



Effects of Cognitive Dissonance Activation Emerged from Not Imposing Lockdown Restrictions on COVID-19-related Attitudes and Preventive Actions Considering the Role of Gender

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Abstract

Background: During the pandemic of COVID-19, some countries imposed lockdown restrictions on their cities to stop the outbreak of the virus. However, this mandatory lockdown was not imposed by all countries.

Objectives: The purpose of this study was to investigate the effects of the induced-compliance situation generated by not imposing the lockdown restrictions during the COVID-19 pandemic on individuals' COVID-19 perceived risk and practicing the World Health Organization preventive actions, considering the moderating role of gender.

Methods: The research was conducted through a causal-comparative method. Participants were 320 social media users who were randomly selected to complete the justification of COVID-19 perceived risk and COVID-19 preventive action implementation questionnaires. Instruments' validity and reliability were confirmed through confirmatory factor analysis and Cronbach alpha.

Results: The analysis of variance (ANOVA) showed significant interactive effects of gender and work attendance on the justification of COVID-19 perceived risk so that the highest rate of justification was applied by males who were required to attend their workplace physically. The ANOVA results showed the significant main effects of gender and work attendance on the action. Based on these findings, the lowest rate of preventive actions belonged to males and those who attended their workplace physically.

Conclusions: It is concluded that not imposing the lockdown restrictions, other than its direct role in increasing social contacts and the probability of virus spread, also lowers preventive actions implementation. This could happen due to belief modification to eliminate the undesirable state of cognitive dissonance that emerged from the induced-compliance situations.

Keywords: Attitude, Cognitive Dissonance, COVID-19, Health Behavior, Preventive Action

1. Background

Coronavirus is a large family of viruses causing disease in humans or animals. There are several known types of coronavirus in humans that cause contagious infections and diseases ranging from the common cold to more severe conditions such as Middle East respiratory syndrome (MERS) and severe acute respiratory syndrome (SARS). The COVID-19 virus is the newest known coronavirus in the world.

The COVID-19 pneumonia was first reported to the World Health Organization on December 31, 2019, from Wuhan, China (1). The virus spread rapidly across geographical borders so that by March 7, 2020, the number of infected people reached 100,000 and 100 countries confirmed the existence of the virus in their borders (2). On March 11, 2020, the World Health Organization declared the COVID-19 the second pandemic of the 21st century (3).

Given the rapid spread of the virus among countries worldwide, the World Health Organization emphasized the necessity of all communities and health systems efforts to control the spread of the virus and slow down the pandemic. It was also said that everyone could contribute to infection control by protecting themselves and others, whether at home, community, health care system, workplace, or transportation system (4).

The COVID-19 virus is transmitted person-to-person directly through respiratory droplets expelled from asymptomatic Coronavirus carriers and patients' mouth or nose when they cough, sneeze, talk, or exhale. Transmission may also occur indirectly through touching surfaces in the immediate surfaces or objects contaminated with droplets expelled from infected individuals, followed by touching the mouth, nose, or eyes (5). As a result, protective behaviors during interpersonal interactions and maintaining

social distance in both infected and healthy people were characterized as critical factors in controlling the spread of this contagious virus. Hence, in its initial self-protection guide, the World Health Organization has suggested that people take some specific preventive actions (6).

Given that the virus is transmitted from person to person and through human interactions, the COVID-19 outbreak could be contained only by employing self-protective actions and minimizing interpersonal contacts during the disease prevalence. Therefore, quarantining cities and provinces encountered with the quick spread of COVID-19 was one of the strategies adopted by authorities to facilitate social distance. City lockdowns were administered by the imposition of compulsory social distance, including the closure of offices, shops, schools, universities, and prohibition of intra- and inter-city transit, except in emergencies. For example, nearly 60 million people were quarantined in China's Hui province, and travel restrictions were imposed on hundreds of millions of citizens and foreigners, and China was finally able to control the virus epidemic in its own country. On March 8, 2020, China said that COVID-19 was curbed in this country (7). At the same time, in Italy, a quarter of the population, ie, 16 million people, was in forced quarantine (8).

However, due to their own particular economic and cultural conditions, some countries, including Iran, did not apply forced quarantine rules. In Iran, mandatory lockdown and travel restriction rules were not imposed by authorities, except for the closure of schools and universities, and efforts were made to raise public awareness in the form of informative programs broadcast on official TV channels. Also, health authorities and health care workers requested people to stay at home, warning text messages were sent on people's cell phones, and a variety of billboards were installed in the cities to prevent people from leaving their homes and get them familiar with personal protection behaviors. However, government organizations, banks, and shops were not closed. Only some of them tried to help control the spread of COVID-19 by reducing their working hours. Therefore, most responsibilities for observing social distance and health principles were left to the people themselves.

In such circumstances, that is, the absence of external restraining forces, the role of individual factors in determining the practice of preventive behaviors becomes even more prominent; the factors that have been shown as the determinants of health behaviors in the health belief model (9), theory of planned behavior (10), and protection motivation theory (11). Likewise, the social-cognitive model of pandemic influenza H1N1 (12) and predictors of health behavior SARS model (13) have suggested the factors influencing the practice of target behavior to prevent com-

mon infectious diseases in the 21st century. All of these models have recognized attitudes or cognitions as influential factors in the practice of health behaviors, ranging from perceived severity (social-cognitive model, health belief model, theory of planned behavior, and protection motivation theory) and perceived susceptibility (social-cognitive model, health belief model, and predictors of health behavior SARS model) to perceived behavioral control (theory of planned behavior, protection motivation theory, and predictors of health behavior SARS model) and belief in the level of preparedness of institutions to control the disease (social-cognitive model).

However, since these models have been developed at the individual level and have considered the effectiveness of social and environmental rules differently from individual factors, they have considered the relationship between cognition and behavior as a one-way relationship, from cognition to behavior. While because health behaviors are formed within the social context, the relationship between disease cognition and health behaviors may be more complex than a one-way relationship.

Since the adoption of some preventive behaviors is the inevitable result of situational factors and rules applied by political and social institutions, based on predictions of dissonance theory of Festinger (14) and the induced-compliance paradigm (15), the relationship between cognition and health behavior could also be created in the opposite direction, that is, from behavior to an attitude so that part of the attitude towards the disease could be developed in response to inconsistent behaviors generated by socially imposed rules. The induced-compliance paradigm (15) states that inducement to engage in a particular behavior causes attitude modification to retrieve cognitive consistency. The general premise of cognitive dissonance theory is that individuals shape their views of the world to be consistent with what they do or feel to reduce the dissonance between their cognitions. In other words, the dissonance is decreased via modifying beliefs or attitudes about inconsistent behaviors (16).

Therefore, it can be expected that if people are forced to be at work during the outbreak of an infectious disease such as COVID-19, they may experience the formation of dissonance between the "awareness of disease risk" and "inability to keep social distancing." Although they are aware of the threat of the virus to their health, their mandated presence in the workplace would generate cognitive dissonance and lead them to seek out their previous congruency via resolving these asymmetrical cognitions. Given that changing the behavior in such situations is approximately impossible, it is predictable that people will try to regain their cognitive congruency by changing the inconsistent attitude, which is associated with the extent

that disease is perceived as life-threatening through the self-justification mechanism. In particular, it is predicted that one's inability to practice social distancing and stay at home could weaken his or her perception of the disease severity and develop a more pervasive attitude towards the disease, which could indirectly elaborate the likelihood of being infected.

The process of self-justification is also done in the following ways (17): Adding new cognitions such as "this disease is just a media play and should not be taken seriously," changing inconsistent attitudes such as "if we think about something we will attract it in our lives, so one should not occupy their mind with disease thoughts," or reducing the importance of asymmetric belief, such as "the mortality rate of the virus is very low, so there is nothing to worry about."

The particular importance of this process is demonstrated because, based on health psychology models (e.g., theory of planned behavior and social cognitive model of pandemic influenza H1N1), this new permissive attitude negatively affects the adoption of preventive behaviors which people have sufficient authority to practice or not. In other words, behaviors such as avoiding unnecessary travels, parties, friends, and family gatherings, as well as practicing hand washing, use of disinfectants for cleaning contaminated surfaces, and wearing face masks, could also be reduced following the formation of lenient attitudes toward COVID-19 and activation of self-justification mechanisms. Therefore, people are more likely to be infected with COVID-19 not only because of attending at work and not keeping safe social distancing but also since they do not perceive the disease as a serious issue and, as a result, do not follow the COVID-19 health protocols efficiently.

Therefore, the first purpose of the present study was to investigate the effect of not imposing mandatory lockdown and employees' ineluctable attendance at work on attitudes toward COVID-19, as well as the extent to which the WHO preventive actions are observed. According to the induced-compliance paradigm, workers who have to attend work during the COVID-19 outbreak physically are more likely to justify themselves in a way that lowers the importance and seriousness of COVID-19, compared to those whose workplaces were closed or were allowed to work from home. In addition, they are less likely to engage in COVID-19-related preventive health behaviors.

On the other hand, based on what was indicated in previous studies, gender plays a significant role in the practice of health-related behaviors (18). Based on previous findings, females adopt healthier eating habits than males, which include eating breakfast, fruits, vegetables (19), low-calorie foods (20), and consuming less sugar-sweetened and alcoholic beverages (21). It has also been demonstrated

that women are more likely to engage in cancer screening behaviors than men (22-24). Another study on students indicated that although both men and women are sufficiently aware of what a "healthy diet" exactly is, women are more inclined to create positive changes in their diets and physical activity and more likely to take the necessary steps to develop a healthy lifestyle in their daily lives (25, 26). Overall, women generally seek more information about health (18) and take more responsibility for their health. This is probably related to women's higher risk perception and concern about potential environmental hazards (23). Another explanation is that women have been socialized to be more concerned about health issues (22-24).

Given the points mentioned above, it could be predicted that the influence of induced compliance on forming permissive attitudes toward COVID-19 and the required preventive actions that could diminish the possibility of getting infected is stronger in females than males. In other words, as women perceive a higher risk and are more concerned about health issues, they experience less cognitive dissonance in health-related induced situations and thus are not intended to reduce the perceived risk of COVID-19 via using self-justification mechanisms. Hence, they will practice more preventive actions than men in forced health-related conditions, ie, mandatory attendance at work.

2. Objectives

Therefore, the present study examined the moderating role of gender in the effect of the induced-compliance situation generated by the lack of lockdown restrictions during the COVID-19 pandemic on individuals' COVID-19 perceived risk and practicing World Health Organization preventive actions.

3. Methods

This study was conducted in Iran between March 3 and March 13, 2020, ie, 13 days after the first recognition of COVID-19 infection (February 19). During this period, the number of infected cases raised from 835 to 1,289, and evidence indicated the increasing spread of COVID-19. As of March 18, 2020, China, Iran, and Italy, in sequence, had the highest numbers of coronavirus infections and deaths in the world (27). On this date, some interventions had been conducted via mass media to raise public awareness about the disease and methods of preventing new infections. In addition, schools, universities, and public places such as holy shrines, cinemas, theatres, and barbershops were closed; however, government corporations continued to

operate, and no ban was imposed on trade unions and self-governing businesses activation. Therefore, this made it possible to compare two groups of people who could be absent from work (no cognitive dissonance situation) and those who had to attend work or study (cognitive dissonance situation) in a causal-comparative research project.

The participants were Iranians over 17-years-old who completed the online research questionnaire. The sample size was calculated as 385, based on Cochran's sample size formula for infinite population, at the confidence level of 0.05 and the z value of 1.96. Sampling was conducted through a conventional method. The questionnaires were shared on social media along with the invitation letter. Finally, 407 people participated in the research, and 320 complete and analyzable questionnaires were obtained, which were adequate according to observed power (0.974). Participants were from 23 provinces of Iran and only eight provinces, including Ardabil, Ilam, Bushehr, South Khorasan, Sistan and Baluchestan, Qom, Kurdistan, and Lorestan, were absent in the research sample.

Participants' age ranged from 17 to 70 years ($M = 34.12$). The age of 55.9% of the sample was in the range of 30 - 38 years. Men and women each made up 50% of the sample; 56.6% reported their marital status as married, 39.7% as single, and 3.8% as divorced; 33.8% were employers or had a personal business, 41.6% were employees, 9.4% were students, 1.6% were home keepers, and 13.8% had another employment status. The highest and lowest frequencies of education level belonged to the "bachelor's degree" (35.9%) and "less than high school" (1.3%), respectively. "Underlying medical condition" was reported by 13.1%, and "family member's underlying medical condition" was reported by 44.7%. Furthermore, the most frequent media used for obtaining information about COVID-19 news were "online social networks" (32.2%), followed by "other media" (21.3%), and "combination of satellite TV and social networks" (10.9%). Besides, 24.1% of the participants stayed at home completely since the onset of COVID-19 in Iran, 15.3% had not been in self-quarantine at all, and 60.6% had partially observed the self-quarantine rules suggested by the health authorities at that time.

3.1. Materials

COVID-19 Perceived Risk Justification Questionnaire: This 11-item scale was developed to assess the individual justifications people adopt to reduce the COVID-19 perceived risk to eliminate the psychological discomfort resulting from cognitive incongruence. Participants were asked to rate their agreement with each statement on a 5-point scale from "strongly agree" to "strongly disagree." Some statements were "one should not think about this virus, because thinking about anything leads to attracting

it into one's life," "COVID-19 is not a serious problem; this is the media that have turned it into a critical issue to attract the audience," and "the number of deaths is exaggerated." A high score on this scale means a high amount of permissive justifications to COVID-19. The internal consistency reliability of this questionnaire was confirmed by Cronbach's alpha coefficient of 0.79. Evidence for its validity, assessed by confirmatory factor analysis, is presented in Table 1.

Table 1. Standardized Loadings of Indicators and Convergent Validity ^a

Construct	Indicator	Standardized Loadings	t-Values
Justification	J1	0.571	7.722
	J2	0.429	6.22
	J3	0.344	5.202
	J4	0.711	8.852
	J5	0.437	6.339
	J6	0.27	4.192
	J7	0.557	
	J8	0.461	6.605
	J9	0.534	7.359
	J10	0.74	9.038
	J11	0.616	8.126
Action	A1	0.589	5.62
	A2	0.655	5.81
	A3	0.583	5.599
	A4	0.467	5.129
	A5	0.408	4.805
	A6	0.429	4.927
	A7	0.567	5.545
	A8	0.309	4.081
	A9	0.366	
	A10	0.421	4.884
	A11	0.41	4.82
	A12	0.635	5.756
	A13	0.66	5.822
	A14	0.337	4.314

^a Justification: justification of COVID-19 perceived risk; Action: preventive actions related to COVID-19

3.2. COVID-19 Preventive Actions Questionnaire

This 14-item scale was designed to assess the extent to which preventive measures recommended by the World Health Organization and health authorities in mass media are being practiced by participants. People were asked to indicate on a 5-point scale how well they performed each of these actions. Examples of statements in this questionnaire include "I wash my hands regularly and use disinfectants," "I will attend the traditional parties of Nowruz," and "during my presence in public, I wear face masks or gloves, or both." A high score on this scale means high rates of preventive action practices. The internal consistency reliability of this scale was confirmed by Cronbach's alpha coefficient of 0.89.

cient of 0.84, and its validity was assessed by confirmatory factor analysis (results shown in [Table 1](#)).

4. Results

The coded data were analyzed using the AMOS graphics program. Confirmatory factor analysis (CFA) was first conducted to test for the quality and adequacy of the measurement model by investigating the measurement models' goodness-of-fit and convergent validity. The purification results of CFA revealed that the goodness-of-fit of the justification and action models achieved the best appropriateness. The chi-square value for the justification measurement model was 116.4 with 43 degrees of freedom ($P < 0.0001$) and a chi-square/df ratio of 2.707. Based on Carmines and McIver (28), a chi-squared/df ratio smaller than 3 is considered an acceptable level of fit. The Goodness-of-fit Index (GFI) was 0.937, the Adjusted Goodness-of-fit Index (AGFI) was 0.903, and the Comparative Fit Index (CFI) was 0.907. The root mean squared error of approximation (RMSEA) = 0.073 was also acceptable. As Marcoulides and Schumacker's (29) standards of model fitting imply, CFA results showed an acceptable fit for the justification measurement model. Similar results were obtained for the action measurement model indicating its goodness of fit. The chi-square value for the action measurement model was 169.9 with 77 degrees of freedom ($p < 0.0001$) and a chi-square/df ratio of 2.207. The GFI was 0.926, the AGFI was 0.898, and the CFI was 0.891. The RMSEA = 0.062 was also acceptable.

The convergent validity of the measurement model was assessed by determining the significance of the indicator's estimated pattern coefficient on its underlying factor (30). Factor loadings presented in [Table 1](#) show that all t -values of the completely standardized loadings for these items measuring justification and action are statistically significant at $\alpha = 0.01$. Thus, the convergent validity of justification and action indicator variables is confirmed. Therefore, the convergent validity of both measurement models is achieved in this study.

Frequencies and dependent variables' scores by demographic variables are presented in [Table 2](#), including marital status, education, underlying medical condition, family members' underlying medical condition, and media people used for receiving COVID-19 news. Separate ANOVA tests were also run on the justification and action scores in demographic variables' categories.

The ANOVA results showed no significant differences among dependent variables' scores in each demographic variable's category, except for justification among education subgroups ($F = 3.29$, $P = 0.004$). A Tukey Post Hoc test

revealed that group differences in justification were significant between "less than high school" and "Ph.D." groups ($P = 0.006$) and between "under diploma" and "bachelor's degree" groups ($P = 0.04$), such that the justification mean scores were significantly lower in "Ph.D." and "bachelor" groups than in "less than high school" group.

The mean and standard deviation of the scores for justification and action are presented in [Table 3](#). Each group's scores are reported separately based on gender and working status. Working status is characterized by whether the respondents have attended their workplace since the spread of COVID-19. Besides, it is based on whether the teleworking option was provided to discriminate between those required to physically attend the workplace (ie, induced compliance group) and those who have been in the workplace by their own free will.

The results of the independent t -test revealed significant differences between justification and action in each gender group. The results of the t -test for each group revealed the following group differences: Men who "went for work without having teleworking option" showed significantly higher scores on justification and significantly lower scores on the action. However, there were no significant differences in justification and action between women and men who "didn't go outside for work" and those who "went for work despite having teleworking option." In other words, all the differences between men and women were due to differences in the group who went to work without having the teleworking option (ie, induced compliance group). Also, bivariate correlation indicated a negative relationship between overall action and justification scores, such that more justification employed by a person, less action performed to prevent COVID-19.

Justification and action mean scores in three work statuses and two genders are presented graphically in [Figures 1](#) and [2](#). From this bar chart, both males and females in "didn't go for work" and "work despite having teleworking option" groups almost equally used justification, while males who worked without teleworking options significantly justified themselves more than their female counterparts. Also, [Figure 2](#) shows that men and women who did not go for work or went for work despite having the teleworking option employed preventive actions to an approximately equal degree. In contrast, females who worked without teleworking options applied more preventive actions than males in this group. In essence, the highest justification rate belonged to males who were required to go to work, while the highest mean score for action was obtained by females who did not go to work at all.

Tukey's post hoc test results also showed that in the men group, there were significant differences in justifica-

Table 2. Dependent Variable Scores by Demographic Variables' Categories

Classifications	No. (%)	Justification		Action	
		Mean \pm SD	F	Mean \pm SD	F
Marital status			1.22		0.53
Married	181 (57)	25.90 \pm 6.37		63.56 \pm 6.13	
Single	127 (40)	25.87 \pm 6.60		63.42 \pm 5.94	
Divorced	12 (4)	27.67 \pm 5.70		63.56 \pm 4.36	
Education			3.29 ^a		1.74
Less than high school	4 (1.3)	35.25 \pm 2.50		59.00 \pm 0.00	
Diploma	13 (4.1)	28.08 \pm 6.51		62.31 \pm 4.85	
Associate degree	11 (3.4)	29.18 \pm 5.15		65.36 \pm 6.20	
Bachelor	115 (35.9)	25.57 \pm 6.32		63.77 \pm 6.10	
Master	98 (30.6)	26.05 \pm 6.34		62.73 \pm 5.85	
Ph.D.	24 (7.5)	22.92 \pm 6.47		66.08 \pm 6.36	
Unspecified	2 (0.6)				
Underlying medical condition			0.01		0.01
Negative	278 (86.9)	25.97 \pm 6.24		63.49 \pm 5.86	
Positive	42 (13.1)	25.82 \pm 7.71		63.59 \pm 6.86	
Family members' underlying condition			1.60		0.64
Negative	177 (55.3)	26.41 \pm 6.08		63.26 \pm 6.01	
Positive	143 (44.7)	25.36 \pm 6.82		63.82 \pm 5.97	
Media			1.82		1.21
Online social networks	103 (32.2)	25.20 \pm 6.45		63.78 \pm 5.99	
IR TV, social networks, and friends/family	13 (4.1)	26.18 \pm 4.24		66.18 \pm 5.46	
Satellite TV and social networks	35 (10.9)	22.52 \pm 6.44		65.08 \pm 5.34	
Satellite TV	16 (5.0)	30.08 \pm 6.32		60.69 \pm 4.64	
No media	11 (3.4)	26.55 \pm 4.55		62.73 \pm 7.04	
IR TV	24 (7.5)	25.75 \pm 5.65		64.05 \pm 6.35	
IR TV and social networks	31 (9.7)	25.38 \pm 6.49		63.90 \pm 5.81	
Family/friends	3 (0.9)	29.00 \pm 10.54		65.00 \pm 5.29	
Online social networks and family/friends	16 (5.0)	26.86 \pm 7.90		63.64 \pm 6.92	
Other media	68 (21.3)	27.46 \pm 6.14		62.16 \pm 6.04	

^a $P < 0.01$

tion between the following groups: "did not go for work" and "work without teleworking option" ($P = 0.027$). Also, for the women group, Tukey's test findings indicated significant differences in justification between "work without teleworking option" and "work despite having teleworking option" ($P = 0.038$). Furthermore, there were significant differences in action mean scores of the following groups: "did not go for work" and "work without teleworking option" ($P = 0.001$), on the one hand, and "didn't go for work" and "work despite having teleworking option" ($P = 0.001$),

on the other hand. Therefore, people who did not go to work significantly applied more protective actions than other groups.

The main and interaction effects of work status and gender were also examined by using a 3(work status)*2(gender) ANOVA for justification as the dependent variable and gender and work status as the independent variables (Table 4).

The ANOVA results for justification showed that only the interactive effect of gender*working status was signifi-

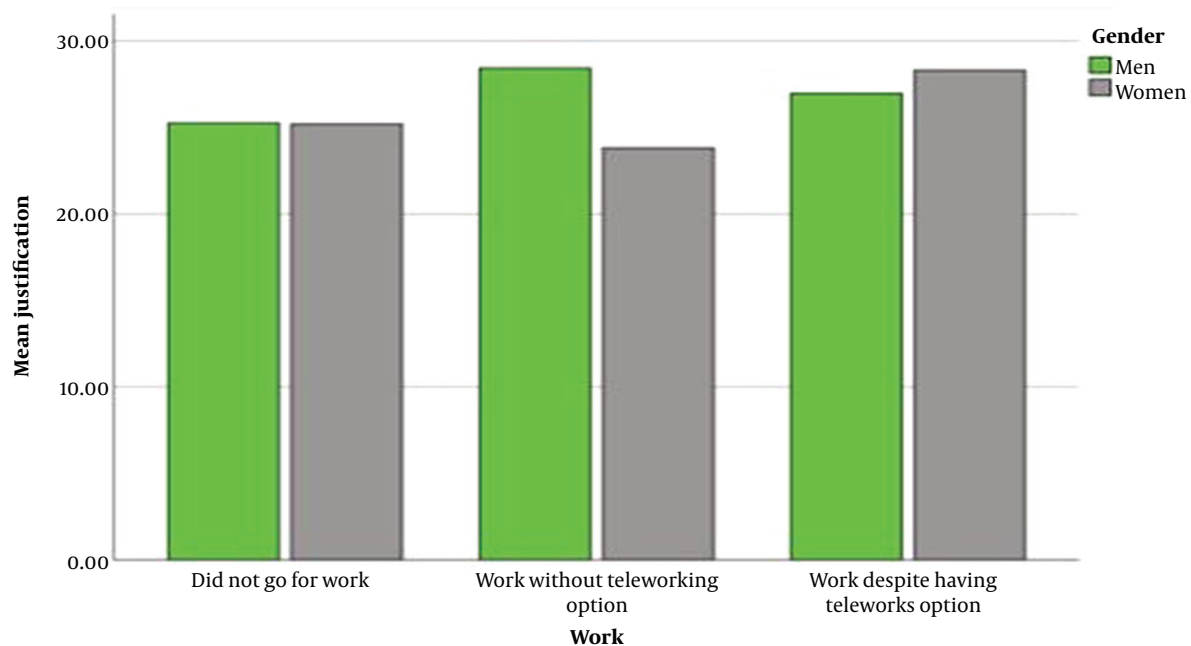


Figure 1. Bar chart of justification scores based on work status and gender

cant ($P = 0.006$). Thus, the moderating effect of gender and work status on justification was confirmed. The ANOVA results of the interactive effects of gender and work status on justification are presented graphically in [Figure 3](#).

Moreover, the main effects of the two independent variables on action were investigated through another 3×2 ANOVA for action as the dependent variable. [Table 3](#) indicates that the main effects of gender ($P = 0.014$) and work status ($P = 0.006$) on action were significant, whereas the interactive effect was not significant ($P = 0.061$). In other words, gender did not moderate the work status effect on preventive actions. The ANOVA results of the interaction between gender and work status as the independent variables are presented in [Figure 4](#).

5. Discussion

This study investigated the role of induced compliance resulting from the non-application of lockdown regulations on the adoption of self-justification strategies and the practice of certain preventive behaviors to prevent COVID-19, emphasizing the moderating role of gender. Consistent with previous studies ([31, 32](#)), the findings showed that the induced-compliance paradigm is accountable for a significant variance of modification in attitudes toward COVID-19. What is unique to the present study is the interaction of forced situations with gender in changing

beliefs. Accordingly, men who had to attend the workplace during the outbreak, ie, men in the induced-compliance situation, were more likely to reduce the COVID-19 perceived risk using their self-justification mechanism than women in the same group. In contrast, women in the induced-compliance group used the least rate of justification for decreasing the perceived risk of COVID-19.

These findings suggest that although forced situations, including health threats, can lead to cognitive dissonance and belief modification, such that people underestimate the risk of being infected by COVID-19 or the extent of the condition seriousness, women do not tend to experience dissonance in this situation and as a result, will not develop a more permissive attitude towards this life-threatening condition. As previous research has shown ([25, 26](#)), women take more health-oriented actions than men because of their higher risk perceptions ([23](#)) and greater concern about the risks to their health, as well as their sociability in a way that they emphasize health-related issues more than men ([22-24](#)). Thus, the induced-compliance situation provides sufficient external justification rather than activating the cognitive dissonance for women, thereby inhibiting the self-justification mechanism's adoption. Thus, the forced situation during the outbreak of COVID-19 puts males at a greater risk of underestimated attitude toward the virus than females.

On the other hand, the results of the group that physi-

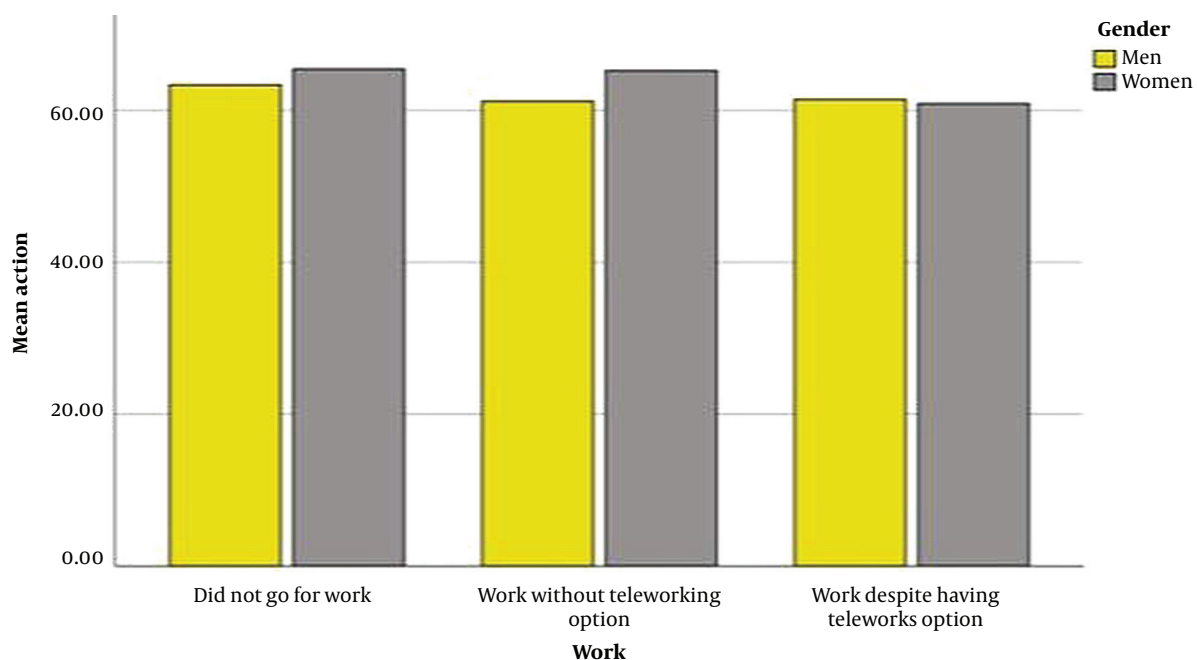


Figure 2. Bar chart of action scores based on work status and Gender

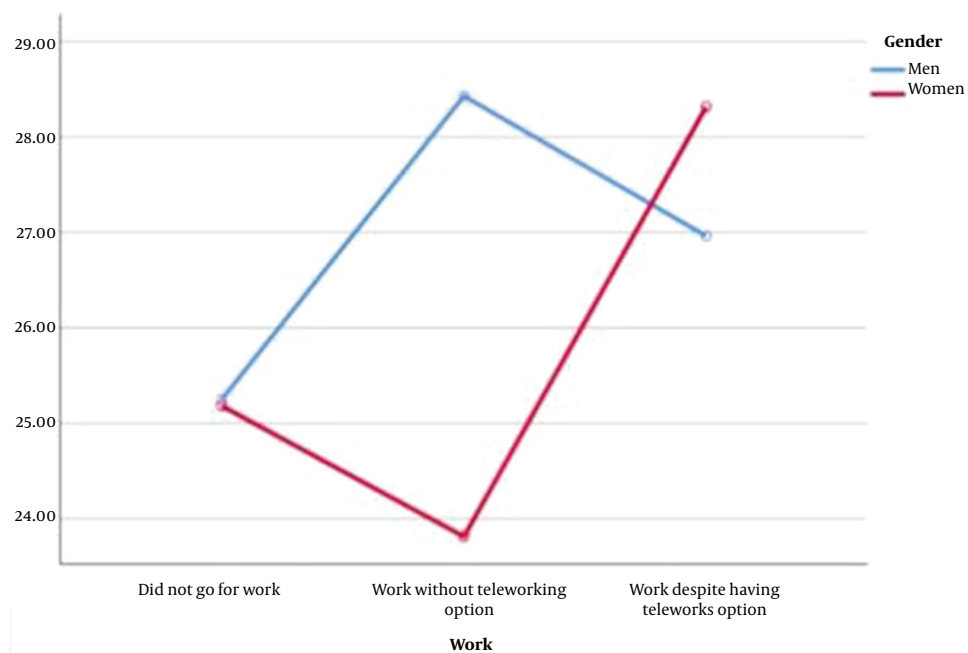


Figure 3. ANOVA results for interaction effects of work status and gender on justification

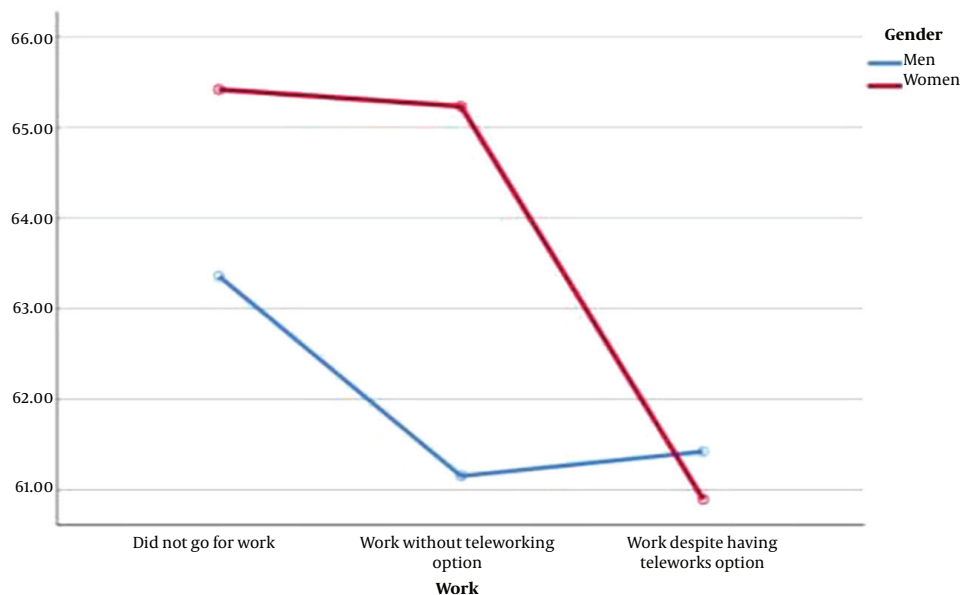


Figure 4. ANOVA results for interaction effects of work status and gender on action

cally attended work despite having the option of teleworking indicated that when attitude precedes and determines behavior, women engaging in high-risk behaviors require a more permissive attitude toward COVID-19. In other words, when women are forced into high-risk situations, not only their COVID-19 attitudes do not become lenient, but also they become stricter. Moreover, in situations where the previous attitude determines the action and factors other than induced compliance have played a role in belief formation, high-risk behavior is performed only if the previous attitude is significantly permissive. Comparing these two groups shows that whether attitude determines behavior or behavior determines attitude, women are less likely to engage in belief-modification than men in the health-related area. Unless they perceive the risk of the disease significantly lower, they do not engage in high-risk behaviors such as physically attending the workplace despite having the option of working from home. This demonstrates women's cautious attitude when dealing with health risks.

Similarly, women significantly adopted more COVID-19 prevention actions than men, whether they did not go to work or were forced to come to work during the COVID-19 pandemic; some behaviors included wearing a mask, not attending the crowded places to keep social distancing, and washing hands regularly or using disinfectants. The only exception was in the group where attitude determined the actions; that is, women who voluntarily came to work. Considering both the low rate of preventive ac-

tions practice in women of this group and the strong inverse relationship of preventive actions with justifying the perceived risk of COVID-19, in line with the social cognitive model of pandemic influenza H1N1 (12), indicate that the perceived risk of a disease affects the practice of protective actions.

It was also shown that consistent with the induced-compliance paradigm, more COVID-19 preventive actions were implemented by those forced to participate in the workplace, compared to those who were not present at work during the COVID-19 outbreak. This, together with a negative correlation between perceived risk justification and the use of preventive actions, suggests that an individual's attitude toward a particular health threat significantly determines his/her preventive behaviors, consistent with the proposed models for predicting health behaviors related to pandemic influenza H1N1 (12) and SARS virus (13), as well as the theory of planned behavior (10) and protection motivation theory (11). In other words, besides being exposed to potentially more social interactions by attending the workplace, the induced compliance also leads to less practice of health-related behavior in other areas of life via justifying the COVID-19 risk.

Gender differences in health measures' adoption were also shown along with the perceived risk justification, as women showed more preventive care behaviors than men. Research by Lau et al. (33) on preventive behaviors related to the SARS virus has shown that women use masks more than men and constantly wash their hands. The results

Table 3. Outcomes' Mean, Standard Deviations, and Mean Difference Analysis Results

Variables	Did Not Go to Work			Went to Work Without Teleworking Option			Went to Work Despite Having the Teleworking Option			Total			R
	No.	Mean \pm SD	t	No.	Mean \pm SD	t	No.	Mean \pm SD	t	No.	Mean \pm SD	F	
Justification													
Men	36	25.25 \pm 5.79	0.05	98	28.42 \pm 6.60	4.06***	26	26.96 \pm 5.52	-0.61	160	27.47 \pm 6.39	3.49*	3.13**
Women	98	25.8 \pm 6.49		43	23.81 \pm 5.21		19	28.31 \pm 9.49		160	25.19 \pm 6.68	3.06*	
Total	134	25.20 \pm 6.29		141	27.02 \pm 6.54		45	27.53 \pm 7.38		320	26.33 \pm 6.61		
Action													
Men	36	63.36 \pm 5.01	-1.89	98	61.5 \pm 5.77	-3.91***	26	61.42 \pm 4.18	0.31	160	61.69 \pm 5.42	2.25	-4.89***
Women	98	65.41 \pm 5.74		43	65.23 \pm 5.52		19	60.89 \pm 7.33		160	64.83 \pm 6.03	4.82*	
Total	134	64.86 \pm 5.61		141	62.39 \pm 5.98		45	61.20 \pm 5.66		320	63.26 \pm 5.94		
-0.603***													

are consistent with Ozcariz et al. (19) and Siegrist et al. (23). As the WHO preliminary analyses of COVID-19 data and previous epidemics such as SARS have shown, men and women have different susceptibilities and vulnerabilities to the virus. These figures represent 58% of COVID-19-related deaths by men (34). It seems that part of this difference is due to men and women's different behavioral and cognitive approaches toward preventive actions.

5.1. Conclusions

In general, the results indicated that the consequences of not applying lockdown regulations and putting some people in a forced position to attend work, while creating a permissive attitude towards this pandemic, disrupt preventive actions even in other situations of life over which the person has control. This change in attitude resulted from the efforts to recover from cognitive dissonance, which puts men at greater risk than women. Due to their sociability, women seem to find sufficient external justification in forced situations that threaten their health or their family; thus, they do not experience cognitive dissonance. Nevertheless, this is not the case with men, making them more vulnerable to the risks of the lockdown rules not being imposed.

Given the high contagiousness and rapid spread of COVID-19, the necessity of developing a realistic attitude toward the virus danger, and the importance of practicing individual preventive behaviors, social distancing and lockdown policies are required to be modified and applied, considering their effects on forming people's attitudes and secondary impacts on implementing preventive actions.

Since the scale was distributed on online social networks, data from people who did not have access to these networks were not included in the analysis. Because this study is casual-comparative and it was impossible to assign people to groups randomly, generalization should be made with caution. It is also recommended to replicate this study in other cultures to investigate the effect of cultural factors on the formation of cognitive dissonance and justification in induced-compliance situations related to health. Furthermore, as education levels differed significantly in the justification variable, further investigation of this variable as a moderator is recommended in future studies. It is also suggested to study the mediating role of psychological processes in the relationship between social factors and health behaviors.

Table 4. Analysis of Variance Results for Justification and Action Differences Among Work Status and Gender Subgroups

Source	df	Justification				Action			
		F-Value	Pr>F	Partial Eta Squared	Observed Power	F-Value	Pr>F	Partial Eta Squared	Observed Power
Corrected model	5	4.637	0.000	0.069	0.974	7.867	0.000	0.111	1.000
Work	2	2.224	0.110	0.014	0.452	5.139	0.006	0.032	0.823
Gender	1	1.644	0.201	0.005	0.248	6.074	0.014	0.019	0.690
Work * gender	2	5.131	0.006	0.032	0.822	2.830	0.061	0.018	0.553

Footnotes

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Ethical Approval: The study been involved collection or analysis of data.

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References

- World Health Organization. *Novel Coronavirus (2019-nCoV): Situation Report*. World Health Organization; 2020.
- World Health Organization. *WHO Director-General's opening remarks at the media briefing on COVID-19, 9 March 2020*. World Health Organization; 2020. Available from: <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---9-march-2020>.
- World Health Organization. *Virtual press conference on COVID-19, 11 March 2020*. World Health Organization; 2020, [cited 15 Sep 2020]. Available from: <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>.
- World Health organization. *WHO statement on cases of COVID-19 surpassing 100000*. World Health organization; 2020, [cited 9/15/2020]. Available from: <https://www.who.int/news-room/detail/07-03-2020-who-statement-on-cases-of-covid-19-surpassing-100-000>.
- World Health Organization. *Transmission of SARS-CoV-2: implications for infection prevention precautions: scientific brief, 09 July 2020*. World Health Organization; 2020, [cited 15 Sep 2020]. Available from: <https://apps.who.int/iris/handle/10665/333114>.
- World Health Organization. *Advice for the public: Coronavirus disease (COVID-19)*. World Health Organization; 2020, [cited 15 Sep 2020]. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>.
- BBC. *Coronavirus: China says disease 'curbed' in Wuhan and Hubei*. BBC; 2020, [cited 15 Sep 2020]. Available from: <https://www.bbc.com/news/world-asia-china-51813876>.
- BBC. *Coronavirus: Northern Italy quarantines 16 million people*. BBC; 2020, [cited 15 Sep 2020]. Available from: <https://www.bbc.com/news/world-middle-east-51787238>.
- Janz NK, Becker MH. The Health Belief Model: a decade later. *Health Educ Q*. 1984;**11**(1):1-47. doi: [10.1177/109019818401100101](https://doi.org/10.1177/109019818401100101). [PubMed: 6392204].
- Ajzen I. The theory of planned behavior. *Organ Behav Hum Decis Process*. 1991;**50**(2):179-211. doi: [10.1016/0749-5978\(91\)90020-t](https://doi.org/10.1016/0749-5978(91)90020-t).
- Rogers RW. A Protection Motivation Theory of Fear Appeals and Attitude Change. *J Psychol*. 1975;**91**(1):93-114. doi: [10.1080/00223980.1975.9915803](https://doi.org/10.1080/00223980.1975.9915803). [PubMed: 28136248].
- Prati G, Pietrantonio L, Zani B. A social-cognitive model of pandemic influenza H1N1 risk perception and recommended behaviors in Italy. *Risk Anal*. 2011;**31**(4):645-56. doi: [10.1111/j.1539-6924.2010.01529.x](https://doi.org/10.1111/j.1539-6924.2010.01529.x). [PubMed: 21077927].
- Tang CS, Wong CY. An outbreak of the severe acute respiratory syndrome: predictors of health behaviors and effect of community prevention measures in Hong Kong, China. *Am J Public Health*. 2003;**93**(11):1887-8. doi: [10.2105/ajph.93.11.1887](https://doi.org/10.2105/ajph.93.11.1887). [PubMed: 14600058]. [PubMed Central: PMC1448068].
- Festinger L. *A theory of cognitive dissonance*. 2. Stanford, USA: Stanford University Press; 1957.
- Eagly AH, Chaiken S. *The psychology of attitudes*. Fort Worth, USA: Harcourt brace Jovanovich college publishers; 1993.
- Harmon-Jones E. *Reexamining a Pivotal Theory in Psychology*. Washington DC, USA: American Psychological Association; 2019.
- Schneider FW, Gruman JA, Coutts LM. *Social psychological theory. Applied social psychology*. 2nd ed. California, USA: Sage Publications; 2012.
- Deeks A, Lombard C, Michelmore J, Teede H. The effects of gender and age on health related behaviors. *BMC Public Health*. 2009;**9**:213. doi: [10.1186/1471-2458-9-213](https://doi.org/10.1186/1471-2458-9-213). [PubMed: 19563685]. [PubMed Central: PMC2713232].
- Ozcariz SG, Bernardo Cde O, Cembranel F, Peres MA, Gonzalez-Chica DA. Dietary practices among individuals with diabetes and hypertension are similar to those of healthy people: a population-based study. *BMC Public Health*. 2015;**15**:479. doi: [10.1186/s12889-015-1801-7](https://doi.org/10.1186/s12889-015-1801-7). [PubMed: 25957998]. [PubMed Central: PMC4458004].
- Rolls BJ, Fedoroff IC, Guthrie JF. Gender differences in eating behavior and body weight regulation. *Health Psychol*. 1991;**10**(2):133-42. doi: [10.1037/0278-6133.10.2.133](https://doi.org/10.1037/0278-6133.10.2.133). [PubMed: 2055211].
- Yahia N, Wang D, Rapley M, Dey R. Assessment of weight status, dietary habits and beliefs, physical activity, and nutritional knowledge among university students. *Perspect Public Health*. 2016;**136**(4):231-44. doi: [10.1177/1757913915609945](https://doi.org/10.1177/1757913915609945). [PubMed: 26475773].
- Siahpush M, Singh GK. Sociodemographic variations in breast cancer screening behavior among Australian women: results from the 1995 National Health Survey. *Prev Med*. 2002;**35**(2):174-80. doi: [10.1006/pmed.2002.1063](https://doi.org/10.1006/pmed.2002.1063). [PubMed: 12200103].
- Siegrist M, Keller C, Kiers HA. A new look at the psychometric paradigm of perception of hazards. *Risk Anal*. 2005;**25**(1):211-22. doi: [10.1111/j.0272-4332.2005.00580.x](https://doi.org/10.1111/j.0272-4332.2005.00580.x). [PubMed: 15787770].
- Davidson DJ, Freudenburg WR. Gender and environmental risk concerns: a review and analysis of available research. *Environ Behav*. 2016;**28**(3):302-39. doi: [10.1177/0013916596283003](https://doi.org/10.1177/0013916596283003).
- Vari R, Scaccocchio B, D'Amore A, Giovannini C, Gessani S, Masella R. Gender-related differences in lifestyle may affect health status. *Ann Ist Super Sanita*. 2016;**52**(2):158-66. doi: [10.4415/ANN_16_02_06](https://doi.org/10.4415/ANN_16_02_06).
- Lund NLT, Snoer AH, Jensen RH. The influence of lifestyle and gender on cluster headache. *Curr Opin Neurol*. 2019;**32**(3):443-8. doi: [10.1097/WCO.0000000000000680](https://doi.org/10.1097/WCO.0000000000000680). [PubMed: 30844861].

27. World Health Organization. *World Health Organization coronavirus disease (COVID-19) dashboard*. World Health Organization; 2020. Available from: <https://covid19.who.int/region/emro/country/ir>.
28. Carmines E, McIver J. *Unidimensional Scaling*. Beverly Hills, USA: Sage Publications; 1981. doi: [10.4135/9781412986441](https://doi.org/10.4135/9781412986441).
29. Arbuckle JL, Marcoulides GA, Schumacker RE. Full information estimation in the presence of incomplete data. In: Marcoulides GA, Schumacker RE, editors. *Advanced structural equation modeling: Issues and techniques*. 243. New York, USA: Lawrence Erlbaum Associates Inc; 1996. p. 243-77.
30. Gerbing DW, Anderson JC. An Updated Paradigm for Scale Development Incorporating Unidimensionality and Its Assessment. *J Mark Res*. 1988;25(2):186-92. doi: [10.1177/002224378802500207](https://doi.org/10.1177/002224378802500207).
31. Bohnert G, Wänke M. *Attitudes and attitude change*. New York, USA: Psychology Press; 2002.
32. Stice E, Shaw H, Becker CB, Rohde P. Dissonance-based Interventions for the prevention of eating disorders: using persuasion principles to promote health. *Prev Sci*. 2008;9(2):114-28. doi: [10.1007/s11121-008-0093-x](https://doi.org/10.1007/s11121-008-0093-x). [PubMed: [18506621](https://pubmed.ncbi.nlm.nih.gov/18506621/)]. [PubMed Central: [PMC2577371](https://pubmed.ncbi.nlm.nih.gov/PMC2577371/)].
33. Lau JT, Yang X, Tsui HY, Pang E. SARS related preventive and risk behaviours practised by Hong Kong-mainland China cross border travellers during the outbreak of the SARS epidemic in Hong Kong. *J Epidemiol Community Health*. 2004;58(12):988-96. doi: [10.1136/jech.2003.017483](https://doi.org/10.1136/jech.2003.017483). [PubMed: [15547057](https://pubmed.ncbi.nlm.nih.gov/15547057/)]. [PubMed Central: [PMC1732647](https://pubmed.ncbi.nlm.nih.gov/PMC1732647/)].
34. World Health Organization. *Gender and COVID19*. World Health Organization; 2020, [cited 15 Sep 2020]. Available from: <https://apps.who.int/iris/rest/bitstreams/1277843/retrieve>.