Factors Influencing Women's Depression According to Age

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Abstract

This study aimed to analyze factors influencing women's depression by age group and propose data for the development of an age-appropriate depression-related intervention program.

Data were extracted from the 2014, 2016, and 2018 Korea National Health and Nutrition Examination Survey (KNHANES). The participants were 10,019 women in their twenties to their seventies. The study variables were general, physical, and psychological characteristics. General characteristics according to physical activity and differences in physical and psychological factors were analyzed using the X^2-test and t-test. Factors influencing depression were analyzed using linear regression analysis.

There were differences between the groups in all general characteristics, physical characteristics, and psychological characteristics. Among those in their twenties and thirties, marital status, obesity, economic activity, hypertension, obesity, drinking amount per time, smoking, subjective health, subjective body image, stress, and quality of life were significant factors influencing depression. The explanatory power was 37.4% ($p<$ .001). As for those in their forties and fifties, household income, marital status, economic activity, obesity, weight change, frequency of drinking, smoking, subjective health, stress, and quality of life were significant factors influencing depression, with an explanatory power of 40.5% ($p<$ .001). Finally, among women in their sixties and seventies, education level, obesity, subjective health, subjective body image, stress, and quality of life were significant factors influencing depression; their explanatory power was 36.1% ($p<$ .001). Increased subjective perception of being thin was related to less stress and depression and a higher quality of life.

This study found several meaningful influencing factors. Based on the results of this study, when planning an intervention program to control women's depression, the age difference of the subjects must be considered.

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Date of Submission :5-10-2020

1. INTRODUCTION

Depression is directly related to human life and can indirectly cause social and economic problems (Rahimi E et al., 2011). Approximately 991 million people worldwide experience mental illness, with 19% of the adult population having mental illness (Noorbala A et al., 2014). The number of patients suffering from depression in Korea is constantly increasing; the prevalence rate of depression is double among women than men (Jeon J., 2016).Women are more susceptible to depression than men through sudden hormonal changes such as puberty, menopause, and childbirth.In 2020, the economic loss of depression worldwide is expected to rank second among all diseases (World Health Organization., 2019), which is of great severity. Aside from hormonal changes, depression is affected by external influences and general characteristics and influences such as age, marriage, level of education, and subjective perception. (Tanaka H et al., 2011). Depression is the most important risk factor for suicidal thoughts (Kim H K et al., 2010). Therefore, prevention and appropriate management of depression can prevent suicidal thoughts and suicide and change the quality of life of the individual. Additionally, social support acts as a protective factor to lower depression and protects the participant from depression (Gariépy G et al., 2016),thus individuals must be supported by family, friends, or social members. Marital status or the presence of a domestic partner; socio-economic factors, such as low education level and unstable income (Schmitz A et al., 2019),and chronic diseases can also be risk factors for depression (Aziz R et al., 2013). Compared to other age groups, depression is a major disease in their fifties and sixties, and the number of people receiving treatment is increasing by 4.6% each year, and total medical cost are also increasing by 6.2% each year(Korea Health Insurance Review & Assessment Service., 2020). However, despite women having risk factors for depression due to sudden changes in hormones and external factors, most studies on depression focus on menopause or middle-aged women (Sohn J M., 2018; Lee H S., 2017).

Depression is not only related to biological characteristics such as hormones but also risk factors like social roles of women (Labaka A et al., 2018).It has been difficult to find a study that identifies the factors influencing depression among women by age group. Moreover, depression must be understood in terms of gender differences and cultural contexts because social, economic, and cultural characteristics differ across nations (Acciai F et al., 2017; Crimmins E M et al., 2010; van de Velde S et al., 2010). Therefore, this study aimed to analyze the factors influencing women's depression by age group using data from the Korea National Health and Nutrition Examination Survey (KNHANES), which is representative of the total female population in Korea and was conducted to provide basic data for the development of an age-appropriate depression-related intervention program by identifying the differences in influencing factors.

2. MATERIALS AND METHOD

2.1. Study Design

This study was a secondary analysis of the 2014, 2016, and 2018 KNHANES and was a descriptive research study that identified factors affecting depression according to age in women in their twenties to seventies.

2.2. Participants

This study used raw data from the 2014, 2016, and 2018 KNHANES, which measured depression using the Patient Health Questionnaire-9 (PHQ-9). The KNHANES calculates national and provincial level representative and reliable statistics on the health level, health behavior, and food and nutrition intake of individuals, and, establishes a comprehensive plan for promoting national health. In addition, the goal of national health promotion is set and used as basic data for national health policy such as program development. The total number of participants in the 2014, 2016, and 2018 KNHANES conducted by the Ministry of Health and Welfare and the Korea Centers for Disease Control and Prevention was 23,692; 10,019 women in their twenties and seventies were targeted.

2.3. MEASURE

The variables examined in this study were general, physical, and psychological characteristics.

2.3.1. General Characteristics

The general characteristic variables examined were age, household income, education level, number of household members, marital status, economic activity, and quality of life. The age groups and household income were divided into three groups each: the twenties and thirties, forties and fifties, and sixties and seventies groups and upper, middle, and lower groups, respectively. Education level was divided into middle school graduates or lower, high school

graduates, and college graduates or higher. The number of household members was classified as having 1, 2, 3 or more household members. Marital status was divided into living with spouse and others. Economic activity was divided into yes or no. Quality of life was measured using the EuroQol-5 Dimension (EQ-5D).

2.3.2. Physical Characteristics

Disease-related characteristics included hypertension, diabetes, obesity, weight change for one year, weight control for one year, drinking, frequency of drinking, drinking amount per time and smoking.

Hypertension and diabetes were classified as being with or without a doctor's diagnosis. Obesity, assessed by BMI, was classified into three groups: less than 18.5kg/m^2 = underweight, $18.5–24.9 \text{kg/m}^2$ = normal weight, more than 25.0kg/m^2 = obese. Weight change for one year was classified as gain, loss, and no change, while weight control for one year was divided into decrease effort, maintain effort, increase effort, and no effort. Drinking was classified into no or yes. The frequency of drinking for one year was divided into once or less per month, two to four times per month, and more than two times per week. The drinking amount per time was classified as ≤2, 3–6, and 7 or more drinks, regardless of the type of drink. Finally, smoking was divided into no or yes.

2.3.3. Psychological Characteristics

Psychological factors included subjective health, subjective body image, stress, and depression. Subjective health was classified as healthy, moderate, or unhealthy. Subjective body image was divided into thin, moderate, and obese, and stress was classified as feel less and feel much. Depression was measured using the PHQ-9, which is a nine-item 4-point Likert scale developed by Spitzer et al. (Spitzer R L et al., 1999), with values ranging from 0 to 27, and with higher scores indicating more severe depression. Quality of life was measured using the EQ-5D. The total score ranges from -1 to 1, and the higher the score, the higher the quality of life.

2.4. Statistical Analysis

To identify the factors influencing depression, the data of women in their twenties and seventies were extracted from the raw data of the 2014, 2016, and 2018 KNHANES using the stratified colony system extraction method. After creating a composite sample planning file using the IBM SPSS 25.0 program, weight was assigned to analyze it. The significance level was set to .05.

The general characteristics and degree of physical and psychological factors were analyzed using frequency and percentage: the measured values as frequencies and the measured values relative to weight as percentages. General characteristics according to physical activity and differences in physical and psychological factors were analyzed using the X^2-test and t-test, and factors influencing depression were analyzed using linear regression analysis.

3. RESULTS AND DISCUSSION

3.1. General Characteristics of the Participants

There were differences between the groups in all general characteristics (Table 1). Household income was the highest among those in their forties and fifties, while the education level was higher among those in their twenties and thirties. Most of those in their sixties and seventies were living alone. The number of those living together with a spouse was lowest at 62.4% among those in their sixties and seventies. Those in their forties and fifties had the most economic activity at 62.2%. Finally, the quality of life was the highest among those in their twenties and thirties, at .97 ($p< .001$).

Table 1: Comparison of General Characteristics between Groups

Characteristics		20-30s(n=2,895) n(weight %)	40-50s(n=3,953) n(weight %)	60-70s(n=3,171) n(weight %)	x^2/t(p)
Household income	Upper	930(33.0)	1400(36.4)	395(12.8)	1301.779(<.001)
	Middle	1627(58.7)	2062(54.2)	1372(45.6)	
	Lower	191(8.2)	356(9.4)	1302(41.6)	
Education level	≤Middle school	74(3.3)	792(21.4)	2273(77.8)	4064.164(<.001)
	High school	869(35.1)	1602(46.4)	418(15.0)	
	≥College	1668(61.7)	1206(32.3)	202(7.1)	
Number of household members	1	149(6.2)	237(5.2)	710(19.9)	1383.136(<.001)
	2	353(13.8)	977(24.0)	1479(45.4)	
	≥3	2256(80.0)	2617(70.8)	897(34.7)	
Marital status	Living with spouse	1577(96.8)	3244(87.8)	1948(62.4)	1019.205(<.001)
	Others	51(3.2)	467(12.2)	1110(37.6)	
Economic activity	Yes	1486(57.1)	2261(62.2)	1019(34.8)	429.972(<.001)
	No	1126(42.9)	1342(37.8)	1875(65.2)	
Quality of life (EQ-5D)		.97	.96	.88	450.047(<.001)

3.2. Health-related Characteristics of Participants

There were differences between the groups in all physical and psychological characteristics (Table 2). Hypertension, diabetes, and obesity were the highest among those in their 60 and seventies. There were many cases of weight gain in a year among those in their twenties and thirties, but they were also more likely to lose weight. Frequency of drinking, drinking amount

per time, and smoking were the most among those in their twenties and thirties. Many in their twenties and thirties perceived that they were subjectively healthy, but many in their twenties and thirties perceived subjective body image as obese. Stress levels were the highest and depression was most severe among those in the twenties and thirties ($p< .05$).

Table 2: Comparison of Physical, Psychological factors between Groups

Characteristics		20-30s(n=2,895) n(weight %)	40-50s(n=3,953) n(weight %)	60-70s(n=3,171) n(weight %)	x^2/t(p)
Hypertension	No	2661(99.4)	3193(86.7)	1524(52.0)	2193.678(<.001)
	Yes	18(0.6)	516(13.3)	1475(48.0)	
Diabetes	No	2665(99.5)	3524(95.2)	2457(82.6)	640.209(.001)
	Yes	14(0.5)	185(4.8)	539(17.4)	
Obesity	Underweight	281(11.5)	131(3.6)	43(1.9)	532.701(<.001)
	Normal	1775(71.7)	2327(67.7)	1504(56.9)	
	Obese	437(16.8)	1002(28.7)	1105(41.1)	
Weight change	Gain	987(36.0)	1064(28.8)	432(15.0)	403.336(<.001)
	Loss	400(15.3)	355(9.5)	382(12.9)	
	No change	1308(48.7)	2315(61.6)	2156(72.2)	
Weight control	Decrease	1504(56.4)	1850(50.1)	1015(34.5)	423.059(<.001)
	Maintain	50(2.0)	109(2.9)	148(4.9)	
	Increase	425(15.9)	832(22.3)	484(15.8)	
	No effort	716(25.7)	944(24.8)	1333(44.8)	
Drinking	No	106(4.2)	401(10.4)	935(30.8)	785.096(<.001)
	Yes	2589(95.8)	3335(89.6)	2043(69.2)	
Frequency of drinking	≤1/month	1360(50.9)	2058(61.1)	1627(79.6)	632.664(<.001)
	2-4/month	751(30.6)	788(24.2)	241(12.0)	
	≥2/week	478(18.6)	489(14.8)	174(8.4)	
Drinking amount per time(Glass)	≤2	868(37.7)	1455(54.0)	1004(73.9)	518.869(<.001)
	3-6	845(39.7)	970(37.2)	273(22.2)	
	≥7	460(22.6)	222(8.7)	44(3.8)	
Smoking	No	2192(80.8)	3359(89.8)	2793(94.0)	239.403(<.001)
	Yes	503(19.2)	376(10.2)	177(6.0)	
Subjective health	Healthy	909(35.0)	1013(27.8)	536(18.7)	354.523(<.001)
	Moderate	1373(52.3)	1953(54.0)	1448(49.7)	

	Unhealthy	333912.7)	649(18.1)	946(31.5)	
Subjective body image	Thin	356(13.4)	360(9.4)	414(14.0)	51.396(<.001)
	Moderate	1104(40.8)	1486(39.8)	1233(41.6)	
	Obese	1235(45.8)	1890(50.8)	1333(44.5)	
Stress	Feel less	1673(62.1)	2794(75.1)	2303(77.4)	199.943(.010)
	Feel much	1022(37.9)	940(24.9)	668(22.6)	
Depression		3.60	2.64	3.21	55.943(<.001)

3.3. Factors Influencing Depression According to Age

Among women in their twenties and thirties, marital status, obesity, economic activity, hypertension, drinking amount time, smoking, subjective health, subjective body image, stress, and quality of life were significant factors influencing depression. The explanatory power was 37.4% ($p < .001$). Those who lived with their spouse, engaged in economic activities, drank less alcohol at a time, smoked less frequently, perceived themselves as subjectively healthy, subjectively perceived themselves as being thinner, felt less stressed, and had a higher quality of life experienced lower levels of depression. Conversely, those who were thin, were more depressed than those who were obese. As for women in their forties and fifties, household income, marital status, economic activity, obesity, weight change, frequency of drinking, smoking, subjective health, stress, and quality of life were significant factors influencing depression, with an explanatory power of 40.5% ($p < .001$). Higher household income, living with a spouse, economic activity, lower frequency of drinking, non-smoking, less stress, and higher quality of life were related to lower depression. Those who were thin were more depressed than those who were obese. Finally, among women in their sixties and seventies, education level, obesity, subjective health, subjective body image, stress, and quality of life were significant factors influencing depression; these factors explained 36.1% of the variation in depression ($p< .001$). The more subjectively perceived as being thinner, the less stressed, the higher the quality of life, and the lower the depression among these women. (Table 3)

Table 3: Factors associated with Depression

Characteristics		20-30s(n=2,895) n(weight %)		40-50s(n=3,953) n(weight %)		60-70s(n=3,171) n(weight %)	
		B	t(p)	B	t(p)	B	t(p)
Household income	Upper	-0.247	-0.53 (.597)	-0.755	-2.903 (.004)	-0.033	-0.12 (.900)
	Middle	-0.313	-0.72 (.472)	-0.591	-2.192 (.029)	-0.066	-0.29 (.769)

	Lower	1.0		1.0		1.0	
Education level	≤Middle school	0.096	0.193 (.847)	0.062	0.35 (.724)	0.295	1.26 (.206)
	High school	-0.004	-0.026 (.979)	0.180	1.78 (.075)	0.888	2.81 (.005)
	≥College	1.0		1.0		1.0	
Marital status	Living with a spouse	-1.163	-2.43 (.015)	-0.730	-3.08 (.002)	-0.530	-1.825 (.069)
	Others	1.0		1.0		1.0	
Economic activity	Yes	-0.544	-3.36 (.001)	-0.483	-4.37 (<.001)	-0.343	-1.768 (.078)
	No	1.0		1.0		1.0	
Hypertension	No	-1.852	-0.40 (.012)	0.339	1.875 (.062)	.0359	1.771 (.078)
	Yes	1.0		1.0		1.0	
Obesity	Underwei-ght	1.375	3.04 (.002)	0.902	5.2 (.013)	-0.133	-0.12 (.899)
	Normal	0.363	1.67 (.095)	0.415	3.01 (.003)	0.559	3.28 (.001)
	Obese	1.0		1.0		1.0	
Weight change	Gain	0.163	0.93 (.353)	0.247	1.98 (.048)	0.228	0.77 (.440)
	Loss	0.123	0.49 (.624)	0.101	0.65 (.513)	0.612	1.91 (.057)
	No change	1.0		1.0		1.0	
Frequency of drinking	≤4/month	-0.078	-0.42 (.669)	-.407	-2.53 (.012)	-0.352	-1.295 (.196)
	2-3/week	-0.313	-1.57 (.117)	-.488	-2.95 (.003)	-0.308	-0.845 (.399)
	≥4/week	1.0		1.0		1.0	
Drinking amount per time(Glass)	≤2	-0.078	-2.71 (.007)	-0.103	-0.47 (.638)	0.295	0.46 (.644)
	3-6	-0.313	-1.48 (.139)	-0.129	90.58 (.560)	0.257	0.39 (.690)
	≥7	1.0		1.0		1.0	
Smoking	No	-1.210	-5.24 (<.001)	-1.246	-5.77 (<.001)	-0.871	91.72 (.086)

	Yes	1.0		1.0		1.0	
Subjective health	Healthy	-2.157	-7.83 (<.001)	-1.546	-7.57 (<.001)	-2.010	-8.115 (<.001)
	Moderate	-1.342	-4.77 (<.001)	-1.021	-5.12 (<.001)	-1.171	-4.527 (<.001)
	Unhealthy	1.0		1.0		1.0	
Subjective body image	Thin	-0.884	-2.61 (.009)	-0.251	-1.205 (.229)	-0.734	-2.01 (.045)
	Moderate	-0.332	-1.71 (.088)	-0.310	-2.617 (.009)	-0.655	-2.625 (.009)
	Obese	1.0		1.0		1.0	
Stress	Feel less	-2.593	-12.79 (<.001)	-2.265	-17.22 (<.001)	-2.652	-4.62 (<.001)
	Feel much	1.0		1.0		1.0	
Quality of life (EQ-5D)		-12.878	-6.35 (<.001)	-14.141	-15.029 (<.001)	-9.286	-8.50 (<.001)
R²/F/p		R^2=.374, F=26.904, p<.001		R^2=.405, F=50.918, p<.001		R^2= .361, F=17.713, p<.001	

As for the general characteristics of the study participants, the most significant difference between women's age groups was seen in those in their sixties and seventies; the number of participants living together with their spouse was the least in this age group, thus the number of individuals in their sixties and seventies living alone was greater than in other age groups. Given that the proportion of women in their sixties and seventies in this study was similar that of the entire population, this result may be interpreted as a characteristic of the population, rather than simply a characteristic of the study. Women have longer average life spans than men (85.7 and 79.7 years, respectively); this may result in large proportions of women living alone (Statistics Korea., 2019). Elderly women living alone may have risk factors and not receive social support; therefore, providing other forms of social support to elderly women living alone is crucial.

As for the health-related characteristics of the participants, there were distinct differences between those in their twenties and thirties and in their sixties and seventies. High blood pressure, diabetes, and obesity were found in the sixties and seventies, while those in their twenties and thirties had the highest rates of drinking, smoking, and stress perception and the most severe depression.Since 2000, the smoking rate of the elderly has greatly decreased, but the smoking rate of women in their twenties has been increasing. Males in the economically active group, those in their thirties to forties, smoked frequently. Similarly, according to a 2017 report, the drinking rate of men in

their forties was 27.2%, the highest among all age groups. While women drank less than men, the drinking rate of women 19 to 29 years old was 11.0%. From the results previously reported, it seems that the rates of drinking were highest among those in their twenties and thirties. Among those in their thirties, the drinking rate of 39-year-olds decreased significantly to 9.0%, while the drinking rate among those in their forties and older than 70 years old were 6.4% and 0.5%, respectively (National Statistical Office., 2019). Results from an annual study of major depressive disorders conducted in 2001, 2006, and 2011 found that depression among women aged 18 to 30 years old was steadily increasing. In 2011, the prevalence of major depressive disorders among women aged 18 to 29 years old was 5.7%, further highlighting the severity of depression in young women. Results from an annual study of major depressive disorders conducted in 2001, 2006, and 2011 found that depression among women aged 18 to 30 years old was steadily increasing, with an average prevalence of 5.7%; this observation was especially marked in 2011. This finding highlights the severity of depression in young women (Seoul National University College of Medi cine., 2012). These results are similar the results of this study and appear to reflect current Korean society. However, this study did not analyze women who drank and smoked at the same time. In the future, there is a need for research to find meaningful antecedent factors through analysis and intervention studies on depression and mental health of women who share smoking and drinking, which are important health behaviors, and use them as data for intervention strategies.

In the analysis of the factors that influenced depression, household income was not a crucial factor except among those in their forties and fifties who were significantly less depressed as household income increased. This may be due to the relatively high economic activity in this age group. These results are consistent with the results of previous studies on middle aged women that showed that depression was higher when economic conditions were poor (Kim Y L et al., 2020). In relation to economic conditions, those in their sixties and seventies were significantly less depressed when they had much economic activity.

As for marital status, those in their twenties and thirties and forties and fifties were significantly less depressed when they had a spouse. Meanwhile, those in their sixties and seventies were less depressed when they had a spouse but not significantly. This may be a reflection of the characteristics of all participants in their sixties and seventies. Although not a variable of this study, in previous studies, middle aged women showed less depression and higher marital satisfaction (Lee S S et al., 2007).Social support was also found to be a factor in lowering depression (Lee H J et al., 2016; Lee J W et al., 1997). This could be interpreted as spousal support aiding in lowering depression.

However, since confirmation of spousal support has not been carried out, additional research on th is area is needed. Studies on spousal relations among married women in their twenties and thirties

are relatively few and are also needed.

Another factor influencing depression was differences in the perceived and actual body type (e.g., perceiving oneself as thin compared to actually being thin). Those in their twenties and thirties were more depressed when they were actually underweight and when they perceived that they were thin, thus the actual level of obesity and body shape were consistent. However, among those in their forties and fifties and their sixties and seventies, those who were actually obese were less depressed when they perceived themselves as thin; for those who perceived themselves as thin, there was a difference between cognition and actual measurement. These results are similar to those of previous studies that showed that obese women had more severe depression (Simon G E et al., 2008; Kim J Y et al., 2007).

However, findings regarding obesity and depression are inconsistent. Some studies show that there is no relationship between depression and obesity (Roberts R E et al., 2003), while others argue that the relationship between weight and depression is not linear, but U shaped, wherein depression increases when one is underweight or overweight (de Wit L M., van Stratan A et al., 2 009). As for perceiving oneself as thin, middle aged and older participants, compared to younger participants, tended to be more depressed when they suffered from insufficient nutrition and had different body type perceptions (Jun J H et al., 2014).

Therefore, regardless of their weight, it can be inferred that those middle aged and older are affected by the psychological mechanism of becoming more depressed when they perceive they are thin.

4. CONCLUSION

Although this study is meaningful in distinguishing and discovering crucial factors influencing depression among women, there are some limitations. As a secondary research study, the manipulation or transformation of variables is limited, and there is a limit to deriving results with the given variables. Additionally, for areas that are not clearly supported by this study, intervention studies are needed in the future.

5. REFERENCES

1. Acciai F. & Hardy M. (2017). Depression in later life: *A closer look at the gender gap. Social Science Research,* 68, pp.163-75.

2. Aziz R. & Steffens D.C. (2013). What are the causes of late-life depression?.*The Psychiatric Clinics of North America,* 36 (4), pp.497-516.

3. Crimmins E.M. & Kim J.K. (2010). A. Sole-Auro Gender differences in health: Results from

SHARE, ELSA and HRS. *European Journal of Public Health*, 21(1), pp.81-91.

4. de Wit L.M., van Stratan A., van Herten M., Penninx B.W. &Cuijpers P. 2009. Depression and body mass index, a u-shaped association. *BMC public health,* 13(9), pp.14.

5. Gariépy G., Honkaniemi H. &Quesnel-Vallée A. (2016). Social support and protection from depression. Systematic review of current findings in Western countries. *The British Journal of Psychiatry : the Journal of Mental Science,* 209(4), pp.284-93.

6. Jeon J. (2016). Korean women's mental health indicators. *Health and Welfare Policy Forum,* 5, pp.47-60.

7. Jun J.H. Lee M.S. (2014). Media involvement on appearance evaluation, appearance stress, and appearance management behavior. *J. Korean Soc Cloth Text,* 38(4), pp.518-27.

8. Kim H.K., Ko S.H. & Chung S.H. (2010). Suicidal ideation and risk factors among the elderly in Korea. *Journal of Korean Public Health Nursing,* 24(1), pp.82-92.

9. Kim J.Y., Oh D.J., Yoon T.Y., Choi J.M. &Choe B.K. (2007). The impacts of obesity on psychological well-being: A cross-sectional study about depressive mood and quality of life. *J Prev Med Public Health,* 40, pp.191-5.

10. Kim Y.L. & Won M.W. (2020). A convergence study of factors influencing on depressive symptom in postmenopausal middle-aged woman. *Journal of Convergence for Information Technology,* 10(4), pp.25-34. DOI : https://doi.org/10.22156/CS4SMB.2020.10.04.025

11. Korea Health Insurance Review & Assessment Service. (2020).*Disease information through statistics.* [Online]. Retrieved from : http://www.hira.or.kr/dummy.do?pgmid=HIRAA030502030000&ilnsCtgyNm=sixtyAge&sortSno=46

12. Labaka A., Goñi-Balentziaga O., Lebeña A. & Pérez-Tejada J. (2018). Biological sex differences in depression. A systematic review. *Biological Research for Nursing,* 20 (4), pp.383-92.

13. Lee H.J., Kim C. & Lee D. (2016). Factors influencing middle-aged women's depression. *Korean J Health Promot,* 16(1), pp.1-10. Doi: 10.15384/kjhp.2016.16.1.1 ;

14. Lee H.S. & Koo Y. (2017). The effects of self-esteem, stress, and social support on depression among middle-aged women. *Journal of Korean Public Health Nursing,* 31(1), pp.58-70. DOI: https://dx.doi.org/10.5932/JKPHN.2017.31.1.58

15. Lee J.W., Kim Y., Yi S. M., Eun H.J. & Kim D.I. (1997). Life events, coping styles, social support and family relationships of middle-aged depressed women. *J Korean NeuropsychiatrAssoc,*36(4),pp.620-629.

16. Lee S.S. & Choi W.H. (2007). The relationship between depression and stress in Korean middle-aged women. *J Korean SocMatern Child Health,* 11(2), pp.185-96

17. National Statistical Office. (2019). *Korean Social Trends 2019.* publication registration number

11-1240245-000014-10. Daejeon, Korea.

18. Noorbala A., Damari B., Riazi S. (2014). Lifestyle modifications in the prevention of common mental disorders, especially depressive disorders. *Daneshvar Med,* 22(113), pp.1-12.

19. Rahimi E., Bavaqar S. (2011). Comparing the effects of Hatha yoga and physical fitness on anxiety and depression in women. *J Qazvin Univ Med Sci,* 15(2), pp.48-54.

20. Roberts R.E., Deleger S., Strawbridge W.J. & Kaplan G.A. (2003). Prospective association between obesity and depression; evidence from the Alameda County Study. *Int J ObesRelatMetabDisord*, 27, pp.514-21.

21. World Health Organization. (2015). "Depression: let's talk 2015," [Online]. Retrieved from : www.who.int/mental_health/management/depression/en/, 2019.09.11.

22. Schmitz A. & Brandt M. (2019). Gendered patterns of depression and its determinants in older Europeans. *Archives of Gerontology and Geriatrics,* 82, pp.207-16. https://doi.org/10.1016/j.archger.2019.02.015

23. Seoul National University College of Medicine. (2012). *The epidemiological survey of mental disorders in Korea 2011*. Seoul: Ministry of Health and Welfare.

24. Simon G.E., Ludman E.J., Linde J.A., Operskalski B H., Ichikawa L. & Rohde P et al. (2008). Association between obesity and depression in middle-aged women. *Gen Hosp Psychiatry,* 30, pp.32-9.

25. Sohn J.M. (2018). Factors influencing depression in middle aged women: focused on quality of life on menopause. *Journal of The Korea Society of Health Informatics and Statistics*, 43(2), pp.148-57. DOI: https://dx.doi.org/10.21032/jhis.2018.43.2.148

26. Spitzer R.L., Kroenke K. &Wiliams J.B. (1999). Patient Health Questionnaire Primary Care Study Group. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. Primary evaluation of mental disorders. Patient Health Questionnaire. *JAMA*, 282(18), pp.1737-44.

27. Statistics Korea. (2019). Life Table 2018. Statistics Korea. [Online]. Retrieved from https://meta.narastat.kr/metasvc/index.do?confmNo =101035

28. Tanaka H., Sasazawa Y., Suzuki S., Nakazawa M. & Koyama H. (2011). Health status and lifestyle factors as predictors of depression in middle-aged and elderly Japanese adults: a seven-year follow-up of the Komo-Ise cohort study. *BMC psychiatry,* 11(1), pp.11-20. DOI : 10.1186/1471-244X-11-20

29. van de Velde S., Bracke P. &Levecque K. (2010). Gender differences in depression in 23 European countries. Cross-national variation in the gender gap in depression. *Social Science & Medicine*, 71 (2), pp.305-13.