Thoughts about childhood ⁶			
happy	11(19.6)	3(8.3)	1.0
very unhappy	27(48.2)	16(44.4)	8.24(1.93-35.05)**
unhappy	11(19.6)	16(44.4)	2.39(.101-6.35)*
Separation experience with parents before 18 ⁷			
no	36(64.2)	30(33.3)	1.0
with mother	2(3.5)	1(2.7)	1.66(.144-19.29)
with father	2(3.5)	-	-
with both parents	13(23.2)	5(13.8)	2.16(.69-6.77)
no response	3(5.3)	-	-

Table 4. (continued)

	group		odds ratio(95% CI)
	case (n=56)	control (n=36)	
Physical abuse ⁸			
no	47(83.9)	27(75)	1.0
yes	9(16)	9(16)	.57(.20-1.62)
Sexual abuse ⁹			
no	54(96.4)	36(100)	-
yes	1(1.7)	-	-
no response	1(1.7)	-	-
Threat or blackmail ⁰			
no	52(92.8)	34(94.4)	1.0
explicit evidence	2(3.5)	2(5.5)	.65(.08-4.86)
suspicion of threat	2(3.5)	-	-

CI. Confidence interval

Reference categories: ¹yes, ²no, ³no, ⁴no, ⁵no, ⁶very happy, ⁷no, ⁸no, ⁹no, ⁰no

Note. * $p < .05$ ** $P < .01$ *** $P < .001$

interpretations of variables of interest. IN the discussion, we concentrate on methodological interpretation of overall results and their relevance to previous works .

Table 3 shows differences between the case and control groups in educational and vocational variables. No significant difference emerged in years of education between case and control group, which were 11.10 years and 12.08 years, respectively. Overall, 55.3% of individuals in case group and 47.2% of individuals in control group who were employed had a job they did not want. For case group, the odds ratio that individuals would have jobs that they do not want was approximately 0.63 times lower than that of control group. For adjustment to school or work, 35% of case group and 1.7% of control group experienced adjustment problems while the adjustment problems of the case group was about 31.49 times higher. Furthermore, 73.2% of case group and 30.5% of control group answered that they are worrying about insecurity of their job in the future, with case group being about 8.47 times more concerned compared to the controls. Regarding unemployment,

Table 5. Physical condition and psychiatric features of case-control group

	group		
	case (n=56)	control (n=36)	odds ratio(95% CI)
Last visit to doctor ¹			
< 1 week	10(17.8)	4(11.1)	1.77(.51-6.17)
< 4 weeks	15(26.7)	4(11.1)	3.00(1.01-9.92)**
< 6 months	20(35.7)	9(25)	1.71(.67-4.35)
< 12 months	21(37.5)	12(33.3)	1.23(.51-2.98)
If visited, the reason			
psychological(mental) reason	12(17.8)	2(5.4)	5.11(1.03-25.23)*
physical reason	11(19.6)	10(27.7)	.93(.33-2.60)
both above	5(8.9)	1(2.7)	4.25(.46-39.13)
Severity of illness ²			
a little(slight damage to major activity)	13(23.2)	6(16.6)	2.50(.79-7.88)
serious(more than one damage)	10(17.8)	4(11.1)	2.89(.78-10.75)
severe(general life damage)	9(16)	4(11.1)	2.60(.69-9.83)
Illness period ³			
< 6 months (serious)	2(3.5)	1(2.7)	2.09(.177-24.73)
> 6 months (severe)	25(44.6)	12(33.3)	2.17(.100-5.37)*
Experience of treatment on mental health problem ⁴			
outpatient treatment	17(30.3)	6(16.6)	2.83(1.12-8.17)*
doctor's treatment other than psychiatrists	6(10.7)	-	-
not applicable	3(5.3)	-	-
Experience of drug prescription ⁵			
yes	20(35.7)	4(11.1)	4.76(1.45-15.27)**
If yes, kind of drug			
antidepressant	7(12.5)	4(11.1)	1.02(.30-3.39)
antianxiety	1(1.7)	1(2.7)	.87(.05-14.64)
antipsychotic drugs	1(1.7)	1(2.7)	.87(.05-14.64)
painkiller	1(1.7)	-	-
more than two combined	10(17.8)	-	-
no response	4(7.1)	-	-
Medication period(Month)	17.2	1.58	1.03(.98-1.08)

Table 5. (continued)

	group		
	case (n=56)	control (n=36)	odds ratio(95% CI)
Diagnosis on mental illness ⁶			
yes	22(39.2)	6(16.6)	3.43(1.22-9.63)**
no response	2(3.57)	-	-
If yes, kind of diagnosis			
psychoactive drug abuse including alcohol	6(10.7)	3(8.3)	2.41(.54-10.69)
depressive disorder	19(33.9)	3(8.3)	7.65(2.01-29.00)***
schizophrenia	4(7.1)	1(11.1)	4.83(.50-46.18)
obsessive disorder, including phobia	1(1.7)	-	-
personality disorder, behavior disorder	1(1.7)	-	-
adjustment disorder	1(1.7)	-	-
Mental illness treatment ⁷			
yes	17(30.3)	4(11.1)	3.86(1.18-12.77)**
no response	4(7.1)	-	-
If yes, treatment type			
hospital treatment	11(19.6)	1(2.7)	12.22(1.47-101.02)**
outpatient treatment	13(17.8)	3(8.3)	4.81(1.23-18.73)**
not applicable	5(8.9)	2(5.5)	2.77(.49-15.51)

CI. Confidence interval

The parameter estimates for each physical status and mental variable

Reference categories: ¹no visit, ²none (no damage), ³none, ⁴none, ⁵no, ⁶no, ⁷no

Note. * $p < .05$ ** $P < .01$ *** $P < .001$

8.9% of individuals in case group and 2.7% in control group were unemployed for 7 to 12 months, with the case groups showing 4 times higher ratio.

Table 4 describes the features of social relation and rising in case-control group. Overall, 64.2% of case group individuals and 22% of control group individuals did not have anybody to trust and the ratio for suicides was 0.15 times lower for the case group compared to the control group. In terms of friendship relation, 14.2% of case group and 50% of control group had more than 4 close friends, with the odds ratio for case group being 0.11 times lower. When they had problems with cohabitants, 26.7% of case group and 11.1% of control group experienced severely as suicides being 2.5 times

Table 6. Features of self-injury before suicide in case-control group

	group		
	case (n=56)	control (n=36)	odds ratio(95% CI)
Self-injury ¹ yes	26(46.4)	3(8.3)	13.38(1.04-170.83)*
If yes,			
in the past	22(39.2)	3(8.3)	
threat only	2(3.5)	-	
attempt only	1(1.7)	-	
missing data	3((5.3)	-	
The number of self-injury	.78	.16	2.65(1.26-5.59)**
Latest self-injury attempt ²			
> 12 months	14(25)	1(2.7)	.50(.027-9.23)
12 months - 5 years	7(12.5)	1(2.7)	.21(.01-4.47)
< 5 years	3(5.3)	1(2.7)	.06(.009-.55)**
If attempted, method			
painkiller poisoning	1(1.7)	-	
psychoactive drug poisoning	1(1.7)	-	
poisoning by gas or steam	2(3.5)	-	
substance poisoning such as herbicide	1(1.7)	-	
hanging, suffocation	7(12.5)	-	
usage of tools like knife	8(14.2)	2(5.4)	
death-leap	1(1.7)	-	
self-burning	1(1.7)	-	
others	2(3.5)	1(2.7)	

CI. Confidence interval

The parameter estimates for attempted deliberate self-harm in the past

Reference categories: ¹no attempt, ²no attempt

Note. * $p < .05$ ** $P < .01$ *** $P < .001$

higher. Concerning problems like worrying, sadness, disappointment, anger with people, 55.3% of individuals in case and 30.5% of individuals in control group were in serious condition, and case group exhibited 0.32 times lower ratio. Furthermore, 48.2% of the case and 44.4% of the control were very unhappy about their childhood and the former showed 8.24 times higher

Table 7. Life events and difficulty features in case-control group

	group			
	case (n=56)	control (n=36)	odds ratio (95% CI)	χ^2 (P-value)
Life events ¹ yes	56(100)	34(94.4)	1.58(.21-.11.81)	.20(.643)
The number of life events	56(100)	34(94.4)	1.26(.72-2.20)	
Life events ² job/work finance education health marriage family bereavement/separation crime	2(3.5) 6(10.7) 3(5.3) 8(14.2) 14(25) 5(8.9) 2(3.5) 5(8.9)	4(7.1) 6(16.6) 1(2.7) 6(16.6) 6(16.6) 9(25) 1(2.7) 1(2.7)	2.75(.28-26.60) ‡ 1.0(.104-9.61) 1.33(.104-12.36) 2.00(.231-17.33) .50(.054-4.67) ‡ 5.0(.23-91.51)	11.07(0.28)
Degree of stress of at least more than one life event eg slight influence moderate influence severe influence	1(1.7) 16(28.5) 37(66)	5(13.8) 20(55.5) 9(25)	.20(.011-3.66) .85(.10-6.69) 4.11(.50-33.27)	16.71(.001)
Life difficulty before death yes	54(96.4)	33(91.6)	3.23(.28-37.05)	.98(.320)
Life difficulty before death ⁴ problems with close person problems with others financial problems health problems school or work related problems others	16(28.5) 3(5.3) 10(17.8) 13(23.2) 11(19.6) 2(3.5)	16(44.4) 1(2.7) 5(13.8) 9(25) 2(5.5) 1(2.7)	2.00(1.64-24.32) 6.00(.22-162.53) 4.00(.28-55.47) 2.40(.18-30.52) 11.00(.64-187.16)* ‡	8.03(.210)
Period of difficulty before death ⁵ < 4 weeks 4 weeks - 3 months 3 months - 1 year 4 years <	5(8.9) 2(3.5) 18(32.1) 30(53.5)	3(8.3) 4(11.1) 16(44.4) 11(30.5)	3.33(.20-54.53) 1.00(.05-18.91) 2.25(.18-27.22) 5.45(.44-66.31)	6.4(.151)
Evaluation ⁶ little difficulty difficulty severe difficulty	1(1.7) 23(41) 31(86.1)	6(16.6) 25(69.4) 3(8.3)	.33(.01-8.18) 1.84(.15-21.67) 20.66(1.42-300.53)*	25.48(.00)

CI. Confidence interval

Reference categories: ¹no, ²no life events, ³no influence, ⁴no difficulty, ⁵no, ⁶no difficulty.

‡ Odds ratio could not be estimated using conditional logistic regression due to the distribution of responses in each strata

Note. * $p < .05$ ** $P < .01$ *** $P < .001$

odds ratio. Additionally, 30.22% of case group and 16.5% of control group experienced separation from parents, with case group experiencing 2.16 times higher chance of experiencing separation. Regarding other variables, including physical abuse, sexual abuse, and threat or blackmail, no significant differences were found between two groups.

Table 5 demonstrates physical condition and psychiatric features of both groups. Concerning last visit to doctor, 26.7% of case group individuals visited a doctor less than 4 weeks before death compared to 11.1% of individuals in the control group.

Overall, 17.8% individuals in case group visited a doctor for mental and psychological reason compared to 5.4% in the control group, with the ratio in the case group being approximately 5.11 times higher. In the case group, 44.6% of individuals experienced over 6 months of sickness period due to physical or psychological reason before death, whereas 33.3% in control group experienced prolong sickness. The case group was 2.17 times higher to experience chronic illness for over 6 months. Additionally, 30.3% of the case group and 16.6% of control group received outpatient treatment when they had experienced mental health related treatment. The case group had been treated 2.83 times more. Additional results showed that 35.7% of case group and 11.1% of control group had been prescribed due to mental problems, with the ratio of case group being 4.76 times higher. Moreover, 39.2% of case group and 16.6% of control group answered that they had received mental illness diagnosis before death, with the ratio for case group being 3.43 times higher. Regarding suicides that followed an illness, 33.9% of case group and 8.3% of control group individuals suffered depressive disorder when they were diagnosed as mentally ill, and the case group were 7.65 times more likely to suffer from it. When inquiring about treatment experience, 30.3% of case group and 11.1% of control group indicated that they were treated for mental illness, with case group's ratio being 3.86 times higher.

Table 6 shows the features of past self-injury in case-control groups, showing that 46.4% of case group and 8.3% of control group had injured themselves before suicide. The analysis indicated that it is an important predictor of suicide, since the odds ratio of case group was 13.38 times higher compared to that of control group. Furthermore, 5.3% of case group and 2.7% of control group engaged in self-injurious behavior in the past 5 years;

however, the odd ratio for the case group was 0.06 times lower compared to that of control group. If they had attempted self-injury, they used mostly tools like knife or tried hanging or suffocation.

Table 7 describes life events and difficulty features in case-control group. Over 90% of participants in both groups encountered major life events, and suicide group showed 1.58 times higher odd ratio of experiencing life events. Individuals in case group confronted marriage (25%) and crime (8.9%) as the major life events while control group confronted finance (10.7%), health (14.2%), and family (8.9%) matters more. Overall, 66% of case group and 25% of control group were under severe stress from the life events whereas case group had 4.11 times higher ratio to belong to severe influence category. More than 90% of individuals in both case and control groups had to face life difficulties before suicide. The case group was 11 times more likely to have difficulty at school or work compared to control did. Besides, the case group was 6 times more likely to experience interpersonal relation problems and 4 times more likely to experience financial problems. The case group had 3.3 times higher odds ratio for experiencing difficulty 4 weeks before suicide and 5.45 times higher ratio for experiencing difficulties 4 years before suicide while 53.5% of case group and 30.5% of control group were the case. Finally, 86.1% of the case group and 8.3% of control group perceived severe difficulties. The case group was 20.66 times higher to experience severe difficulties.

IV. DISCUSSION

This study aimed to explain the causes of suicide and to decrease suicide rates by appropriate crisis intervention in mental health area. Furthermore, one of our study proposes is to find out distinctive causes of suicide to close controversies in either civil or criminal case in investigation aspect. For this, we implemented case-control method, which is different from previous works, based on standard interview designed for suicide cases. Case-control study is a controlled study, and it uses structured interviews to examine the nature of fatal suicide behaviors beyond simple list of data description. In most recent works, control group generally consists of normal population or

the bereaved family of homicide victims. The variables were mainly selected based on culturally distinctive factors through a number of previous studies conducted in East such as Hongkong, Japan, and China in order to collect comprehensive information on suicide. The main source of psychological autopsy and related information were objectively chosen through interview with major examinee, medical personnel and review of available treatment records, environment provoked suicide and meticulous analysis of behavior events.

Our findings propose that adjustment to coworkers or tasks at school or work is the most critical risk factor for suicide. Moreover, excessive worrying about job insecurity contributed to suicide. Adjustment at school or work was a better predictor compared to consistent job, the job individuals wanted, or level of income. This implies that suicide relates more to self-efficacy or a sense of achievement rather than high-income career. Duberstein et al. (2004) found that self-confidence of functionality in affiliated society and problem solving skills showed deeper relevance compared to jobs or income through direct interviews on social economic variables, social integration (family), and religious participation of suicide victims over 50 years old.

One of the other major variables consisting of psychological autopsy items is building relationships with others. Suicide victims had very limited number of people or friends with whom they could share their concerns or worry. Kimberly et al. (2008) proposed that due to the damaged support system, suicide victims were socially disconnected even with their own family because of long-term alcoholism, drug addiction, mental illness, depression or unemployment. Foster et al. (1999) showed that the risk of suicide increased due to serious conflict with ex-cohabitant or cohabitant and unhappiness about childhood when there was no one trustworthy to talk about private concerns. This is in line with the results of Appleby, Cooper, and Faragher (1999), which indicated that mostly social or interpersonal conflicts, including problems with friends or lover and social exclusion, are related to suicide. Eventually, suicide prevention programs, like those in the US or Europe, should reinforce social support system to help reduce suicide rates among youths (Litts et al. 2003)

Several factors, including psychiatric disorder, visiting (general, psychiatric) doctor (less than 4 weeks), mental/psychological reasons

for seeing the doctor, disease period (chronic), prescription experience (psychiatric drugs), diagnosis of mental illness (depressive disorder), experience with depressive disorder, and mental treatment (hospital treatment) were highly relevant to suicide. Pertaining to this, previous findings based on the face-to-face interviews with near kindred and friends of suicides suggested that psychiatric disorder before suicide, psychiatric treatment experience, and personality disorder are clinical risk factors for suicide, similar to our results (Lesage et al. 1994; Harwood et al. 2001; Hawton et al. 2002; Waern et al. 2002). However, Foster et al. (1999) proposed that psychiatric examination by family doctor within 26 weeks is a main risk factor for suicide. The percentage of psychiatrically diagnosed people was 90.5% in Joiner et al. (2008), for example, and 90% in Waren et al. (2002), which was relatively higher than our study. Borderline disorder, schizophrenia, depression, bipolar disorder and alcohol-related drug addiction were the most frequent and repetitive contributors to suicide attempts, desensitization of (suicide) fear and increase in fatal suicide behavior contributed to possibility of suicide (Thomas et al., 2008).

Most importantly, previous suicide or self-injury attempts by hanging or using tools like knife correlated highly with suicide. Psychological autopsy studies have considered the relationship among non-suicidal self-injury, self-injury attempts, and suicidal behavior (Cavanagh, Owens, and Johnstone 1999; Hawton et al. 2002; Philips et al. 2002). Repetitive self-injury attempts, starting with slitting wrist with easily approachable tools (sharp-tip object like kitchen knife) or hanging with string or towel gradually changed to fatal methods, such as poisoning with arson and gas. Self-injury attempts appear to have the highest association with suicide, and they are usually accompanied by drinking behavior; however, the fact that alcohol-related drinking behavior contributes to impulsive suicide directly seems less persuasive, since suicidal cycle like intention, determination, plan, action, and reattempt occurs consciously for a certain time (Thomas et al. 2008). Only about 40% of suicide attempters received proper psychiatric services. These findings can play an important role in understanding suicide attempters and further more can inform psychiatric intervention or fundamental prevention programs.

More than 90% of individuals in both groups experienced more than one life event in lifetime; however, the level of stress feeling from the events

in suicide group was significantly much more strong, which indicates their positive relevance to suicide. Concerning life difficulties just before death, more than 90% in both groups responded affirmatively, although suicide group experienced more severe difficulties. The finding is similar to other studies, which proposed that psychological response to life difficulties or events is related to suicide more compared to the difficulty or experience itself (Appleby et al. 1999; Zhang et al. 2004). Especially, Philips et al. (2002) found that 29% of suicide victims faced very serious life events, and most of them experienced severe relationship conflicts two days before suicide. Case group suffered more from marriage (25.5%) or health (14.2%) problems compared to control group, and they also experienced problems at school or work as well as health problems over 4 years. Their depression tended to intensify before death so they felt like they burdened their family. Specifically, because they also experienced health problems, they thought that others would be better off if they died. Serious conflicts with close person resulted in relationship break, which actually separated them from society, decreasing their sense of belongingness in spite of belonging to family or work. Revengeful thoughts as well as contempt and hostility toward outside world were only secondary motives. Murphy (1979) and Rich (1988) reported that some life events showed interaction effect with substance abuse and that stressful life event related to school or work was the most influential.

However, our study has some limitations. First, the bereaved family complained of stress because a few interviews were conducted within 3 months following the suicide. Additionally, objectivity of certain data remains questionable because some of the examinees were in the middle of divorce, had conflicts with their ex-husband or husband, or were separating from husband, reflecting negative aspects of suicides which lead to some information biased only depending on husband or wife. Interviews were performed by those who were trained in semi-structured interview procedures; however, information from examinees could have been reduced, contaminated, or exaggerated depending on the method and performance of each interviewer. Sample is limited in that it represents the population restricted to certain geographic area. Above all, both groups were bounded by factors such as location of suicide occurrence, time, reasons for suicide, and regional differences; hence, further research should focus on a group

representative of the whole provinces and uniqueness of suicide in Korea. In addition, although psychological autopsy reports by Korean Association for Suicide Prevention in 2009 were included, more variables could be reviewed and selected from previous studies and literatures in other countries to support suicide prevention efforts and police or military investigations.

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