Author’s response to reviews

Title: Factors associated with mental health consultation in South Korea

Authors:

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Author’s response to reviews:

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Factors associated with mental health consultation: a focus on educational level

(BPSY-D-17-00148)

We thank you for giving us the opportunity to revise our paper. In revising our paper, we have carefully considered the reviewers’ comments and suggestions, and have done our best to incorporate them accordingly. We appreciate the constructive feedback on our original submission. After addressing the issues raised, we feel that the quality of the paper has improved and we hope you agree. Our responses to each comment are listed below. We have attached revision notes and underlined the revised sections of the manuscript. Additionally, we used an English proofreading service as you suggested. Once again, thank you for the valuable and helpful comments.

Response to Reviewer #1’s comments

Harald Gündel (Reviewer 1): The authors present results from a nationwide community health survey in Korea on multiple factors associated to mental health consultation. This appears to be an important topic. The chosen statistical model is appropriate and results are presented in three tables. Language and grammar are correct (as far as I can judge this as nonnative speaker).
Major comments

There are two major shortcomings: A) Right now results seem country specific and are not discussed enough / embedded in an international context.

Response

Thank you for your great effort in reviewing our manuscript. In response to your comments, we introduced some of the overseas papers and discussed them from an international perspective. (page 3, line 23-28, page 4, line 1-4).

Major comments

B) Author promise the reader specific strategies based on their results, but yet these are fairly descriptive and generic. Both issues can be fixed.

Response

Thank you for your great effort in reviewing our manuscript. I apologize for the confusion. We would like to express that there are several implications that could help in establishing policies in this study. However, the meaning may be misunderstood through the paper. I clarified the expression of the paper to reflect your opinion.

Major comments

Page 1

Line 6 (Title): The title should capitalize on the fact of the multiple factor regression model associated with seeking mental health consultation, instead of highlighting education only.
Response

Thank you for your valuable suggestion. Considering your comments, we revised the title. However, after we analyzed our results again on the basis of your suggestion of categorizing occupation, marital status, and educational level, we found that education level maintained a significant positive association. Therefore, we kept ‘focusing on an educational level’. But if you think these are not appropriate for the title of the paper, we will remove the words ‘a focus on educational level’.

Major comments

Page 2 (Abstract)

Line 8 (Objective): Please change your objective accordingly

Response

Thank you for your great effort in reviewing our manuscript. We changed the objective part to reflect your opinion.

Major comments

Line 13 (Methods): Please indicate that the data are from Korea.

Response

Thank you for your great effort in reviewing our manuscript. We indicated that the data are for the general population of Korea.
Major comments

Page 3 (Background)

Line 25: What is the potential reason that Korea is so worse of regarding suicide? What does this implicate for the generalizability of the findings (Add this to the discussion section)

Response

Korea ranks highest for suicide rates among OECD countries. The most common cause of suicide in Korea is psychiatric problems and a typical mental illness is depression. It has been consistently reported that depression is a serious risk factor of suicide attempt and suicide in previous studies. In this study, we examined the factors affecting the use of mental health services to treat depressive symptoms, and confirmed that educational level is correlated with the utilization of mental health services. The results could have implications on policies for the use of mental health services. Ultimately, this contributes to lowering suicide rates in Korea by improving accessibility of mental health services (page 11, line 13-21).

Major comments

Line 32: Obviously, authors refer to the same dataset/population. According to the descriptives N=228,781 were assessed with 12,743 reporting depressive symptoms. This is a proportion of 5.57%, not of 55.7% (12,743/2,287.81 instead of 12,743/228.781)

Response

Thank you for your meaningful comment and we apologize for this mistake. Based on what you had advised, we reclassified the variables and analyzed again. This caused a change in the number of people due to missing data. I wrote down the number of people accurately in the paper exactly (13,269/228,781) (page 3, line 16-17).

Major comments

Line 36: Is this backed up by national treatment guidelines in Korea? If so, please state, this strengthens your argument.
Response

The Ministry of Health and Welfare runs the Division of Mental Health Policy to make efforts to improve the mental health of Koreans. In addition, the government has set up a mental health promotion center in each city / county district [1]. Since 2005, a mental health care hotline (+ 82-1577-0199) has provided mental health consultation by mental health experts anywhere, anytime in the country (page 4, line 14-18) [1].

Major comments

Line 40: Please give some examples for the mentioned "several factors". This would make a nice transition for the next paragraph that you can pick up.

Response

Thank you for your comment and we completely agree with it. According to your comments, we added the examples of several factors in the study (page 3, paragraph 4).

Major comments

Line 54: Authors may want to extend this argument, since you find no evidence that income positive effects on self-reported counseling seeking behavior.

Response

What we would like to talk about here is that education directly affects mental health consultation, and the level of education affects various socioeconomic variables, which could affect use of mental health consultation. However, in the process of revising the paper, this paragraph could give confusion to the readers and therefore we deleted. If our revision is not appropriate, please give us comments as that would be really helpful for us.
Major comments

Page 4

Line 6: Please list one or two examples in brackets for direct and indirect means effects.

Response

Thank you for your comment and we completely agree with it. To improve the flow of the paper, we revised it again and removed that part. We tried our best, but if there is lack of flow in this paper, please give us feedback).

Major comments

Page 5 (Material and Methods)

Line 17: Authors should write: "the sample consist only of those who report to have depressive symptoms" - not "who had DS" as there is no diagnose of this. Please correct throughout the manuscript (e.g. also line 38 same page):

Response

Thank you for your meaningful comment and we apologize for this mistake. According to your suggestion, we changed the expression ‘depression’ to ‘depressive symptom’.

Major comments

Line 47: Authors should use the International Standard Education Classification (ISCED) to bring their results to a higher international comparability. Please underline the reference group, also in the description of the following categorical variables.
Response

Thank you for pointing this out. According to your suggestion, we recategorized educational level by International Standard Education Classification (ISCED). Low educational level included ISCED classification of 0-1 (early childhood education and primary education) and medium educational level included ISCED classification of 2 (lower secondary education). High education was defined as ISCED classification of 3 (upper secondary education) and college or over as ISCED classification of 5 to 8 (short-cycle tertiary education, bachelor or equivalent, master or equivalent, doctoral or equivalent (page 5, line 23-28, page 6, line 1).

Major comments

Page 6

Line 11: what is the reason for classifying age into such broad categories and not using smaller ones or a continuous variable?

Response

Thank you for your comment. Age was divided to reflect the characteristics of Life Turning Point cycle. In Korea, young adults are usually 19-44 years old, middle-aged adults are 45-64 years, and older adults are 65 years or older. However, we considered that your comments are really important, so we divided age again into 19 to 29 years, 30 to 39 years, 40 to 49 years, 50 to 59 years, 60 to 69 years, and 70 or above and analyzed again.

Major comments

Line 13: Marital status reads like five categories here. In the tables of the results however, marital status has only 3 categories. Please educate the reader why married and non-cohabit, bereaved and divorced are presented as a single category. E.g. Is there a specific cultural reason that married but not cohabit and divorced participants are in one category? From a gut feeling I would expect them to be different regarding consultation seeking behavior.
Response

Thank you for your comment and we totally agree with it. We considered that your comments have changed the classification of marital status into five groups: married and cohabit, married and non-cohabit, bereaved, divorced and unmarried groups.

Major comments

Line 15: Please give the definitions of regions (urban vs. rural) e.g. by the number of inhabitants in a certain area. Similar, please give the definition/numbers behind the income categories in your local currency and in an international one such as € euro to help the international readership to better understanding the values.

Response

Thank you for pointing this out. We apologize for the insufficient explanation. We added detail information about how to classify region and house income level. Region was classified into capital region, urban area, and rural area. Capital region included Seoul, which is capital of Korea, and Gyeonggi province, which surrounds Seoul. A population of 20 million (about 50% of Korea) live in the Capital region. Urban areas included metropolitan cities in which about usually 1 million population live. Rural area included the remaining geographic area, except for the capital and urban regions. The standards of dividing house income level per year were less than 8,400,000 won (about 75,350,000 USD), less than 24,000,000 won (about 215,290,000 USD), less than 40,000,000 won (about 358,800,000 USD), and more than 40,000,000 or above (about 358,800,000 USD).

Major comments

Line 17: Although i´m familiar with the collar description to categorize jobs within the labor force market, most readers of this journal won´t be. Please define briefly what type of jobs are included in these categories. Authors preferable include for example the International Classification of Occupation (ISCO) if available or the Erikson Goldthorpe Class Scheme alternatively.
Response

Thank you for your meaningful comment and we apologize for confusing the classification of occupation. Occupation was classified by Korean Standard Classification of Occupations (KSCO) which is made on the basis of International Standard Classification of Occupations. International Standard Classification of Occupations is one of the standard frameworks for classifying jobs according to the tasks and duties undertaken in the job [28]. In our paper, occupation is not an interesting variable and be used as covariates. Therefore, this classification was simplified into high skilled white collar, low skilled white collar, high skilled blue collar, low skilled blue collar and others in the study. High skilled white collar group included managers, professionals and clerical support workers. Low skilled white collar group included service workers and sales workers. High skilled blue collar group included skilled agricultural, forestry and fishery workers, craft and related trades workers. Low skilled blue collar group included plant and machine operators, and assemblers, elementary occupations. Others included armed forces occupations, students, and other job status. If you think our classification is inappropriate, please let us know, and we will fix them (page 6, line 16-25).

Major comments

Line 25: Although I understand the inclusion of the control variables from a technical point of view, authors have not given a reason yet why a) these variables should be associated with the outcome of interest and b) how these variables will help to develop more powerful strategies enhancing mental health consultation rates. Given the behavioral change associated with depression / depressive symptoms, these health behavior or self-care variables may serve more as proximate measure of symptom severity and therefore might take away "effects" from the variables that are useful and of interest when tailoring specific strategies to delivery healthcare (MH consultation) to certain subpopulations. Of course there will be arguments for both (including and excluding some of the variables), but authors should make their arguments for either way explicit.

Response

Thank you for your meaningful comment and we apologize for this mistake. There are several previous studies that there is significantly association between socioeconomic status/demographic factors and use of mental health consultation [2-4]. In addition, health behavior like smoking status and alcohol consumption are also significantly related with depression [5, 6]. Therefore, we thought these factors could relate with use of mental health
In addition, we conducted the Hosmer-Lemeshow Goodness-of-Fit Test, which is one of the ways to determine the model fit parameter of the logistic regression analysis. We did a Hosmer and Lemeshow goodness-of-fit test. Significance level is greater than 0.05. Therefore, we could judge the model of this study is appropriate.

Hosmer and Lemeshow Goodness-of-Fit Test

<table>
<thead>
<tr>
<th>Chi-Square</th>
<th>DF</th>
<th>Pr &gt; ChiSq</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.5591</td>
<td>8</td>
<td>0.1279</td>
</tr>
</tbody>
</table>

Major comments

Given the quite large sample, significance levels are reached easily. The other question is what would be a policy relevant difference in consultations rates that justifies to allocate more resources to a certain subpopulation?

Response

Thank you for your meaningful comments. There were several changes in the subgroup variables, so we could not answer the question because paragraph that you commented on was deleted. If the changes are not appropriate now, we would appreciate your comments again.

Major comments

In addition, authors consider p-values here, but there is no single p-value presented in the text or tables. Please provide them.
Response

Thank you for pointing this out. In several previous articles, only confidence intervals (CI) were shown to be significant [7]. Considering these, we thought that CI value is enough to show significance of the analysis. However, according to comments, we present the single p-value in the R. Table 1. Analysis of Maximum Likelihood Estimates. We found that the level of education, which is our main interest variable, was significant, although age, gender, and marital status variable also showed significant values.

R.table 1. Analysis of Maximum Likelihood Estimates

<table>
<thead>
<tr>
<th>Parameter</th>
<th>DF</th>
<th>Estimate</th>
<th>Standard Error</th>
<th>Wald</th>
<th>Pr &gt; ChiSq</th>
<th>Error Chi-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1</td>
<td>-2.8764</td>
<td>0.2280</td>
<td>159.1376</td>
<td>&lt;.0001</td>
<td></td>
</tr>
<tr>
<td>Age 2</td>
<td>1</td>
<td>-0.1118</td>
<td>0.1211</td>
<td>0.8533</td>
<td>0.3556</td>
<td></td>
</tr>
<tr>
<td>Age 3</td>
<td>1</td>
<td>-0.1238</td>
<td>0.1275</td>
<td>0.9421</td>
<td>0.3317</td>
<td></td>
</tr>
<tr>
<td>Age 4</td>
<td>1</td>
<td>-0.2290</td>
<td>0.1348</td>
<td>2.8848</td>
<td>0.0894</td>
<td></td>
</tr>
<tr>
<td>Age 5</td>
<td>1</td>
<td>-0.1502</td>
<td>0.1551</td>
<td>0.9380</td>
<td>0.3328</td>
<td></td>
</tr>
<tr>
<td>Age 6</td>
<td>1</td>
<td>-0.7830</td>
<td>0.1683</td>
<td>21.6506</td>
<td>&lt;.0001</td>
<td></td>
</tr>
<tr>
<td>Gender 2</td>
<td>1</td>
<td>0.1731</td>
<td>0.0770</td>
<td>5.0500</td>
<td>0.0246</td>
<td></td>
</tr>
<tr>
<td>Marital status 2</td>
<td>1</td>
<td>0.2508</td>
<td>0.1522</td>
<td>2.7151</td>
<td>0.0994</td>
<td></td>
</tr>
<tr>
<td>Marital status 3</td>
<td>1</td>
<td>0.2089</td>
<td>0.0891</td>
<td>5.4911</td>
<td>0.0191</td>
<td></td>
</tr>
<tr>
<td>Marital status 4</td>
<td>1</td>
<td>0.2798</td>
<td>0.1038</td>
<td>7.2700</td>
<td>0.0070</td>
<td></td>
</tr>
<tr>
<td>Marital status 5</td>
<td>1</td>
<td>0.1115</td>
<td>0.1066</td>
<td>1.0951</td>
<td>0.2953</td>
<td></td>
</tr>
<tr>
<td>Region 2</td>
<td>1</td>
<td>-0.0157</td>
<td>0.0724</td>
<td>0.0467</td>
<td>0.8288</td>
<td></td>
</tr>
<tr>
<td>Region 3</td>
<td>1</td>
<td>0.0063</td>
<td>0.0626</td>
<td>0.0101</td>
<td>0.9198</td>
<td></td>
</tr>
<tr>
<td>Household income level 2</td>
<td>1</td>
<td>0.1131</td>
<td>0.0798</td>
<td>2.0088</td>
<td>0.1564</td>
<td></td>
</tr>
<tr>
<td>Household income level 3</td>
<td>1</td>
<td>0.1439</td>
<td>0.0888</td>
<td>2.6239</td>
<td>0.1053</td>
<td></td>
</tr>
<tr>
<td>Household income level 4</td>
<td>1</td>
<td>0.1577</td>
<td>0.0934</td>
<td>2.8509</td>
<td>0.0913</td>
<td></td>
</tr>
</tbody>
</table>
Educational level - ISCED 2 1 0.2778 0.0965 8.2873 0.0040
Educational level - ISCED 3 1 0.3025 0.0960 9.9347 0.0016
Educational level - ISCED 4 1 0.3971 0.1072 13.7121 0.0002
Occupation 2 1 0.0730 0.1154 0.4002 0.5270
Occupation 3 1 -0.0872 0.1664 0.2747 0.6002
Occupation 4 1 -0.0026 0.1242 0.0004 0.9831
Occupation 5 1 0.4331 0.0960 20.3457 <.0001
Sleeping duration 2 1 0.0648 0.0614 1.1122 0.2916
Sleeping duration 3 1 0.1249 0.1128 1.2272 0.2680
Stress level 2 1 -0.4285 0.0712 36.2362 <.0001
Stress level 3 1 -0.2428 0.1560 2.4215 0.1197
Physical activity 1 1 0.1182 0.0645 3.3530 0.0671
Smoking status 1 1 -0.0196 0.0827 0.0558 0.8132
Alcohol consumption 1 1 -0.2095 0.0682 9.4412 0.0021
Suicidal Thought 1 1 0.7642 0.0639 142.9291 <.0001
Perceived health status 2 1 0.2681 0.0860 9.7216 0.0018
Perceived health status 3 1 0.6348 0.0921 47.4980 <.0001

Major comments

Page 7

Line 8: Table 1 is not sufficiently reflected in the text. Authors calculated many comparisons between the consulted vs. non-consulted subjects, so please give the reader a quintessence of your findings of table 1.
Response

Thank you for your valuable suggestion. According to your comments, we added several explanations of table 1 and additionally, we have re-structured the paragraph for better reading.

Major comments

Line 17: Authors may want to indicate that education results looks like a linear trend over the categories. Also make clear that this is one big model assessing the associations / OR simultaneously.

Response

Thank you for your comment. We changed the explanation to indicate that educational level has a positive association with utilization of mental health consultation.

Major comments

Line 36: Please indicate the reference group of regions here.

Response

Thank you for pointing this out. After we considered your comments and analysis again, there was no significant association between region and utilization of mental health services. So we excluded the part of explanation of association between region and use of mental health consultation.

Major comments

Line 40: Suicidal intentions appear here out of nowhere for the reader. Please add the description of the measure to the method section and provide a reasonable introduction in the background section.
Response

Thank you for your meaningful comment and we apologize for this mistake. We added how to examine the suicidal thoughts in the methods section (page 7, line 1-2). Our results showed people who have suicidal thoughts had higher mental health consultation rates than people with no suicidal thoughts. These may be related with the fact that people with suicidal thoughts also may have severe depressive symptoms. Severe mental disorder is significantly related to use of mental health services [8]. Demyttenaere K. et al. reported that people with serious mental disorders has much higher use of mental health treatment than people with moderate mental disorders [8]. Therefore, people with suicidal thoughts could have more mental health consultation rates (page 4, line 2-4).

Major comments

Line 44: "Effect" is causal language, please use "association" throughout.

Response

Thank you for your meaningful comment and we apologize for this mistake. We changed expression into association in the paper.

Major comments

Line 45: Authors may consider to summarize the results of table three into a graph, e.g. a BarChart with odds on the y-axis and the groups like income and education on the x axis. Please indicate if these stratified models contain control variables.

Response

Thank you for your comment. According to your comments, we changed table 3 into a bar chart and presented control variables.
Major comments

Line 47: Stratification here is useful to investigate the associations. However, you may improve the information's you gain from the model by the introduction of interaction variables. This would give you certain subpopulations that you may infer from your previous analysis to be specifically at risk like low educated males from rural areas aged 65>. In addition, you can test directly coefficients against each to assess statistically significant differences between certain subgroups.

Response

Type 3 Analysis of Effects
Effect DF Wald Pr > ChiSq

Chi-Square
Age 5 45.8274 <.0001
Gender 1 10.054 0.0015
Marital status 4 11.0872 0.0256
Household income level 3 2.9929 0.3927
Occupation 4 47.3455 <.0001
Sleeping duration 2 1.9786 0.3718
Stress level 2 37.5305 <.0001
Physical activity 1 3.0573 0.0804
Smoking status 1 0.095 0.758
Alcohol consumption 1 8.9748 0.0027
Suicidal Thought 1 7.7005 0.0055
Perceived health status 2 51.5519 <.0001
Gender*educational level 3 4.7337 0.1924
Age*educational level 3 9.6409 0.0219
Suicidal thoughts*educational level 3 22.6401 <.0001
Thank you for your great effort in reviewing our manuscript. We completely agree with your comment and accordingly we performed a test for statistical interaction between educational level and gender, age, and suicidal thought variables used in subgroup analyses. The modifying effects of age and suicidal thoughts were significant in the test for interaction. However, gender was not significant. Therefore, we have briefly mentioned the results of age group and suicidal in the Results section. However, the subgroup analyses showed significant differences in each group. Considering the importance of knowing factors associated with depressive symptoms among various age and suicidal thoughts, the overall trends seen in our findings imply that there is a need to include age group and gender factors when considering depressive symptoms. Particularly, considering the high prevalence of senior depression in Korea and high rates of suicidal thoughts in Korea, this result could be meaningful. Hence, we have discussed the subgroup analysis results and their implications in the Discussion section. We included a figure on age, suicidal thoughts, and the association of educational level with depressive symptom. Nevertheless, if these findings are not very relevant to the paper, we will move it to the appendix section or delete it from our paper.

Major comments

Page 9

Line 17: please also indicate the direction of association.

Response

Thank you for pointing this out. We explained that educational level has a positive association with utilization of mental health consultation.

Major comments

Page 10

Line 15: What about the urban regions? Or is this meant with "other regions". You may want to stick to the same wording to avoid confusing readers.

Response

Thank you for your meaningful comment and we apologize for this mistake. We changed the expression of ‘other region’ into urban region consistently.
Major comments

Line 41: please add to the limitation section that people with severe mental illnesses are less likely to respond to a survey (potential selection bias).

Response

Thank you for your meaningful comment and we apologize for this mistake. We added your comments about limitations in the discussion section. (page 11, line 6-7).

Major comments

General comment. At the end of the Intro you promised the reader to present / suggest strategies for development of depression education programs. Yet, I have not read any elaborated strategy in the discussion.

Response

Thank you for your great effort in reviewing our manuscript. We would like to convey the implication that our paper may help to establish a policy basis related to the use of mental health consultation. It seems that the meaning has been misunderstood in the paper. According to your suggestion, we thought that expression was not appropriate. Therefore we removed it. If you think there is further more correction, please give us feedback again.

Major comments

Also, I am missing a discussion of the present results in the context of similar research in Korea and/or in other countries. Are your findings consistent with previous research in your and in other countries?
Response

Thank you for your meaningful comment and we apologize for this mistake. We added several studies from other countries. Generally, our findings are consistent with previous studies.

Major comments

Authors fail to discuss anything on the suicidal group and their "higher" delivered care / mental consultation. If the suicidal intention group instead of the depressive symptom group is the analyzed population, do you gain similar / comparable results (supplementary analysis).

Response

Thank you for your valuable suggestion. We analyzed again with the dependent variable, which was defined as the use of mental health consultation for suicidal thoughts. Appendix table 1 shows that more college or over educated people undergo mental health consultation for suicidal thoughts than low educated people. However, it could be hard to say there is consistently association between educational level and mental health consultation for suicidal thoughts.

Appendix I. Factors associated with mental health consultation for suicidal thoughts*

Variables

Total Mental health consultation

<table>
<thead>
<tr>
<th>N</th>
<th>%</th>
<th>Adjusted OR</th>
<th>95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>23,025</td>
<td>Educational level - ISCED</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>10,782</td>
<td>46.8</td>
<td>1.00</td>
</tr>
<tr>
<td>Medium</td>
<td>2,759</td>
<td>12.0</td>
<td>1.40 (1.14 - 1.71)</td>
</tr>
<tr>
<td>high</td>
<td>6,148</td>
<td>26.7</td>
<td>1.44 (1.19 - 1.74)</td>
</tr>
<tr>
<td>college or over</td>
<td>3,336</td>
<td>14.5</td>
<td>1.36 (1.07 - 1.71)</td>
</tr>
<tr>
<td>Age 19-29</td>
<td>1,437</td>
<td>6.2</td>
<td>1.00</td>
</tr>
<tr>
<td>40-49</td>
<td>3,261</td>
<td>14.2</td>
<td>0.75 (0.59 - 0.97)</td>
</tr>
</tbody>
</table>
### 60-69
4,121 17.9 0.70 (0.52 - 0.96)
70≤ 7,596 33.0 0.30 (0.21 - 0.43)

<table>
<thead>
<tr>
<th>Gender</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>7,458</td>
<td>32.4</td>
<td>1.00</td>
</tr>
<tr>
<td>Female</td>
<td>15,567</td>
<td>67.6</td>
<td>1.44 (1.25 - 1.67)</td>
</tr>
</tbody>
</table>

### Household income level

<table>
<thead>
<tr>
<th>Quartile</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Quartile 1 (lowest)</td>
<td>7,072</td>
<td>30.7</td>
<td>1.00</td>
</tr>
<tr>
<td>Quartile 2</td>
<td>6,094</td>
<td>26.5</td>
<td>0.95 (0.81 - 1.12)</td>
</tr>
<tr>
<td>Quartile 3</td>
<td>5,000</td>
<td>21.7</td>
<td>0.92 (0.77 - 1.10)</td>
</tr>
<tr>
<td>Quartile 4 (highest)</td>
<td>4,859</td>
<td>21.1</td>
<td>0.91 (0.75 - 1.10)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Region</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital(Seoul, Gyeong-gi)</td>
<td>6,453</td>
<td>28.0</td>
<td>1.00</td>
</tr>
<tr>
<td>Urban</td>
<td>3,986</td>
<td>17.3</td>
<td>1.04 (0.90 - 1.20)</td>
</tr>
<tr>
<td>Rural area</td>
<td>12,586</td>
<td>54.7</td>
<td>0.95 (0.84 - 1.08)</td>
</tr>
</tbody>
</table>

### Marital status

<table>
<thead>
<tr>
<th>Status</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Married-cohabit</td>
<td>13,550</td>
<td>58.8</td>
<td>1.00</td>
</tr>
<tr>
<td>Married-no cohabit</td>
<td>655</td>
<td>2.8</td>
<td>1.31 (1.00 - 1.72)</td>
</tr>
<tr>
<td>Bereaved</td>
<td>5,146</td>
<td>22.3</td>
<td>1.06 (0.86 - 1.30)</td>
</tr>
<tr>
<td>Divorced</td>
<td>1,359</td>
<td>5.9</td>
<td>1.43 (1.16 - 1.77)</td>
</tr>
<tr>
<td>Unmarried</td>
<td>2,315</td>
<td>10.1</td>
<td>1.39 (1.14 - 1.69)</td>
</tr>
</tbody>
</table>

### Occupation

<table>
<thead>
<tr>
<th>Occupation</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>High skilled white collar</td>
<td>2,117</td>
<td>9.2</td>
<td>1.00</td>
</tr>
<tr>
<td>Category</td>
<td>Count</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------</td>
<td>------</td>
<td>----</td>
</tr>
<tr>
<td>Low skilled white collar</td>
<td>2,411</td>
<td>10.5</td>
<td>1.10</td>
</tr>
<tr>
<td>High skilled blue collar</td>
<td>3,734</td>
<td>16.2</td>
<td>0.91</td>
</tr>
<tr>
<td>Low skilled blue collar</td>
<td>2,831</td>
<td>12.3</td>
<td>1.10</td>
</tr>
<tr>
<td>Others</td>
<td>11,932</td>
<td>51.8</td>
<td>1.68</td>
</tr>
</tbody>
</table>

Physical activity

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
<th>Mean</th>
<th>SD</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inactive</td>
<td>15,782</td>
<td>68.5</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>7,243</td>
<td>31.5</td>
<td>1.12</td>
<td>(0.99 - 1.27)</td>
</tr>
</tbody>
</table>

Smoking status

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
<th>Mean</th>
<th>SD</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never or former</td>
<td>18,612</td>
<td>80.8</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td>4,413</td>
<td>19.2</td>
<td>1.09</td>
<td>(0.93 - 1.28)</td>
</tr>
</tbody>
</table>

Alcohol consumption

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
<th>Mean</th>
<th>SD</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never or former</td>
<td>9,846</td>
<td>42.8</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Current (within a year)</td>
<td>13,179</td>
<td>57.2</td>
<td>0.85</td>
<td>(0.74 - 0.97)</td>
</tr>
</tbody>
</table>

Stress level

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
<th>Mean</th>
<th>SD</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very</td>
<td>13,351</td>
<td>58.0</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Little</td>
<td>7,750</td>
<td>33.7</td>
<td>0.60</td>
<td>(0.52 - 0.69)</td>
</tr>
<tr>
<td>No</td>
<td>1,924</td>
<td>8.4</td>
<td>0.66</td>
<td>(0.51 - 0.84)</td>
</tr>
</tbody>
</table>

Sleeping duration

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
<th>Mean</th>
<th>SD</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 7 hours</td>
<td>12,526</td>
<td>54.4</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>7-8 hours</td>
<td>9,183</td>
<td>39.9</td>
<td>0.95</td>
<td>(0.84 - 1.06)</td>
</tr>
<tr>
<td>9 hours or over</td>
<td>1,316</td>
<td>5.7</td>
<td>1.12</td>
<td>(0.88 - 1.42)</td>
</tr>
</tbody>
</table>
Perceived health status

<table>
<thead>
<tr>
<th>Status</th>
<th>Count</th>
<th>Percentage</th>
<th>Odds Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>3,979</td>
<td>17.3</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>7,889</td>
<td>34.3</td>
<td>1.19 (1.01 - 1.41)</td>
<td></td>
</tr>
<tr>
<td>Bad</td>
<td>11,157</td>
<td>48.5</td>
<td>2.00 (1.67 - 2.39)</td>
<td></td>
</tr>
</tbody>
</table>

*Logistic regression analysis was used to determine odds ratios (ORs) and 95% confidence intervals (CIs). A total of 23,978 participants included in the analysis. The example of how to interpretate is 'Respondents who received a college or over education were more likely to receive mental health consultation for suicidal thoughts (OR=1.36; 95% CI: 1.07–1.71), compared with respondents with low educational level'.

Major comments

Page 12:

Line 34: Authors point out stigmatization as a problem, yet it is not introduced in the background section.

Response

Thank you for your meaningful comment and we apologize for this mistake. We added contents of the stigmatization in the background section (page 3, line 27-28).

Major comments

Page 16 & 17 (Table 1 & 2)

The order of variables should remain stable throughout the tables.

Response

Thank you for your meaningful comment and we apologize for this mistake. We modified the order of variables that remained stable throughout the tables.
Major comments

The reference category should be the first category (Household income Tab2)

Response

Thank you for your meaningful comment and we apologize for this mistake again. We modified the reference category of the household income.

Major comments

Sex is an indicator of the biological assessment. I guess you had also self-reports, so gender would be the correct term.

Response

Thank you for your valuable suggestion. According to your suggestion, we changed the expression of ‘sex’ into ‘gender’.

Major comments

Table 1: Please provide under the table the applied test (CHI2)

Response

Thank you for your meaningful comment and we apologize for this mistake. According to your suggestion, we added in the sentence that’ P-values calculated by the chi-square test’ under the table 1.

Major comments

Table 2: Please provide under the table the statistical applied (Logistic regression) and the included N
Response

Thank you for your meaningful comment and we apologize for this mistake again. According to your suggestion, we added the statistical method applied (Logistic regression) and included N under the table2.

Major comments

Table 2 and 3 would benefit from a reading example under the table.

Response

Thank you for your meaningful comment and we apologize for this mistake. According to your suggestion, we added a reading example under the table 2 and figure 1.

Major comments

Page 19 Literature:

Literature heading is missing

Response

Thank you for your meaningful comment and we apologize for this mistake. We added the literature heading.

Major comments

Line 15 (Source 3): This is a webpage. Please add date of retrieval. I tried to follow the weblink but could not find the described contend there. You may consider to link to a permanent document or remove the unspecific link (it points to a homepage)
Response

Thank you for pointing this out and we apologize for this mistake. We have determined that readers may have difficulty accessing the reference, and therefore, removed the reference.

Major comments

Line 57: Reference 10 seems to be incomplete.

Response

Thank you for pointing this out and we apologize for this mistake. According to your comments, we corrected the reference.

Major comments

Page 20 line 14: is there a newer reference available?

Response

Thank you for your comment. We searched for a thesis on Asian studies with similar research topics[9]. However, in our study, the original reference was used as a reference to the fact that mental health consultation is effective, as well as psychiatric medication. Newer reference do not included those contents. Therefore we did not add a newer reference. But if you think it is not appropriate for the paper, we would make changes according to your comments.

Major comments

Page 21

Line 9: ref. 23 add date of access
Response

Thank you for your valuable suggestion. In the process of revising the paper, there were many changes in the paper and we thought that this paragraph was inappropriate and completely deleted it. However, if you thought these are not appropriate, please give us some feedback.

Major comments

Line 56 Ref. 32: Cite this more specific, e.g. chapter, pages etc. A handbook is pretty broad.

Response

Thank you for pointing this out. In the process of revising the paper, there were many changes in the paper and we thought that this paragraph was inappropriate and completely deleted it. However, if you thought these are not appropriate, please give us some feedback.

Response to Reviewer #2’s comments

Major comments

Reinhold Kilian (Reviewer 2): The manuscript is focused on the effect of education on the use of mental health services but it is not explained why the authors limited their interest to the effect of education. Since the presented results provide information on a broad spectrum of variables which are also of interest I would suggest the authors to widen the scope of the paper by using a more general title and extending the introduction and the discussion to consider the role of other variables relevant for mental health service use.

Response

Based on the advice of you and other reviewers, we revised the category and analysis again. According to your comments, we broadened the spectrum of the paper, revised the text as a whole, and revised the title. I really appreciate your advice on improving the paper.
Major comments

The authors use a large data base to analyze factors affecting the use of mental health services by people with depressive symptoms. Depressive symptoms are assessed by a single item which contains standardized criteria of depression but does not provide a valid basis for a DSM or ICD diagnosis.

Response

Thank you for your valuable suggestion. Screening question in the paper was included in the Korean version of the World Health Organization Composite International Diagnostic Interview-Short Form, and validated as a cost-effective screening instrument that could be easily integrated into health surveys [10].

Major comments

It would be also interesting to analyze the use of mental health consultation in the whole population sample. This could be used as an indicator of the criteria validity of the assessment of depressive symptoms.

Response

Thank you for your valuable suggestion. Unfortunately, the question of whether to use of mental health consultation was addressed only to people with depressive symptoms. Therefore, we could not investigate the use of mental health consultation for people without depressive symptoms.

Major comments

It is not clear if the study was approved by an ethical committee.

Response

Thank you for your valuable suggestion. Korea Centers for Disease Control and Prevention approved the use of data from CHS through the CHS website (https://chs.cdc.go.kr/chs/index.do). The CHS received consent from study participants before
the beginning of the study. Instruments and study processes used for the survey were approved by the KCDC Institutional Review Board (IRB #: 2013-06EXP-01-3C).

Major comments

No information on the overall fit of the logistic regression model is provided. The authors should present a Pseudo R-square or any other model fit parameter.

Response

The Hosmer-Lemeshow Goodness-of-Fit Test is one of the ways to determine the model fit parameter of the logistic regression analysis. We did Hosmer-Lemeshow goodness-of-fit test. Significance level is greater than 0.05. Therefore, we could judge the model of this study is appropriate.

Hosmer and Lemeshow Goodness-of-Fit

Test

Chi-Square DF Pr > ChiSqr

12.5591 8 0.1279

Major comments

No information is provided on missing values and the final sample size included in the logistic regression model.

Response

Thank you for your meaningful comment and we apologize for this mistake. We added information on the missing values and final sample size of the study. In the process of revision, there were several changes to the total number of the population due to re-categorizing. We added a paragraph in the paper.

We selected participants using the question ‘Within the last year, did you experience any emotions such as sadness or despair continuously for more than 2 weeks, which increased the difficulty of daily life?’ Respondents who answered ‘No’ (n=215,345) and no answer about the question (n=59) were excluded from our study population. Respondents who answered ‘Yes’
were classified as individuals with depressive symptoms (n=13,377). We excluded individuals with data missing for use of mental health consultation services (n=1), marital status (n=11), educational level (n=26), occupation (n=11), stress level (n=16), smoking status (n=3), suicidal thoughts (n=11), perceived health status (n=2), and physical activity (n=27). Therefore, a final sample population of 13,269 people was included for analysis of this study.

Major comments

The parameters differences in the subgroup analyses are not statistically tested.

Response

<table>
<thead>
<tr>
<th>Type 3 Analysis of Effects</th>
<th>Effect</th>
<th>DF</th>
<th>Wald</th>
<th>Pr &gt; ChiSq</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chi-Square</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>5</td>
<td>45.8274</td>
<td>&lt;.0001</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>1</td>
<td>10.054</td>
<td>0.0015</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td>4</td>
<td>11.0872</td>
<td>0.0256</td>
<td></td>
</tr>
<tr>
<td>Household income level</td>
<td>3</td>
<td>2.9929</td>
<td>0.3927</td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td>4</td>
<td>47.3455</td>
<td>&lt;.0001</td>
<td></td>
</tr>
<tr>
<td>Sleeping duration</td>
<td>2</td>
<td>1.9786</td>
<td>0.3718</td>
<td></td>
</tr>
<tr>
<td>Stress level</td>
<td>2</td>
<td>37.5305</td>
<td>&lt;.0001</td>
<td></td>
</tr>
<tr>
<td>Physical activity</td>
<td>1</td>
<td>3.0573</td>
<td>0.0804</td>
<td></td>
</tr>
<tr>
<td>Smoking status</td>
<td>1</td>
<td>0.095</td>
<td>0.758</td>
<td></td>
</tr>
<tr>
<td>Alcohol consumption</td>
<td>1</td>
<td>8.9748</td>
<td>0.0027</td>
<td></td>
</tr>
<tr>
<td>Suicidal Thought</td>
<td>1</td>
<td>7.7005</td>
<td>0.0055</td>
<td></td>
</tr>
<tr>
<td>Perceived health status</td>
<td>2</td>
<td>51.5519</td>
<td>&lt;.0001</td>
<td></td>
</tr>
<tr>
<td>Gender*educational level</td>
<td>3</td>
<td>4.7337</td>
<td>0.1924</td>
<td></td>
</tr>
</tbody>
</table>
Thank you for your great effort in reviewing our manuscript. We completely agree with your comment, and accordingly, we performed a test for statistical interaction between educational level and gender, age, and suicidal thoughts variables used in subgroup analyses. The modifying effects of age and suicidal thoughts were significant in the test for interaction. However, the rest of gender was not significant. Therefore, we have briefly mentioned the results of age group and suicidal in the Results section. However, the subgroup analyses showed significant differences in each group. Considering the importance of knowing factors associated with depressive symptoms among various age and suicidal thoughts, the overall trends seen in our findings implied that there is a need to include age group and gender factors when considering depressive symptoms. Particularly, considering the high prevalence of senior depression in Korea and high rates of suicidal thoughts in Korea, this result could be meaningful. Hence, we have discussed the subgroup analysis results and their implications in the Discussion section. We included a figure on age, suicidal thoughts and the association of educational level with depressive symptom. Nevertheless, if these findings are not very relevant to the paper, we will move it to the appendix section or delete it from our paper.

Major comments

If improvements to the English language within your manuscript have been requested, you should have your manuscript reviewed by someone who is fluent in English. If you would like professional help in revising this manuscript, you can use any reputable English language editing service. We can recommend our affiliates Nature Research Editing Service (http://bit.ly/NRES_BS) and American Journal Experts (http://bit.ly/AJE_BS) for help with English usage. Please note that use of an editing service is neither a requirement nor a guarantee of publication. Free assistance is available from our English language tutorial (https://www.springer.com/gb/authors-editors/authorandreviewertutorials/writinginenglish) and our Writing resources (http://www.biomedcentral.com/getpublished/writing-resources). These cover common mistakes that occur when writing in English.
Response

Thank you for pointing this out. We have re-written according to your suggestion, and we used an English proofing service for better reading.

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Where a mandatory section is not relevant to your study design or article type, for example, if your manuscript does not contain any individual persons data, please write "Not applicable" in these sections.

For the 'Availability of data and materials' section, please provide information about where the data supporting your findings can be found. We encourage authors to deposit their datasets in publicly available repositories (where available and appropriate), or to be presented within the manuscript and/or additional supporting files. Please note that identifying/confidential patient data should not be shared. Authors who do not wish to share their data must state that data will not be shared, and provide reasons for this in the manuscript text. For further guidance on how to format this section, please refer to BioMed Central's editorial policies page - http://www.biomedcentral.com/submissions/editorial-policies#availability+of+data+and+materials.
Declarations

- Ethics approval and consent to participate
- Consent to publish
- Availability of data and materials
- Competing interests
- Funding
- Authors' Contributions
- Acknowledgements
- Authors' Information

Reference


