Socioeconomic inequality in precautions compliance and health behavior changes during
COVID-19 outbreak: analysis of the Korean Community Health Survey 2020

Running title: Socioeconomic inequality during COVID-19 epidemics

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Abstract

[Objectives] To examine socioeconomic inequalities in precautions compliance and health behavior changes during the coronavirus disease 2019 (COVID-19) outbreak using a representative Korean sample.

[Methods] This exploratory study utilized around 210,000 participants aged ≥ 25 years in the Korean Community Health Survey 2020. Socioeconomic status was measured with educational attainment and household income. Outcomes included non-compliance with eight precaution measures and deterioration in six health behaviors. The relative inequality index (RII) was calculated to quantify the degree of inequality by education and income level. RII values >1.0 indicate that deprived people have a higher frequency of health problems, and RII values <1.0 indicate that those have a lower frequency of the problems.

[Results] People with lower education or income level tended to have a higher rate of non-compliance with COVID-19 safety precautions (RII ranges 1.20 to 3.05). Lower education and income levels were associated with increased smoking amount (RII 2.10 and 1.67, respectively) sleep duration changes (RII 1.21 and 1.36, respectively). On the contrary, higher education and income were associated with decreased physical activity (RII 0.59 and 0.77, respectively) and increased delivery food consumption (RII 0.27 and 0.37, respectively). However, increased alcohol drinking was associated with lower education and income levels in younger men (RII 1.73 and 1.31, respectively), but with higher levels in younger women (RII 0.73 and 0.68, respectively).

[Conclusions] Our findings suggest the need to develop customized strategies, considering the characteristics of the target population, to decrease the burden and impact of COVID-19 outbreak.

Keywords: Public Health, Educational Status, Income, Coronavirus, Health Behavior

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1 Introduction

The coronavirus disease 2019 (COVID-19) outbreak was first reported in December 2019 and continued to spread worldwide [1]. After the COVID-19 outbreak, worldwide governments have imposed mask-wearing and social distancing to mitigate pandemics [2]. Specifically, the Korean government implemented a strong social distancing national campaign; people were asked to leave their houses only when necessary, and many community facilities were closed with the potential for non-compliant facilities to be handed administrative orders [3]. Additionally, in Korea, the isolation of the confirmed cases and self-quarantine of contacts have been the norm [4]. These policies have been helpful to reduce or delay the COVID-19 epidemic [5]. However, strengthening quarantine measures and social distancing have worsened health behavior and increased psychological stress [6,7]. Socioeconomic characteristics may affect the degree of compliance with COVID-19 prevention measures and deterioration of health behavior [8], other than age or comorbidities [9]. Although there are some differences according to types of behaviors or socioeconomic status (SES) indicators, usually, people with lower SES are more likely to have deleterious health behaviors [10,11], and less likely to receive information on safety and health precautions [12]. During pandemics, economic hardships may affect lower SES people's access to material resources and health services [13], accordingly, the already existed-socioeconomic inequality in health behaviors may worsen. During COVID-19 pandemics, several studies reported different health and safety behaviors according to SES [14,15]. However, the previous studies cannot be generalized due to their limited sampling methods, size, and characteristics. Therefore, we analyzed the Korean representative sample to explore the SES inequalities in the safety precaution compliance and health behavior changes during the COVID-19 outbreak.

2 Materials and methods

2.1 Data and sample

We analyzed anonymized research dataset obtained from the Korean Community Health Survey (KCHS) for 2020. The KCHS is a nationwide health interview initiated by the Korea Disease Control and Prevention Agency (KCDA), aiming to establish a standardized community survey with which to develop health projects for all local districts. Detailed information on the study design and aims of the KCHS has been previously reported [16]. Briefly, before each year's interview, sample households are selected to represent each of all administrative districts of Korea. Based on the registration data from the Ministry of the Interior and Safety and the data on housing types from the Ministry of Land, Infrastructure, and Transport, sample households are selected. An average of 900 individuals are examined by each health center in 255 local districts, yielding about 230,000 people in total. Trained interviewers conduct one-to-one interviews with individuals aged 19 years or older. The KCHS is the only data source that collects standardized health information from all administrative districts in Korea. In 2020 KCHS, all interviewers completed a COVID-19 polymerase chain reaction (PCR) test and vaccinations before the start of the survey. Interviewers checked their health status every day, and those with symptoms did not participate in the interview. Additionally, while visiting households, the interviewers strictly followed the precautions including wearing a mask, sanitizing hands, checking body temperature, and keeping a physical distance from the participant [17]. In the 2020 KCHS, questions about the degree of compliance with safety measures to prevent COVID-19 and changes in health behavior after the COVID-19 outbreak were added. In current study, we have excluded participants aged under 25 years since they may have not finished their education or be economically inactive [18]. Final study samples consisted of 214,703 individuals for the analysis using

education attainment and 209,455 individuals for the analysis using household income in 2020. A flow chart of the selection of study participants are presented in Supplementary Figure 1.

2.2 Measurements

Educational attainment was categorized into four groups. Participants were categorized into elementary school or less, middle school, high school, and college or more (reference group). Equivalized household income was defined as the total monthly household income divided by the square root of the number of household members. Participants were divided into four groups according to the quartiles of equivalized household, from Q1 (lowest) to Q4 (highest, reference group). The quartiles of monthly household income were separately calculated by sex and age (< 65 or ≥ 65) considering that those aged ≥ 65 were mostly economically inactive. Self-reported responses in compliance with COVID-19 safety precautions and health behavior deteriorations during COVID-19 outbreak were utilized as main outcomes. First, “compliance with COVID-19 safety precautions” included questionnaires whether the participants, in last one week, (1) covered their mouth while coughing, (2) practiced regular disinfection, (3) practiced regular ventilation, (4) wore mask in indoor facilities such as public transportation, restaurant, and department store, etc., (5) wore mask when hard to keep distance, (6) kept minimal physical distances (2 meters), (7) refrained from visiting patients in hospital, and (8) refrained from going out. The questionnaires were asked using following responses: completely complied, complied, failed to comply, or not applicable. Participants were classified into ‘failure to comply’ or not. Second, “health behavior changes” included questionnaires whether participants have experienced changes in (1) physical activity including walk or exercise, (2) sleep duration, (3) amount of consuming instant meals and soda, (4) amount of consuming delivery food, (5) alcohol drinking, and (6) smoking amount. The

questionnaires were asked using following responses: increased, not changed, decreased, or not applicable. Health behavior deteriorations were captured as follows: increases in smoking amount, alcohol drinking, consuming instant food and soda, or consuming delivery food; changes in sleep duration; and decreases in physical activity.

2.3 Statistical analyses

The demographic characteristics of the participants were presented as weighted mean $\pm$ standard deviation or frequency and weighted proportion. Logistic regression models were used to estimate the associations between SES (educational attainment; household income) and outcomes of interest (failure to comply with precautions; health behavior deteriorations). Age-adjusted Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated using PROC SURVEYLOGISTIC to apply stratification, primary sampling units, and population weights. Additionally, for precaution compliance, COVID-19 related characteristics including quarantine/isolation experience due to COVID-19 infection and recent experience of fever/coughing were adjusted. For health behavior changes, smoking status (past/current), alcohol drinking frequencies, sleep durations, and moderate physical activity (yes/no) were additionally adjusted in the models for increased in smoking amount, increased in alcohol drinking, changes in sleep duration, decreased in physical activity, respectively. Furthermore, the age-adjusted frequencies of precaution non-compliance and health behavior deterioration were estimated using a direct standardization method based on the 2015 Korean Census.

The relative index of inequality (RII) was developed to quantify the relative inequality gap between those who are positioned in the lowest and the highest socioeconomic status [19]. The RII indicates the ratio between the most and least disadvantaged groups. If it is equal to 1.0, there is no inequality, higher values will indicate worse outcomes in the most

disadvantaged group, and values less than 1.0 will indicate worse outcomes in the most advantaged group [20]. In the current study, RIIs by education or income levels were separately calculated. First, to estimate RII by education level, a relative position of educational attainment was obtained from rescaling the categorical educational attainment variables to have a continuous range from 0 (the highest education level) to 1 (the lowest education level). The relative position of educational attainment was assigned to each category based on the proportion of participants above the midpoint in the category. For instance, if 10% of the participants were included in the highest education level group, they were assigned a relative position of 0.05 ($0.0 + 0.5 \times 0.10$). If the 30% of the participants were included in the next highest education level group, a relative position of 0.25 ($0.10 + 0.5 \times 0.30$) was assigned, and so forth. Second, this relative position was treated as an independent variable in binomial regression models, assuming a linear association between education levels and the outcomes. Lastly, the coefficient of the relative position is the RII value by education level. RIIs by income levels were also calculated with the same process. All analyses were conducted in the total population and then stratified by sex and age group (< 65 or ≥ 65). All statistical analyses were performed using SAS software version 9.4 (SAS Institute, Inc., Cary, NC, USA) and R version 4.1.2 (R Foundation for Statistical Computing, Vienna, Austria). A two-sided p value less than 0.05 considered significant.

2.4 Ethics

Data in this study were from the Korean Community Health Study, Disease Control and Prevention Agency, Ministry for Health and Welfare, Republic of Korea. Our data from the KCHS are freely available if researchers submit appropriate institutional review board clearance to the Korea Disease Control and Prevention Agency. This study was approved by

the institutional review board of Severance Hospital at Yonsei University College of Medicine (IRB No: 4-2021-1256).

3. Results

Table 1 presents the sociodemographic characteristics of total study participants and by sex and age groups. Overall, women had higher proportions of lower education such as elementary or middle school graduates compared to men in both age groups. Additionally, more than half of men aged <65 were manual workers (32.3%) or professional administrators (19.5%), while most of the women aged <65 were homemakers (39.2%) or sales workers (18.2%). In the elderly (age ≥ 65) group, both men and women were mostly unemployed or homemakers (men: 61.6%, women: 77.7%) or manual workers (men: 19.8%, women: 10.8%).

(Table 1)

Table 2 presents ORs for failure to comply with safety precautions and health behavior deteriorations according to educational attainment or household income. Overall, participants with lower SES tended to have higher odds for failure to comply with COVID-19 safety precautions compared to the highest SES group. In health behavior deteriorations, lower SES groups tended to have higher ORs for changes in sleep duration and increased smoking amount, while they had lower ORs for decreased physical activity, increased instant/delivery food consumption, and increased alcohol drinking. The sex- and age-specific results are shown in Supplementary Tables 1 to 4.

(Table 2)

Figure 1 shows RIIs by education levels for failure to comply with safety precautions and health behavior deterioration in total population and by sex and age. Estimates of RIIs were found in

Supplementary Table 5. In total population, RIIs by education levels for failure to comply with COVID-19 safety precautions were greater than 1, indicating that less-educated people tended to fail to comply with safety precautions compared to the more-educated people. However, in women, these educational differences in failure for several precautions tended to be weaker; RIIs for no mask-wearing in indoor facilities, not refrain from going out, and not refrain from visiting hospitalized patients were not significant in women. In health behavior deteriorations, different directions of RIIs in total population were found according to the type of health behaviors. Increased smoking amount and sleep duration changes (RIIs 2.10, 1.21, respectively) were prominent in less-educated people while decreased physical activity, increased consumption of instant meals, and of delivery food were prominent in more-educated people (RIIs 0.59, 0.42, and 0.27, respectively). In particular, the tendencies for the less-educated people to experience worse changes in smoking and sleep duration mostly remained in younger men (RII for increased smoking 2.06; for changed sleep duration 1.69) and younger women (RII for increased smoking 3.35; for changed sleep duration 1.11) but not in elderly men and women. Furthermore, in increased alcohol drinking, the deterioration was apparent in groups with different education levels by sex; it was associated with lower education levels in younger men (RII 1.73), but with higher education level in younger women (RII 0.73). Forest plots and estimates of RIIs by income levels are presented in Figure 2 and Supplementary Table 6, respectively, and overall results were similar with RIIs by education levels.

(Figure 1 and Figure 2)

3 Discussion

Overall, in the nationwide health survey conducted in 2020, significant socioeconomic discrepancies were observed in compliance to COVID-19 precautions and in health behaviors

changes. People with lower education or lower income were more likely to fail to comply with safety precautions, but the relative degree of inequality differed by types of precaution measure and by respondent's sex and age. Socioeconomic discrepancy in health behavior deterioration varied not only in the magnitude but also in the direction of inequality indicators.

Our findings of SES inequalities in safety precautions are aligned to a previous study analyzing the data of 6,000 individuals from the USA, the UK, Italy, China, Japan, and Korea; high-income people are adopting more self-protective behaviors such as mask-wearing during COVID-19 pandemics [15]. In the current study, although the overall rate of compliance with safety measures and social distancing for the prevention of COVID-19 was very high, the compliance rate was differently observed according to socioeconomic status. In particular, the compliance rate for wearing masks in indoor facilities or when hard to keep distance and regular ventilation was very high, ranging from 95% to 98%, in all education/income groups (Supplementary Tables 4 to 7). Nevertheless, RII by education level was greater than 1.0 for all eight precaution measures, and RII by income level was also significantly greater than 1.0 for seven out of eight measures. We used RII, which quantifies the socioeconomic gradient in relative terms, to evaluate socioeconomic inequalities in the frequency of failure to comply with precaution measures. But, when making policy decisions, absolute estimates are also needed to evaluate the cost-effectiveness of policy alternatives [21]. The observed socioeconomic inequalities in precaution compliance may amplify the risk of COVID-19 infection among people with low SES, considering that deprived people are easily exposed to vulnerable environments. Moreover, the link between low education levels and non-compliance with COVID-19 safety precautions was more clearly observed in men under age 65, most of whom would be employed workers. Socially or economically deprived people are more likely to live worse living conditions or have jobs that do not allow telecommuting [13]. Therefore, socioeconomic inequality that presents in COVID-19 safety precautions or social

distancing needs to be considered more seriously when making policy decisions.

Socioeconomic inequality was also observed in deteriorating health behavior after the COVID-19 outbreak, but the direction and magnitude were different depending on the type of health behavior. Our study findings were aligned to a previous study with 1,809 US convenience samples which reported that people with higher education attainment tended to decrease in tobacco use or increase in alcohol consumption during the COVID-19 outbreak [14]. In the current study, the increase in smoking amount was observed more in both groups with lower education and income levels, but the changes in sleep duration were found only in those with lower income levels. Unexpectedly, increase alcohol drinking, decreased physical activity, and increased consumption of unhealthy food were observed more in people with higher education or income levels. This is probably due to the difference in the baseline status of health behaviors that people with higher SES had better lifestyles before the COVID-19 outbreak. Since the increase in smoking amounts usually occurs only among smokers, such baseline effects would not occur in smoking behaviors. In addition, people with higher SES have encountered more changes in working patterns such as telecommuting [13] and may have been more affected by the closure of sports facilities [22]. Reasons for the greater increase in consumption of delivery/instant food among higher SES groups may include the more frequent telecommuting and the lower economic barriers to buying such foods.

In the current study, the socioeconomic inequalities in the increased smoking amounts and changed sleep duration were more prominent in younger groups. Among young people who are likely to be economically active, those with lower education or income levels showed greater fear of financial difficulties during the COVID-19 [13,23]. Studies have also reported that psychological stress associated with COVID-19 exacerbates sleep quality and increases smoking volume [24,25]. Interestingly, increased alcohol drinking was differently observed

in younger men and women. The increase in alcohol consumption was more prominent in lower SES groups in younger men, but more prominent in higher SES groups in younger women. This finding was partially aligned to a previous study using international data from 15 countries in Europe and South America; heavy drinking was found in more-educated women and less-educated men [26]. But, the age- and gender-different impact of COVID-19 on alcohol consumption needs to be further studied.

Our study has an advantage in that it used representative samples that cover the entire administrative district of Korea and used data collected according to a standardized questionnaire and quality control program. However, several limitations should be considered. First, there is a possibility of measurement error as both compliances with COVID-19 precautions and changes in health behaviors were measured based on self-report surveys. We cannot completely rule out the possibility that these measurement errors may vary depending on the socioeconomic level. Second, our study could be considered as an exploratory analysis in the association of SES with precaution compliance and health behavior changes. Confirmatory studies are required to further evaluate socioeconomic inequalities. Third, the RII is a relative indicator of inequality and is useful for comparing the degree of inequality between different health outcomes or subgroups, but data on absolute inequality levels need to be supplemented.

4 Conclusion

This study using a representative Korean sample found that socioeconomic inequality exists in compliance with COVID-19 precautions and in health behavior deterioration. People with

low SES were more likely to fail to comply with safety precautions, but the magnitude of inequality varies by sex, age, and type of precaution measure. The socioeconomic inequality in health behavior differed not only in the magnitude but also in the direction of inequality indicators. Our findings suggest that it is necessary to develop a customized strategy that considers the characteristics of the target population to reduce the burden and impact of the COVID-19 outbreak.

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Conflict of Interest

The authors have no conflicts of interest to declare for this study

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Author Contributions

Conceptualization: GBL, SJJ, HCK

Data curation: GBL

Formal analysis: GBL

Methodology: HCK, GBL

Project administration: HCK, SJJ

Visualization: GBL

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Figure legends

Figure 1. Relative index of inequality (RII) by education levels for failure to comply with COVID-19 safety precautions and health behavior deterioration in total population and by sex and age

Figure 2. Relative index of inequality (RII) by income levels for failure to comply with COVID-19 safety precautions and health behavior deterioration in total population and by sex and age

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Table 1. Demographic characteristics of participants by sex and age in Korea Community Health Survey 2020.

Characteristics	Total (n=214,966)	Men (n=97,250)		Women (n=117,716)	
		Age < 65 (n=66,924)	Age ≥ 65 (n=30,326)	Age < 65 (n=75,230)	Age ≥ 65 (n=42,486)
Age, year	51.49 ±0.05	44.90 ±0.05	73.39 ±0.05	45.65 ±0.05	74.17 ±0.04
Education attainment					
Elementary or less	53,785 (13.7)	3,075 (2.6)	12,451 (31.9)	6,672 (5.0)	31,587 (63.7)
Middle school	24,825 (8.8)	5,119 (5.1)	6,353 (20.3)	8,047 (7.4)	5,306 (15.7)
High school	67,002 (33.2)	26,078 (35.8)	7,702 (30.1)	29,028 (37.0)	4,194 (15.2)
College or higher	69,091 (44.3)	32,577 (56.5)	3,771 (17.6)	31,393 (50.6)	1,350 (5.4)
Monthly household income					
Q1 (lowest)	63,353 (24.5)	19,916 (25.0)	8,759 (23.8)	22,114 (24.7)	12,564 (23.0)
Q2	53,417 (24.5)	15,300 (23.9)	7,829 (24.6)	18,886 (25.3)	11,402 (24.2)
Q3	43,256 (21.9)	12,277 (20.3)	7,361 (26.5)	13,906 (20.8)	9,712 (26.8)
Q4 (highest)	49,429 (29.1)	17,436 (30.9)	5,854 (25.1)	18,119 (29.2)	8,020 (26.0)
Job					
Professional administrators	22,244 (14.5)	10,817 (19.5)	817 (3.9)	10,418 (16.3)	192 (0.7)
Office worker	18,925 (12.5)	9,528 (17.3)	308 (1.4)	9,011 (14.3)	78 (0.3)
Sales worker	27,048 (13.6)	8,577 (14.0)	1,138 (4.0)	15,165 (18.2)	2,168 (5.3)
Agricultural worker	22,358 (3.2)	5,773 (2.7)	6,846 (9.3)	4,205 (1.5)	5,534 (5.2)
Manual worker	41,987 (20.1)	22,137 (32.3)	5,178 (19.8)	8,840 (10.5)	5,832 (10.8)
Etc.(Homemakers or unemployed)	82,198 (36.1)	10,017 (14.2)	16,018 (61.6)	27,528 (39.2)	28,635 (77.7)

Data expressed as weighted mean ± standard deviation or number (weighted proportion)

Table 2. Odds ratio for failure to comply with safety precautions and health behavior deterioration during COVID-19 outbreak according to education attainment or household income

COVID19-related questionnaires	Educational attainment (n=214,703)								Household income (n=209,455)							
	College +	High school		Middle school		Elementary or less		Q4 (highest)	Q3		Q2		Q1 (lowest)			
	OR	OR	95% CI	OR	95% CI	OR	95% CI	OR	OR	95% CI	OR	95% CI	OR	95% CI		
Failure to comply with safety precautions ¹																
Not covering mouth while coughing	1.0	1.39	(1.28 - 1.51)	1.62	(1.45 - 1.80)	2.27	(2.05 - 2.50)	1.0	1.13	(1.02 - 1.25)	1.28	(1.16 - 1.42)	1.61	(1.46 - 1.77)		
No regular ventilation	1.0	1.11	(1.00 - 1.24)	1.33	(1.12 - 1.58)	2.06	(1.78 - 2.39)	1.0	1.04	(0.91 - 1.18)	0.92	(0.81 - 1.05)	1.21	(1.06 - 1.37)		
No regular disinfection	1.0	1.17	(1.13 - 1.20)	1.34	(1.28 - 1.40)	1.81	(1.73 - 1.89)	1.0	1.06	(1.02 - 1.11)	1.19	(1.14 - 1.23)	1.65	(1.59 - 1.73)		
No mask wearing in indoor facilities	1.0	1.20	(0.97 - 1.50)	1.52	(1.12 - 2.07)	2.19	(1.64 - 2.93)	1.0	1.54	(1.16 - 2.04)	1.27	(0.95 - 1.68)	1.87	(1.39 - 2.52)		
No mask wearing when hard to keep distance	1.0	1.28	(1.08 - 1.50)	1.62	(1.30 - 2.02)	2.11	(1.75 - 2.54)	1.0	1.10	(0.90 - 1.34)	1.01	(0.83 - 1.22)	1.34	(1.11 - 1.62)		
Not keeping minimal physical distance	1.0	1.13	(1.06 - 1.22)	1.29	(1.16 - 1.45)	1.45	(1.30 - 1.61)	1.0	1.05	(0.96 - 1.14)	1.03	(0.94 - 1.13)	1.05	(0.95 - 1.16)		
Not refrain from visiting hospitalized patients	1.0	1.29	(1.12 - 1.50)	1.22	(0.97 - 1.54)	1.26	(1.02 - 1.55)	1.0	1.13	(0.93 - 1.37)	1.23	(1.01 - 1.49)	1.42	(1.16 - 1.73)		
Not refrain from going out	1.0	1.05	(0.95 - 1.15)	1.04	(0.89 - 1.22)	1.54	(1.33 - 1.78)	1.0	1.04	(0.93 - 1.17)	1.03	(0.91 - 1.16)	1.17	(1.03 - 1.32)		
Health behavior deterioration																
Decreased in physical activity ²	1.0	0.82	(0.79 - 0.84)	0.74	(0.71 - 0.78)	0.68	(0.65 - 0.71)	1.0	0.87	(0.84 - 0.90)	0.83	(0.80 - 0.86)	0.81	(0.78 - 0.84)		
Changes in sleep duration ³	1.0	1.18	(1.14 - 1.22)	1.24	(1.17 - 1.31)	0.99	(0.93 - 1.04)	1.0	1.01	(0.96 - 1.05)	1.14	(1.09 - 1.19)	1.23	(1.17 - 1.28)		
Increased in consuming instant meals/soda	1.0	0.85	(0.82 - 0.89)	0.52	(0.47 - 0.58)	0.36	(0.32 - 0.40)	1.0	0.91	(0.87 - 0.95)	0.77	(0.73 - 0.82)	0.67	(0.62 - 0.73)		
Increased in consuming delivery food	1.0	0.74	(0.72 - 0.77)	0.41	(0.38 - 0.45)	0.28	(0.25 - 0.30)	1.0	0.78	(0.75 - 0.81)	0.59	(0.56 - 0.62)	0.47	(0.44 - 0.51)		
Increased in alcohol drinking ⁴	1.0	1.05	(0.98 - 1.12)	0.89	(0.77 - 1.01)	0.69	(0.59 - 0.81)	1.0	0.96	(0.89 - 1.04)	0.95	(0.87 - 1.04)	0.90	(0.81 - 1.00)		
Increased in smoking amount ⁵	1.0	1.34	(1.22 - 1.47)	1.36	(1.15 - 1.61)	1.36	(1.13 - 1.63)	1.0	1.13	(1.00 - 1.28)	1.26	(1.11 - 1.42)	1.44	(1.26 - 1.66)		

Abbreviations: OR, odds ratio; 95% CI, 95% confidence interval

1. adjusted for quarantine/isolation experience due to COVID-19 infection and recent experience of fever/coughing

2. adjusted for moderate physical activity (yes/no)

3. adjusted for sleep duration

4. adjusted for alcohol drinking frequencies

5. adjusted for smoking status (current/past)

Figure 1. Relative index of inequality (RII) by education levels for failure to comply with COVID-19 safety precautions and health behavior deterioration in total population and by sex and age

*Questions were sorted by descending order of RII values in the total population analysis

1. adjusted for quarantine/isolation experience due to COVID-19 infection and recent experience of fever/coughing
2. adjusted for smoking status (current/past)
3. adjusted for sleep duration
4. adjusted for alcohol drinking frequencies
5. adjusted for moderate physical activity (yes/no)

Figure 2. Relative index of inequality (RII) by income levels for failure to comply with COVID-19 safety precautions and health behavior deterioration in total population and by sex and age

*Questions were sorted by descending order of RII values in the total population analysis

1. adjusted for quarantine/isolation experience due to COVID-19 infection and recent experience of fever/coughing
2. adjusted for smoking status (current/past)
3. adjusted for sleep duration
4. adjusted for alcohol drinking frequencies
5. adjusted for moderate physical activity (yes/no)