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Path analysis of the suicidal ideation of Korean adults

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Abstract

This study attempted to test the path model that can predict Korean adult suicidal ideation. The subjects were 459 adults aged between 19 and 64 who agreed to this study among quota sampled by the population, sex, and region of the metropolitan city. The path model of collected data was estimated using SPSS 24.0 program and AMOS 22.0. The results of the bias-corrected percentile method for verifying the significance of the mediator effect of the final model showed that suicidal attitude, depression, and stress were found to be mediating effects of health status on suicidal ideation. Suicide attitude and stress were found to mediate the effects of health status on depression. And the effect of drinking on depression was mediated by stress. This result is expected to be used as a practical basis for the development of suicide prevention and intervention programs for adults in the future.

Keywords: Korean adults, Suicidal ideation, Path analysis

1. Introduction

The suicide rate of Korea in 2016 was 25.6 persons per 100,000 population[1], which is more than double of the average suicide rate(12.1 persons) of major countries announced by OECD in 2017[2]. Thus, Korea has been stigmatized as a country with the highest suicide rate for 13 years.

The remarkable characteristics of suicide in Korea include the national consciousness that does not recognize the seriousness of suicide, the social atmosphere that does not receive the active treatment for mental illnesses such as depression, and great influence of socioeconomic factors such as degeneration of economic fluctuation, and especially, changes in unemployment rate and recession of local economy[3,4]. The reality of Korea facing the economic crisis which is three times worse than IMF because of lots of unfavorable factors such as the uncertainty of policies due to the recent political factors, the US protectionist policies, the reinforcement of non-tariff barriers of China, and the increase of international raw material prices, could more increase the suicide rate[5]. Under this context, especially, the suicide rate of adults with a role of breadwinner at home could be more serious[6]. In the statistical results of suicide rate of each age group of Korea in 2016, compared to the teenagers(4.4%), the suicide rates of adult age groups were like 20s(16.6%), 30s(24.7%), 40s(29.6%), 50s(32.5%), and 60~64 years old(33.5%)[1]. Especially, in case of adults, the first or second cause

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of death is the suicide, which disproves the seriousness of adults' suicide. In case of adults' suicide, it is not limited to an individual problem, but also causing a triple distress such as psychological pain to the left family members and economic hardship for domestic life, which could be a problem with family, and overall society[7]. Therefore, it is urgently needed to establish more active countermeasures for adults' suicide.

Meanwhile, the suicide is a sequential concept including the suicidal ideation, suicide attempt, and suicide act. Out of them, the suicidal ideation is generally a signal for serious emotional pain of an individual, which is one of the most powerful predictive factors that increase the risk of suicide attempt and suicide success[8]. Thus, the suicidal ideation could be used an important indicator for establishing the measures for the prevention of suicide, so that there have been active researches on it.

Most of the existing researches on the suicidal ideation of Korean adults mainly focused on revealing the relevant factors of suicidal ideation for both male and female adults. In the results, the suicidal ideation of Korean adults was much influenced by factors related to mental health such as drinking, depression, stress, self-esteem, and hours of sleep, and also physical factors such as perceived health status[9-21]. On top of such physical and psychological factors[14,17,19,20], the economic hardship such as poverty also worked as a preceding factor[15]. With the recent increase of suicide as an extreme choice caused by economic crisis like economic hardship such as income severance and debt of Korea[7,21,22], there have been researches aiming to verify the economic hardship as a cause of suicide. So far, there have been active researches verifying the factors having effects on the suicidal ideation of Korean adults. Moreover, most of such researches revealed the reliable relevant-factors through the secondary research of national research data in large scale. However, it is hard to find researches verifying the definite path of direct and indirect causality between influence factors on the suicidal ideation.

Thus, this study aims to suggest a path model that could explain the suicidal ideation of adults, based on the relevant factors of suicidal ideation of adults, verified by domestic preceding literature. The direct and indirect factors that could predict the suicidal ideation of Korean adults verified by the results of this study are expected to be used as the actual basic data for the development of suicide prevention or intervention programs for Korean adults as the recent increase of suicide rate is rising as a social problem.

2. Study Method

2.1 Study Design

This study is a path analysis study to test the appropriateness and effect of a hypothetical model that can explain the suicidal ideation of Korean adults.

2.2 Study Subject and Data Collection

For the analysis, this study used a part of original data of the 'A survey of awareness of life respect in Ulsan 2017' of the Ulsan a Regional Mental Health Welfare Center which was conducted by this researcher, with the approval of the center. For the data collection, this study finally analyzed the data of 459 adults in 19-64 out of total 500 subjects of quota sampling in accordance with the distribution of sex and region, compared to the total population, except for the recipients of basic living subsidies as the poor, in order to consider the economic level of adults in their 19 years or up in each borough and county of metropolitan city from July 1st to August 20th 2017. The sample size of this study is judged as plentiful as it is suitable for maximum likelihood(MI) in the research of mediating effects based on a preceding literature by Yu[23], and regarding the sample size, the 200 or more would be desirable for the improvement of power. After explaining the objective and purpose of

this study, non-disclosure of information, cases, and other matters related to research ethics to the whole subjects, the structured survey was conducted targeting the subjects who filled out a written consent form.

2.3 Study Tools

The tools used in this study were the 14 items of demographic characteristics and the suicidal attitude tool used by Renberg and Jacobsson[24], a total of 37 items and ATTS (Attitudes Towards Suicide) consisting of 10 sub-domains. The value of cronbach's α was .676. The Suicidal Ideation Scale (SIS) was developed by Harlow et. al.[25] and the cronbach's α value was .813. Depression scale was developed by Chon and Rhee[26] in 1971 by the National Institute of Mental Health Research (NIMH). The value of cronbach's α was .696. Drinking behaviors are the 10 items on the Korean version of the Alcohol Use Disorders Identification Test (AUDIT-K) developed by WHO, translated by Lee et. al.[27] and the cronbach's α value was .811. Stress, perceived health status, perceived economic status and acquaintance's suicide were also investigated.

2.4 Socio-Demographic Characteristics

The gender distribution of the subjects was males, 51.2% and females, 48.8%, and the mean age was 41.87 ± 12.583 years. The age distribution was in the order of 24.8% in the 50s, 24.6% in the 40s, 21.6% in the 30s, 21.1% in the 20s, and 7.8% in the 65s. Among the marriage status of the subjects, The marriage status of the subjects was the highest with 66.7% of married persons, followed by 28.5% of unmarried persons, 2.0% of divorced persons and 1.7% of widowed persons. The most common type of housing was self-employed (73.6%), chartering 13.7%, monthly renting 6.3%, and monthly 4.1%. The final education level was 54.2% of high school graduates, 39.4% of college graduates, 5.4% of middle school graduates, and 0.9% of primary school graduates. The religion was followed by 55.6% of non-religionists, 25.5% of Buddhists, 12.6% of Christianity, 5.2% of Catholics and 1.1% of others. Respectively. 62.5% had no occupation, and 37.5% had no occupation. 85.8% had no disease and 14.2% had no occupation. The average monthly household income was 31.6% less than 300 ~ 4 million won, 28.3% less than 400 ~ 5 million won, and 14.2% less than 200 ~ 3 million won. In the perceived economic status, 63.3% were 'not so good', followed by 'bad' (24.4%) and 'good' (8.9%).

2.5 Data analysis method

In this study, a path model was estimated to examine the relationship between perceived health status, perceived economic status, acquaintance's suicide, stress, depression, drinking behaviors, suicidal attitude, suicidal ideation. Structural Equation Modeling (SEM) identifies the causal relationship between models through a measurement model and a structural model. The measurement model shows the characteristics of the relationship between the measured variables and the latent variables, and the structural model shows the relationship characteristics between the latent variables. The maximum likelihood estimation method was used for estimating the coefficients in the covariance structure analysis. To determine the goodness of the path model, χ^2 , RMSEA (Root Mean Square Residual), GFI (Goodness of Fit Index), RMR (Root Mean Square Residual), AGFI (Adjusted Goodness of Fit Index), NFI (Normed Fit Index) and RFI (Relative Fit Index). These data were analyzed using SPSS 24.0 program and AMOS 22.0.

3. Results

3.1 Path model analysis

As shown in [Table 1], the fitness index of the hypothetical path model set in this study is $\chi^2 = 1.474$ ($p > .05$), RMSEA is .000, GFI is .999, RMR is .019, AGFI is .990, NFI .994, and RFI is .943, and the hypothetical path model is considered to be a suitable model.

Table 1. Goodness-of-fit-index of the hypothetical structural model

Goodness of fit index	χ^2	RMSEA	GFI	RMR	AGFI	NFI	RFI
Standard	Probability value .05 or more	.05 or less	.9 or more	.05 or less	.9 or more	.9 or more	.9 or more
Path model	1.474 (df=3 p=.688)	.000	.999	.019	.990	.994	.943

The results of the hypothetical path model and the parameter estimates are shown in [Fig. 1] and [Table 2] respectively.

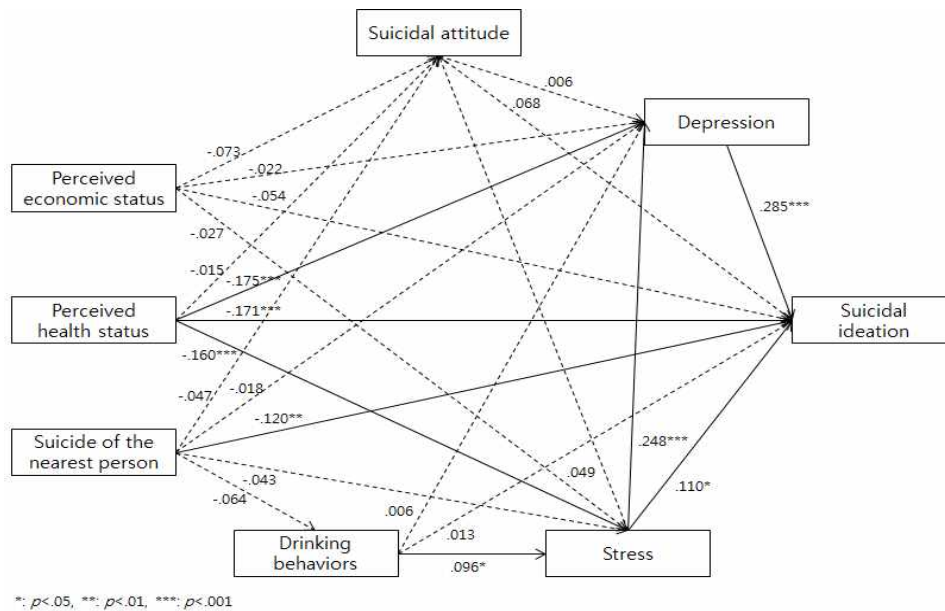


Figure 1. Path coefficient of research model

In the hypothetical path model, the direct path coefficients of the hypothesized pathways were statistically significant in terms of perceived health status ($\beta = -0.160$, $p < .001$), drinking behaviors ($\beta = -0.096$, $p = .037$). And there were no variables directly affecting suicidal attitudes. Stress ($\beta = 0.248$, $p < .001$) and perceived health status ($\beta = -0.175$, $p < .001$) were the significant variables that had direct effects on depression, ($P < .05$), depression ($\beta = 0.285$, $p < .001$), perceived health status ($\beta = -1.171$, $p < .001$) ($\beta = -0.110$, $p = .012$), respectively.

In the hypothetical path model, the direct path coefficients of the hypothesized pathways were as follows: variables that showed direct effects on stress were health ($\beta = -0.160$, $p < .001$), drinking behaviors ($\beta = -0.096$, $p = .037$). And there were no variables directly affecting suicidal attitudes. Stress ($\beta = 0.248$, $p < .001$) and perceived health status ($\beta = -0.175$, $p < .001$) were the significant variables that had direct effects on depression. ($P < .05$), depression ($\beta = 0.285$, $p < .001$), perceived health status ($\beta = -1.171$, $p < .001$) ($\beta = -0.110$, $p = .012$), respectively.

Table 2. Path coefficient and significance test of final model

		Standardized Coefficients	Unstandardized Coefficients	S.E.	C.R.	p	SMC
Acquaintance's suicide	→ Suicidal ideation	-.064	-.187	.136	-1.379	.168	.004
Perceived economic status	→	-.027	-.025	.046	-.556	.578	
Perceived health status	→	-.160	-.122	.037	3.318***	p<.001	.042
Drinking behaviors	→ Stress	.096	.051	.025	-2.086*	.037	
Acquaintance's suicide	→	-.043	-.068	.072	.943	.345	
Perceived economic status	→	-.073	-.031	.021	1.504	.132	
Perceived health status	→ Suicidal attitude	-.015	-.005	.017	.300	.764	.013
Stress	→	.049	.022	.021	-1.038	.299	
Acquaintance's suicide	→	-.047	-.033	.033	-.998	.318	
Perceived economic status	→	-.022	-.226	.477	.475	.635	
Perceived health status	→	-.175	-1.433	.385	3.719***	p<.001	
Drinking behaviors	→ Depression	.006	.034	.257	-.131	.896	.111
Stress	→	.248	2.669	.485	5.500***	p<.001	
Suicidal attitude	→	.006	.148	1.062	-.139	.889	
Acquaintance's suicide	→	-.018	-.303	.749	-.405	.685	
Depression	→	.285	.013	.002	6.490***	p<.001	
Perceived economic status	→	-.054	-.024	.020	1.231	.218	
Perceived health status	→	-.171	-.062	.016	3.821***	p<.001	
Drinking behaviors	→ Suicidal ideation	.013	.003	.011	.315	.753	.215
Stress	→	.110	.052	.021	-2.506*	.012	
Suicidal attitude	→	.068	.072	.044	1.630	.103	
Acquaintance's suicide	→	-.120	-.090	.031	-2.881**	.004	

In the hypothetical path model, the variance explained by all variables affecting drinking behavior was 0.4%. The variance explained by all variables affecting stress was 4.2%, and all variables affecting suicidal attitude explained The variance was 1.3%, and the variance explained by all variables affecting depression was 11.1%. The variables explained by all variables affecting suicidal ideation were 21.5%.

Verifying of mediation effect. The total, direct, and indirect effects of the final model are shown in Table 3.

In order to verify the significance of the mediator effect of the final model, the bias-corrected percentile method was used as the bootstrap method.

In the results of using the bias-corrected percentile method, in the results of testing the mediating effects of suicidal attitude, depression and stress on the effects of perceived health status on the suicidal ideation, the confidence interval did not include '0', so that the indirect effects were significant. In the results of testing the mediating effects of suicidal attitude and stress on the effects of perceived health status on the depression, the confidence interval did not include '0', so that the indirect effects were significant. And in the results of testing the mediating effects of stress on the effects of drinking behaviors on the depression, the confidence interval did not include '0', so that the indirect effects were significant. In the results of testing the mediating effects of suicidal attitude and depression on the effects of stress on the suicidal ideation, the confidence interval did not include '0', so that the indirect effects were significant.

Table 3. Total, direct, and indirect effects in structural models

		Acquaintance's suicide	Perceived health status	Perceived economic status	Drinking behaviors	Stress	Suicidal attitude	Depression
Drinking behaviors	Total effect	-.064 (-.148, .029)	-	-	-	-	-	-
	Direct effect	-.064 (-.148, .029)	-	-	-	-	-	-
	Indirect effect	-	-	-	-	-	-	-
Stress	Total effect	.050 (-.046, .135)	-.160** (-.259, -.062)	-.027 (-.118,.072)	.096* (.188,.012)	-	-	-
	Direct effect	.043 (-.056, .130)	-.160** (-.259, -.062)	-.027 (-.118,.072)	.096* (.188, .012)	-	-	-
	Indirect effect	.006 (-.002, .021)	-	-	-	-	-	-
Suicidal attitude	Total effect	-.049 (-.134, .049)	-.023 (-.074, -. 125)	-.075 (-.017, -.173)	.005 (.003, .019)	.049 (.140, .045)	-	-
	Direct effect	-.047 (-.135, .046)	-.015 (-.086, .118)	-.073 (-.019, -.170)	-	.049 (.140, .045)	-	-
	Indirect effect	-.002 (-.016, .002)	-.008 (-.006, -.027)	-.002 (-.003, -.014)	.005 (.003, .019)	-	-	-
Depression	Total effect	-.030 (-.118, .063)	-.214** (-.118, -.303)	-.028 (-.068, -.114)	.018 (.061, .115)	.247*** (.332, .164)	.006 (.096, .086)	-

	Direct effect	-.018 (-.101, .070)	-.175** (-.081, -.263)	-.022 (-.075, .108)	.006 (.085, .081)	.248*** (.332, .163)	.006 (.096, .086)	-
	Indirect effect	-.012 (-.037, .012)	-.039** (-.015, -.073)	-.006 (-.020, -.032)	.024* (.004, .050)	.000 (.005, .010)	-	-
	Total effect	-.138** (-.223, -.041)	-.251** (-.160, -.337)	-.070 (-.039, -.156)	.029 (.050, .129)	.183** (.272, .101)	.066 (.025, .148)	.285*** (.205, .371)
Suicidal ideation	Direct effect	-.120* (-.201, -.031)	-.171** (-.082, -.258)	-.054 (-.038, -.133)	.013 (.063, .103)	.110** (.188, .028)	.068 (.018, .149)	.285*** (.205, .371)
	Indirect effect	-.018 (-.050, .015)	-.080** (-.046, .117)	-.016 (-.018, -.045)	.016 (.014, .045)	.074*** (.112, .045)	.002 (.029, .025)	-

4. Discussions and Conclusion

This study attempted to establishing the suicide prevention strategies of adults as an economically-active population, degenerated by the rapidly-changing domestic and foreign political and economic changes and also economic crisis. For this purpose, a path analysis was conducted to test the appropriateness and effectiveness of a hypothetical model that could explain the suicidal ideation of Korean adults.

In the path model, when the level of depression was higher, when the perceived health status was worse, when there was a person who committed a suicide out of acquaintances, when the degree of stress was higher, people thought more about suicide. Just like the results of this study, the depression was verified as the most powerful and direct predictive factor of suicidal ideation. In the results of this study, the perceived health status[14,17,19,20] and stress[10,12,17-19,28], verified by preceding researches also had direct effects on the suicidal ideation of adults. As it has the direct effects on the suicidal ideation, it would be necessary to verify the causality of suicide of more concrete acquaintances and celebrities and the suicide of adults in the future.

Meanwhile, drinking behaviors are highly related to suicide[29], and drinking behaviors have been revealed as a factor having effects on the suicidal ideation in many preceding literature[9-11]. However, it did not have direct effects on the suicidal ideation in this study. Even though drinking behaviors had effects on the depression having the most direct effects on the suicidal ideation, it did not have direct or indirect effects on the suicidal ideation, so that it should be verified through repetitive researches in the future.

Next, in the results of testing the mediating effects between each variable, the variables showing the significant mediating effects on the effects of perceived health status on the suicidal ideation included stress, suicidal attitude, and depression. When all sorts of economic crises and unemployment are added to the recent increase of cancers and cardiovascular diseases in Korean adults based on wrong lifestyle, eventually, the stress is increased with the negative attitude toward suicide such as the rationalization of suicide, which is led to the extreme suicidal ideation. The suicidal attitude and depression had the mediating effects on the effects of stress on the suicidal ideation. When the degree of stress goes up, the suicidal attitude becomes negative, and the degree of depression also goes up, which is led to the increase of suicidal ideation. However, this is

the result of verifying the mediating effects of the results verifying the unidirectional causality in preceding researches, so that it would be necessary to have in-depth repetitive researches on the direct and indirect effects of each variable in the future.

As mentioned above, based on the predictive factors of suicidal ideation of Korean adults, this study aims to suggest the conclusions and suggestions as follows for the decrease of suicide rate of Korean adults in the recent condition of socioeconomic crisis. First, it would be necessary to vitalize the depression at the early stage of screening project in the national unit of Korea. Especially, the depressed patients should be preferentially discovered in the early stage through the depression early screening test targeting the adults suffering from unemployment and economic hardship. Also, on top of the specialized psychological counseling that could improve the mental health of depressed patients, it would be needed to seek for the psychological support program through family and acquaintances of depressed patients, and also to seek for the active program for the formation of social support network in community. Second, when the perceived health status of Korean adults get worse, they would think more about suicide. Recently, in the disease characteristics of Korea, the adult diseases mostly caused by wrong lifestyle have remarkably increased. Especially, the warning sign about adults' perceived health status like the increase of cardiovascular diseases is mostly caused by drinking, smoking, frequent eating-out, high-fat and high-salt diet like excessive intake of fast food, and lack of exercise. Therefore, it would be necessary to execute the effective health lifestyle practice program for the prevention of various chronic diseases including cardiovascular diseases, targeting adults including adolescents. Third, the thoughtless report of suicide of famous politicians including entertainers through all sorts of media including TV could encourage the rationalization of suicide as the last choice in the hardship or pain of life[6]. Therefore, it would be necessary to monitor the suicide reports in the public and private level, and also to seek for the measures for refining such reports. Fourth, stress is a normal response to human abnormalities, but it can be threatening if it continues or accumulates[30]. In particular, suicide in adults is not an impulsive suicide but accumulates as stress or difficulty and eventually suicide is chosen by oneself. Therefore, it is necessary to prepare more active plan or solution including social support for stress reduction and prevention.

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