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The Relevance of Being Single Person Household and the Depression and Thoughts of Suicide Among Current Smokers Based on the Utilization of the Korea National Health and Nutrition Examination Survey

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ABSTRACT

This study utilized the data from 2017, 2019 Korean National Health and Nutrition Survey to analyze the association between living status (i.e., Living alone or Other) with depression and suicidal ideation. Of the 2,042 participants included in the study, compared to the people in the Other category, the prevalence of depression for those living alone was 2.353 times (OR[Odds ratio]: 2.353, *p*-value: 0.016) higher, and 2.811 times (OR: 2.811, *p*-value: 0.018) higher in the 50 years old or older population. As such, living alone could aggravate the risk of mental problems, particularly in the middle aged and older population. In this age cohort, the lack of human or materialistic support, when coping with various difficulties, strengthens a sense of isolation, which then could lead to solitary death as well as suicidal behaviors. Hence, it is necessary to consider this issue in a more comprehensive way and secure various social support systems.

1. Introduction

Recently, single person households have increased rapidly. According to the National Statistical Office's population and housing census, the proportion of the single person households among all households increased from 15.5% in 2000 to 31.7% in 2020 (Statistics Korea, 2020). Above all, the increase among the single person households in Korea, which has entered an aging society, is expected to be accounted for by the elderly living alone, and the proportion of the elderly living alone among the elderly is expected to reach about 35% by 2045 (Statistics Korea, 2017). Furthermore, single person households are deeply related to the increase in the mental health problems. Depression is not only associated with heart diseases (Wulsin & Singal, 2003), stroke (Pan, Sun, Okereke, Rexrode, & Hu, 2011), and medical expenses due to an increase in the patients with multiple

chronic diseases (S. J. Ko, 2011), but also are largely related to the thoughts of suicide, suicide plans, and suicide attempts among the suicidal behaviors (Lee et al., 2009).

Overall, it has been uncovered that the single person households have significantly poorer health-promoting behaviors and physical and mental health levels compared to the other households (Y.S. Kim, 2014). Examining the previous studies (Korea Institute for Health and Social Affairs, 2012) on the number of household members and mental health, the prevalence of depression turned out to be higher among the single person households than among the multi-people households, and even when analyzed by age, the mental health of middle-aged single person households turned out to be statistically higher than that of the multi-people households, thereby yielding a statistically significant difference (Park et al., 2016). Furthermore, when the elderly living alone and the elderly who do not live alone are classified, the prevalence of depression was higher in the elderly who live alone than in the elderly who do not live alone (Arslantas, Ünsal, & Ozbabalık, 2014). Such results suggest that the mental health management of the single person households is a public health problem that is necessary (Arslantas et al., 2014).

Meanwhile, according to a study by Munafò and Araya (Munafo & Araya, 2010), it is claimed that smoking offers anti-anxiety and anti-depressant effects, and that it can alleviate depressive symptoms, yet conversely, there is also a claim that the act of smoking itself induces depression, and it is still under debate which one will have a more dominant effect (Moon et al., 2019). The act of smoking is understood to be that various behavioral and psychological factors, including visual, tactile, and olfactory behavioral processes, contribute together to strengthen the nicotine dependence, and there is a lot of room for depression to be involved in these behavioral, psychological, and factors, and it has been reported that the occurrence of smoking and the possibility of continuing smoking are relatively high in the high-risk group for depression (Ministry of Health and Welfare & Korea Centers for Disease Control and Prevention, 2013). According to a domestic study analyzed by using the Korea National Health and Nutrition Examination Survey (Moon et al., 2019), the incidence of depression has more than doubled in current smokers compared to non-smokers, and the incidence of depression is higher in the single person households or those in divorced and low-income households. Furthermore, in the case of the single person households, the perception of health status and health behavior is low, and the degree of social activity is low, so they feel more helpless. Furthermore, it is highly likely to lead to inappropriate health behaviors such as smoking, which can lead to an increase in chronic diseases, deterioration of nerve function, and anxiety and depression (Arslantas et al., 2014).

Hence, in this study, based on the results of the previous studies (Arslantas et al., 2014), which uncovered that physical and mental health conditions and health behaviors have more negative tendencies among the single person households, by analyzing as to whether single person households among the smokers are associated with depression and thoughts of suicide, it is intended to be used as evidence for implementing a policy intervention program for single person households, such as health risk behaviors, to prevent an increase in the suicide rates related to death by loneliness.

2. Method

2.1 Research Data

This study used the Korea National Health and Nutrition Examination Survey of 2017 and 2019, the two most recently investigated years, considering the year in which the thoughts of suicide variable, one of the dependent variables, was investigated, and is also a cross-sectional research study that analyzes the association with (whether depressed, thoughts of suicide). The sampling method uses the two-stage stratified colony sampling method with survey district and household as the first and second sampling units, stratifying the sampling frame based on city, town, and village, and housing type (general house, apartment), and residential area ratio and household head's educational attainment ratio were used as the implicit stratification criteria. Furthermore, there are 192 survey districts, and 23 sample households were selected using the systematic sampling method among appropriate households excluding nursing homes, military facilities, prisons, etc., and foreign households within the sample survey district. And excluding non-smokers, 18 years of age or younger, and data with missing data in the survey information, 2,042 adults who responded that they are currently smoking were selected as the final analysis subjects.

2.2 Independent Variable

2.2.1 Whether a single person household

Whether a single person household is classified based on the measure of response to the questions of “Which of the following does the type of household fall under?”, whereby the 1st generation (single person household, couple, others), 2nd generation (couple and unmarried children, others), and 3rd generation (couple and unmarried children + parents, etc.) were classified accordingly. Among which, the single person households were analyzed by classifying them into single person households and other households.

2.3 Dependent Variable

2.3.1 Mental health (current prevalence of depression, thoughts of suicide)

As for the prevalence of depression, the question of “Do you currently suffer from depression?” was asked for survey, and was analyzed by classifying into “yes” and “no,” and as for the thoughts of suicide, it was analyzed by classifying it into “yes” and “no” through the questionnaire presenting the question of “Have you seriously considered suicide in the past year?”

2.4 Correction Variable

As the potential variables that can affect the mental health of the single person households, demographic variables, health status, and economic variables were considered. As for the demographic variables, age (34 or younger, 35-49, 50-64, and 65 or older), gender (male, female), region (Seoul

and metropolitan cities, etc.), level of education (below elementary school, middle school, high school, university graduate or higher), and marital status (married, single) were included. As for the health status, the subjective health status was classified as good, average, or poor, and were included for the analysis by considering basic livelihood benefits (experienced, not experienced) and household income quartiles (low, middle, upper middle, and high) for the economic variables.

2.5 Statistical Analysis

The relationship between the general characteristics of the population, health status, health risk behavior, household structure, and mental health was analyzed by using the chi-square test and multi-survey logistic regression analysis with a multiple sample design. As for the data analysis, the statistical package SAS 9.4 version (SAS Institute Inc., Cary, NC, USA) was used.

3. Results

3.1 General Characteristics of the Smoking Participants

Table 1 is a table illustrating the general characteristics of the participants. The total number of participants was 2,042 people, and the prevalence of depression was 2.6% (57 people), and the thoughts of suicide experience rate was 6.2% (140 people). Among the total participants, the single person households were 15.6% (351 people), and among them, the prevalence of depression and thoughts of suicide were 7.3% (27 people) and 12% (49 people), and it was analyzed that it turned out to be higher than the prevalence of depression (1.7%, 30 people) and thoughts of suicide (5.1%, 91 people) among the non-single person household participants (Table 1).

Table 1. General characteristics

	Total		Depressive symptom			Suicidal ideation		
	N	%	Yes	%	P-value	Yes	%	P-value
Single person household					**<.0001			**<.0001
Yes	351	15.6	27	7.3		49	12.0	
No	1,691	84.4	30	1.7		91	5.1	
Age					*0.030			**0.000
≤34	484	30.9	10	2.0		36	7.6	
35-49	688	35.0	11	1.7		23	2.9	
50-64	582	26.1	27	4.3		55	7.9	
≥65	288	8.0	9	2.7		26	9.2	
Gender					**0.001			**<.0001
Male	1,733	86.5	37	2.1		95	4.8	
Female	309	13.5	20	5.7		45	14.9	

	Total		Depressive symptom			Suicidal ideation		
	N	%	Yes	%	P-value	Yes	%	P-value
Residential region					0.476			0.134
Seoul	409	19.3	15	3.3		28	5.8	
Metropolitan	503	26.2	10	1.9		41	8.2	
Other	1,130	54.5	32	2.6		71	5.3	
Education					0.095			**<.0001
Elementary or below	244	7.7	12	5.0		31	12.6	
Middle school	200	8.4	7	3.7		20	8.6	
High school	863	44.2	27	2.7		66	7.2	
College or above	735	39.7	11	1.7	0.502	23	3.3	
Marriage								*0.016
Married	1,469	66.2	37	2.4		90	5.2	
Single	573	33.8	20	2.9		50	8.0	
Perceived health					**<.0001			**<.0001
Good	544	27.7	6	1.3		13	2.5	
Moderate	1,101	54.3	18	1.4		62	4.9	
Bad	397	18.0	33	7.9		65	15.7	
Basic livelihood benefit					**<.0001			**<.0001
Yes	186	7.9	23	12.2		39	19.4	
No	1,856	92.1	34	1.7		101	95.0	
Household income					**<.0001			
Low	378	14.5	30	8.4		53	14.7	**<.0001
Middle Low	503	24.0	18	3.7		41	6.7	
Middle High	599	31.6	5	0.6		31	5.2	
Hugh	562	29.9	4	0.9		15	2.6	
Total	2,042	100.0	57	2.6		140	6.2	

*p<0.05, **p<0.001

3.2 Correlation between the single person households and mental health (whether prevalent of depression, thoughts of suicide) among the smokers

To demonstrate the factors affecting the mental health of the single person households, the change in mental health was classified into Model 1 (demographic variables), Model 2 (demographic variables + economic variables), and Model 3 (Model 2 + 50 years of age or older), whose extent of change in mental health was measured. Regarding the prevalence of depression, the prevalence of depression among the single person households was 3.846 times higher[OR (odds ratio): 3.846, p-value: <.0001] compared to households without it, and while the degree was reduced (OR: 2.353, p-value: 0.016), it was still significant. However, in Model 3, which analyzed the middle-aged and older adults aged 50 or older, the prevalence of depression among the single person households tended to increase by 2.811 times (OR: 2.811, p-value: 0.018) compared to the households without it. Regarding the

thoughts of suicide, single person households had thoughts of suicide 1.912 times (OR: 1.912, p-value: 0.008) higher than the non-single person households, and in Model 2, in which health status and economic variables were adjusted, and in Model 3, which analyzed participants aged 50 years or older, no significant results were found (Table 2).

Table 2. Relevance between single person household and mental health

	Depressive symptom						Suicidal ideation					
	Model 1		Model 2		Model 3		Model 1		Model 2		Model 3	
	OR	P-value	*OR*	P-value	*OR*	P-value	*OR*	P-value	*OR*	P-value	*OR*	P-value
Single person household												
Yes	**3.846**	**<.0001	**2.353**	*0.016	**2.811**	*0.018	**1.912**	*0.008	1.376	0.232	1.460	0.258
No	1.000		1.000				1.000		1.000		1.000	
Age												
≤34	1.000		1.000				1.000		1.000			
35-49	1.255	0.645	0.905	0.842			0.582	0.145	0.463	*0.032		
50-64	2.636	0.108	1.371	0.570	1.000		1.442	0.340	1.040	0.911	1.000	
≥65	1.154	0.860	0.457	0.335	0.432	0.132	1.218	0.701	0.802	0.654	0.739	0.452
Gender												
Male	1.000		1.000		1.000		1.000		1.000		1.000	
Female	2.680	**0.003	2.138	*0.025	2.534	0.054	3.171	<.0001	2.790	**<.0001	2.081	0.047
Residential region												
Seoul	1.792	0.232	2.327	0.103	2.423	0.179	0.725	0.310	0.785	0.437	0.834	0.648
Metropolitan	1.000		1.000		1.000		1.000		1.000		1.000	
Other	1.308	0.497	1.689	0.202	1.837	0.160	0.638	0.058	0.691	0.127	0.743	0.372
Education												
Elementary or below	1.000		1.000				1.000		1.000		1.000	
Middle school	0.689	0.456	1.186	0.757	0.667	0.547	0.734	0.445	1.030	0.946	1.003	0.995
High school	0.709	0.514	1.396	0.563	1.822	0.286	0.666	0.297	0.999	0.998	1.182	0.705
College or above	0.478	0.238	1.544	0.528	4.382	0.031	0.327	0.013	0.621	0.325	1.051	0.932
Marriage												
Married	0.809	0.654	1.348	0.492	1.209	0.751	0.619	0.156	0.778	0.410	0.827	0.653
Single	1.000		1.000				1.000		1.000		1.000	
Perceived health												
Good			1.000						1.000			
Moderate			0.922	0.871	1.533	0.522			1.864	0.079	10.796	*0.022
Bad			**4.601**	**0.004	**3.018**	**0.106**			**5.775**	**<.0001	**22.355**	*0.003
Basic livelihood benefit												
Yes			**2.800**	**0.016	**2.902**	*0.013			**2.050**	*0.009	**1.419**	**0.302**
No			1.000						1.000		1.000	
Household income												
Low			**5.172**	*0.014	**31.259**	*0.004			**2.394**	*0.031	**11.107**	*0.006
Middle Low			**3.683**	*0.045	**22.334**	*0.009			**1.748**	**0.122**	**6.167**	*0.020
Middle High			0.695	0.624	8.825	0.075			1.712	0.149	4.500	0.068
Hugh			1.000		1.000				1.000		1.000	

*p<0.05, **p<0.001

Model 1: age, gender, residential region, education, marriage, Model 2: Model 1+perceived health, basic livelihood benefit, household income, Model 3: Model 2+50 years old or more

4. Consideration

This study used the Korea National Health and Nutrition Examination Survey of 2017 and 2019 to analyze the relationship between whether a person lived alone among the smokers, the prevalence of depression, and the thoughts of suicide. To summarize the analytical results, the factors affecting mental health were significantly related to living alone, subjective health status, income and basic livelihood benefits. In particular, after correcting for subjective health status and economic factors (basic livelihood benefits, household income) (Model 2), the relationship between the single person household status and the risk of depression prevalence decreased, and the relevant level of risk decreased, yet as with the risk of thoughts of suicide, no significant result was apparent. However, as a result of the analysis of the middle-aged and older people aged 50 and older (Model 3), it was analyzed that whether a single person household was related to an increase in the risk of mental health, which suggests the need for the public health monitoring and intervention for the single person households smoking to improve their mental health.

The results of a meta-analysis on risk factors for depression (Cole & Dendukuri, 2003) suggest the factors such as the level of education, health condition, lack of social support, cognitive impairment, sleep disorder, and the disease morbidity, in addition to living alone, and in a study (H. R. Kim & Kim, 2014) comparing the risk factors for depression for the single person household and non-single person households, it turned out that there was a significant difference between the single person households in terms of gender, level of education, national basic livelihood benefits, and the use of welfare centers. In another study, single person households demonstrated higher rates of negative health behaviors such as smoking, excessive drinking, and sleeping hours than the multi-people households, and the rate of practicing health behaviors for health promotion was low (Ha & Lee, 2017), and the health promotion behavior was low as a result of the analysis performed (Y. S. Kim, 2014). Accordingly, mental illness among the single person households with low rates of health promoting behaviors and health behaviors such as smoking can cause difficulties and functional decline in maintaining daily activities, and can further increase the risk of solitary death and suicide. Hence, early intervention in terms of public health may be said to be crucial (Bae, Um, & Lee, 2012; Moon et al., 2019).

According to previous studies (Moon et al., 2019), among the Korean adults, the current smokers significantly increased the depressive symptoms compared to the non-smokers, and in the case of single person households, the rate of complaining of depressive symptoms increased significantly compared to those living with a spouse or children. Furthermore, in a study that analyzed the relationship between smoking status and depression (Bares, 2014), the smokers demonstrated a higher rate of experiencing depression than non-smokers. In particular, the studies that have analyzed the effects of smoking on depression from a neurobiochemical perspective primarily explain the relationship between nicotine and depression through stress hormones (T. S. Kim & Kim, 2007; Moon et al., 2019). That is, nicotine increases corticosteroid in the body by stimulating the hypothalamic-pituitary-adrenal axis, just like acute stress, and amygdala, which is responsible for emotionality, increases the expression of intracellular steroid-related mRNA, and when nicotine is repeatedly administered for more than 5 days, resistance to these changes occurs, and corticosteroids rise during the withdrawal

period, thereby yielding the experience of depression (Moon et al., 2019).

Consequently, many previous studies (Berlin, Covey, Donohue, & Agostiv, 2011; Tsoh, Humfleet, & Mu, 2000; Wu & Anthony, 1999) evidence molecularly and statistically that the direction of the causal relationship between smoking and depression is the direction in which smoking causes an increase in depression, and living alone, particularly among the middle aged people living alone, may also cause a significant impact on the risk of suicidal behaviors (Y. H. Kim & Han, 2004). In particular, in connection with the fact that the prevalence of depression was higher among the single person households aged 50 or older in this study, in a study by Taehyeon Kim (Y. H. Kim & Han, 2004), the average number of children of the elderly living alone was analyzed to be 2.87 compared to the average of 3.65 for the general elderly, and it was expected to be difficult to obtain various social supports due to low economic support and few people to rely on during the old age. Furthermore, it is uncovered that these elderly people living alone are isolated from their surroundings, resulting in their psychological loneliness, health problems, and household chores, further resulting in a lower quality of life than the elderly people living in other forms of living. It may also be understood that the lack of human and material support to cope with various difficulties faced in daily life increases the risk of depression and thoughts of suicide among the single person households. Hence, it is necessary to actively use community resources such as local welfare centers to expand social contact and support with friends and neighbors, secure a variety of social support systems, and manage the emotions of isolation to ensure that they do not lead to death by loneliness and suicidal behavior. Rather than focusing only on management, it is necessary to comprehensively consider issues such as whether smoking can cause depression, as well as various social and economic conditions, such as single person households, low income and whether to receive the basic livelihood benefits. In this respect, this paper is meaningful in that it was presented based on the Korea National Health and Nutrition Examination Survey, and it is considered as a grounds for the response and educational material that the mental health management of the single person households should comprehensively consider the socio-economic and spiritual issues other than smoking, and it is also expected that this paper will be used, and it suggests that more detailed studies are needed by using the longitudinal data in the future.

Currently, the study has several limitations. First, since this study was analyzed by using the Korea National Health and Nutrition Examination Survey, which is a cross-sectional survey, the causal relationship between the single person households and the mental health is yet unknown. Furthermore, since the independent variables of this study, which are single person household and other correction variables, are self-survey data, they might have the disadvantage in that the responses may carry inaccuracies. Third, given the nature of the secondary data, the relevant results could be biased since all the correction variables needed for conducting this study could not be included for the analytical model. Notwithstanding which, its strengths are such that it is the first paper using the representative data of Korea and that it may be generalized for the adults aged 19 or older.

Conflicts of interest

No author has any financial or other conflict of interest to declare.

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