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## **Comparison between gender and vaccination status on psychological states during peak period of total serious and critical cases of COVID-19 pandemic in developing countries**

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**Abstract**---At large, all of the studies that have examined the psychological disorders during the COVID-19 PANDEMIC have reported that the affected individuals. Different psychological distresses like, anxiety, trauma, depression, anger, panic, and some other mental illness are some of the common mental illnesses widely seen in Pandemic situations. Some studies have shown that compared to their female's counterparts, risk perception for COVID-19 PANDEMIC are higher in males. While others showed that females reported higher levels of risk as a concern than do males. the primary aim of this study was to assess and compare the psychological states - felt Stressed and perceived risk between gender and vaccination status during the peak period of total serious and critical cases of COVID-19 PANDEMIC as reported by Worldometer in developing countries. Current study was an online-based survey questionnaire with "Google form" served to the targeted samples for data collection. A total of 709 respondents' data was collected throughout this period.

The COVID-19 Pandemic Mental Health Questionnaire (CoPaQ) was employed in this study. Current study revealed that males significantly felt stressed higher than females, it may feasibly have related to gender socialization that is evidence that males tend to care less about their health than females. Results of this study found that no significant difference between vaccinated and unvaccinated respondents on stress levels even though when the data collection, it was a period whereby the highest number of serious and critical cases of COVID-19 PANEMIC reported by Worldometer. Regarding the psychological states on perceived risk, the results revealed that no significant between males and females' respondents. The findings revealed significant difference between vaccinated and unvaccinated respondent on psychological state related to perceived risk. The results of this study with a small samples size does not represent the population, then it is not truly representative; and therefore generalizability cannot be achieved.

**Keywords---**gender, vaccination status, psychological states, Peak COVID-19 pandemic, developing countries.

## **Introduction**

Since out broken from Wuhan, China, in late 2019, the novel coronavirus is out spread rapidly. The world is witnessing a brand new epidemiological as well as a psychological ruination, with the spread of the COVID-19 PANDEMIC (Julio Torales, O'Higgins, Castaldelli-Maia, & Ventriglio, 2020). Researchers are racing to develop and test vaccines against COVID-19 PANDEMIC (Karlsson et al., 2021). Like the antecedent of the COVID-19 PANDEMIC, human mental health going through an unbelievable censorious condition (Julio Torales et al., 2020). At large, all of the studies that have examined the psychological disorders during the COVID-19 PANDEMIC have reported that the affected individuals. Different psychological distresses like, anxiety, trauma, depression, anger, panic, and some other mental illness are some of the common mental illnesses widely seen in Pandemic situations (Samantha K. Brooks et al., 2020). Clinical results found that the spread of infectious diseases can create anxiety disorder on human psychology (Salari et al., 2020) and COVID-19 PANDEMIC, also creating stress and anxiety disorder in the mind-set of humans all around the world (Chakraborty, 2020).

Gender seems to be related to well-being (Mroczek & Kolarz, 1998) and stress levels (Taylor, Agho, Stevens, & Raphael, 2008). Previous studies have found that females report greater sadness, anxiety, and stress than males (Kowal et al., 2020). Also, gender is an important driver of risk with higher severity and mortality rates in response to patients with the coronavirus. Data show that severity of, and death toll from, COVID-19 PANDEMIC is higher for females than males (Falahi & Kenarkoohi, 2021). Some studies have shown that compared to their females counterparts, risk perception for COVID-19 PANDEMIC are higher in males (Caramelo, Ferreira, & Oliveiros, 2020) while others showed that females

reported higher levels of risk as a concern than do males (Dryhurst et al., 2020a). These results suggest gender differences in risk perception.

Another study in 25 countries on susceptibility to stress during the COVID-19 PANDEMIC situation indicated that females report greater levels of stress (Gamonal-Limcaoco, Montero Mateos, Fernandez, & Roncero, 2020) . Similar gender differences for stress, anxiety, and depression symptoms were reported in a Chinese sample during the initial stage of the COVID-19 PANDEMIC outbreak, although only a minority of the participants reported being confined (Wang & Zhao, 2020). From a cross-national survey with participants from 10 countries found “being male was uniformly associated with lower risk perception” in the majority of countries sampled (Dryhurst et al., 2020a). Females generally evaluate their COVID-specific risk more highly than males, exhibit higher levels of anxiety about the Pandemic (Petzold et al., 2020), and report higher psychological distress (Qiu et al., 2020) than their male counterparts.

A consistent finding in the literature is the existence of a gender gap in perceptions of, and attitudes toward, risk. Faced with the same circumstance, males will, on average, both perceive their risk to be lower, and be more risk-seeking, than females. In sum, while the evidence suggests that females in normal circumstances experience more stress. Researchers in the field of vaccination have offered frameworks to organize and make sense of this research and identify new directions for intervention (Attwell et al., 2021; Dubé et al., 2015), but looking at influences on vaccination behavior from a psychological perspective can offer useful insights.

Vaccination is not only beneficial for participants and directly applicable to clinical settings but also a helpful paradigm to assess the immune system’s ability to respond to pathogens, given that everyone receives the same standardized dose but responses can vary widely (Whittaker was Phillips, 2008). The above research also demonstrates that both state and trait psychological factors may help determine the prevalence and severity of vaccine-related side effects. For example, experiencing an acute stressful event immediately after vaccination may worsen side effects (Brydon, Walker, Wawrzyniak, Chart, & Steptoe, 2009).

A 2007 meta-analysis of 34 studies on vaccination behavior found that individuals’ perception of risk likelihood, susceptibility, and severity were all significant predictors of whether or not an individual became vaccinated. The study concluded that “risk perceptions are rightly placed as core concepts in theories of health behavior”(Brewer et al., 2007). The pandemic has forced many governments to bring in strict laws to stop it from spreading (Adhikari et al., 2020). It has recently been observed that fear of COVID-19 PANDEMIC is associated more with anxiety and stress and to a lesser extent with depression (Tzur Bitan et al., 2020).

Nevertheless, despite the fact that there seems to be a lesser association between fear and depression, cases of suicide have been reported in the population due to fear of COVID-19 PANDEMIC (Mamun & Griffiths, 2020). From the early stages of the Pandemic, Chinese researchers found moderate and severe symptoms of anxiety, stress, and depression in the Chinese population (Huang & Zhao, 2020).

Risk is a complex, psychologically-oriented, and socially-constructed phenomenon is affected by various factors such as probability, severity, controllability, dread, catastrophic potential, and unfamiliarity with a hazard (Renn & Rohrman, 2000a). Perceived risk refers to individuals' psychological evaluations of the probability and consequences of an adverse outcome (Renn & Rohrman, 2000b). Risk perception is a critical determinant of the public's willingness to engage in health protective behaviors.

Within the context of pandemic, research showed that perceived risk is related with anxiety, worry, and having daily routines disrupted (Kwok et al., 2020), preventive behaviors against COVID-19 PANDEMIC (Yıldırım & Arslan, 2021), and health conditions, distress, and life satisfaction (Zhang & Ma, 2020), coping strategies (Gerhold, 2020) and socioeconomic status (Cao et al., 2020). The perception of risk can trigger people to engage in precautionary behaviors including staying home, avoiding public gatherings, maintaining physical and social distancing, and personal hygiene (Yıldırım & Güler, 2022).

The rapid escalation of the COVID-19 PANDEMIC caused not only the risk of death after virus infection, but also created unbearable psychological consequences (Cao et al., 2020). During Pandemics, greater exposure to negative news content related to the COVID-19 PANDEMIC on social media increases the likelihood of rumination over information (Yıldırım & Güler, 2022).. Evidence from China in the context of the COVID-19 PANDEMIC outbreak has showed increased levels of anxiety, depression, and susceptibility to social risk and that decreased levels of life satisfaction and positive emotions (Wang & Zhao, 2020).

The literature has reported that in times of the COVID-19 PANDEMIC crisis people behaved differently than their normal behaviors. Thus, risk perception pertaining to the COVID-19 PANDEMIC varies significantly across populations and places, indicating that risk perception is potentially a significant determinant of the Pandemic evolution, as it can influence the number of new positive cases (Cori, Bianchi, Cadum, & Anthonj, 2020). Additionally, previous studies reported that the risk perception of COVID-19 PANDEMIC was relatively high (Dryhurst et al., 2020b) indicating the public is well informed and aware of the results of infection. In a study on public risk perception of COVID-19 PANDEMIC was predicted by a wide range of factors such as personal experience with the virus, individualistic and prosocial values, personal and collectivistic efficacy, and social elaboration through family and friends (Dryhurst et al., 2020a).

### **Purpose of current study**

After reviewing the emerging literature on the critical situation of global Pandemic caused by COVID-19 PANDEMIC, it is clear that more research is needed related to psychological states in developing countries. At such, the primary aim of this study was to assess and compare the psychological states - Felt Stressed and Perceived Risk between gender and vaccination status during the peak period of total serious and critical cases of COVID-19 PANDEMIC as reported by Worldometer in developing countries. The hypotheses we studied were that: (1) females will show higher levels of stress and higher levels of perceived risk during

this period compared to males; (2) vaccinated individuals have lower levels of stress and perceived risk compared to the unvaccinated during this period.

## Methods

### Respondents

The present study was an online-based survey questionnaire with “Google form” served to the targeted samples for data collection. Different social media platforms (i.e., Facebook Messenger, WhatsApp, Viber) were being used for the data collection. Two reminders were given at one-week intervals, to those who did not revert within a week, failing which no further reminders were given. The data was collected from May 2021 to September 2021-time period during the peak of total serious and critical cases of COVID-19 PANDEMIC as reported by Worldometer (Figure 1). A total of 709 respondents' data was collected throughout this period. All participants provided informed consent where the anonymity and confidentiality of the data were upheld strictly.

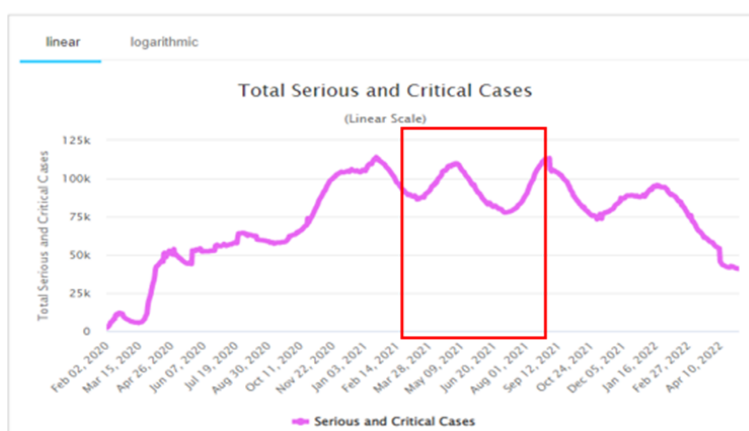


Figure 1: Total Serious and Critical Cases of COVID-19 PANDEMIC by Worldometer

### Procedures

Participant-inclusion criteria were to be at least 18 years old, participation was voluntary. Ethical approval was obtained from the Ethics Committees of the participating countries. *The COVID-19 Pandemic Mental Health Questionnaire (CoPaQ)* is a novel self-administered questionnaire specific to COVID-19. We used a questionnaire based on the English long version of CoPaQ questionnaire. It took about 10 minutes to complete it. Considering the ongoing Pandemic at the time of study, a fast-track ethical clearance was obtained from the scientific review committee.

### Measures

The COVID-19 Pandemic Mental Health Questionnaire (Rek et al., 2021) is a multi-faceted self-report questionnaire that measures the personal and social

consequences of the COVID-19 Pandemic. The CoPaQ is a newly developed and highly comprehensive self-report measure assessing the psychosocial impact of the COVID-19 Pandemic. The questionnaire was designed in English with the input of the investigators of the different countries, translated into the national languages of the participating countries, and pilot tested in these countries.

## Results

Current study collected a total of 709 respondents from the developing countries in Asia. The respondents comprised of 276 (38.9%) males and 433 (61.1%) females. Table 1 displayed the country of respondents.

Table 1: Country of Respondents

Country	Frequency	Percent (Rajkumar)
Malaysia	180	25.4
India	57	8.0
Indonesia	47	6.6
Philippines	160	22.6
Sri Lanka	45	6.3
China	4	0.6
Thailand	27	3.8
Vietnam	189	26.7
Total	709	100

The data collected on Psychological States based on gender from the respondents as presented in table 2. We only extracted two major psychological states (Felt Stressed and Perceived Risk) from the overall data collected. Majority of the respondents have been vaccinated with a total of 442 (62.3%) and only 267 (37.7%) participants have not been vaccinated during that period (Table 3).

Table 2: Psychological States and Gender

Psychological States	Gender	N	Mean	Std. Deviation
Felt Stressed	Male	276	35.50	10.52
	Female	433	33.47	9.92
Perceived Risk	Male	276	10.77	4.52
	Female	433	10.98	4.80

To compare the psychological states on felt stressed between gender, an independent-samples t-test indicated that scores were significantly higher for males ( $M = 35.50.0$ ,  $SD = 10.52$ ) than for females ( $M = 33.47$ ,  $SD = 9.92$ ),  $t(707) =$

2.59,  $p < .05$ ,  $d = 0.20$ . Regarding the psychological states on perceived risk, results from the independent-samples t-test revealed that no significant difference between males ( $M=10.77$ ,  $SD=4.52$ ) and females ( $M=10.98$ ,  $SD=4.80$ ),  $t(707)=-.57$ ,  $p>.05$ ,  $d= 0.05$ .

Table 3: Psychological States and Vaccination Status

Psychological States	Vaccination Status	N	Mean	Std. Deviation
Felt Stressed	Yes	267	33.87	11.17
	No	442	34.50	9.57
Perceived Risk	Yes	267	10.10	4.89
	No	442	11.38	4.50

To find out if there is any significant difference between vaccinated and unvaccinated respondents on psychological states regarding felt stressed. Results revealed no significant difference between vaccinated ( $M=33.87$ ,  $SD=11.17$ ) and unvaccinated respondent ( $M=34.50$ ,  $SD=9.57$ ) on felt stressed,  $t(707)=-.80$ ,  $p>.05$ ,  $d= 0.06$ . To compare the psychological states on perceived risk between vaccinated and unvaccinated respondents, results revealed that significant difference between vaccinated respondents ( $M=10.10$ ,  $SD=4.89$ ) and unvaccinated respondents ( $M=11.38$ ,  $SD=4.50$ ),  $t(707)=-3.53$ ,  $p<.001$ ,  $d= 0.28$ .

## Discussion

The results of the present study, based on analyses of data from 709 respondents from 8 developing countries in Asia provide evidence, that males significantly felt stressed higher than females  $t(707)=2.59$ ,  $p<.05$ ,  $d=.20$ . These results contradict with the existing literature on the relationship between gender and stress levels (Bergdahl & Bergdahl, 2002; Day & Livingstone, 2003). On the other hand, these results similar to a few recent studies on the COVID- 19 outbreak, which found gender to be unrelated to stress levels (Zhong et al., 2020). However, conclusions from these studies ought to be drawn with caution, as they only included a small number of participants (Gamonal-Limcaoco et al., 2020), as this study only collected 709 respondents from 8 developing countries in Asia.

The results of this study revealed males felt stressed significantly higher than females are because stressed individuals often have poor health behaviours, such as smoking, eating a low-quality diet, having poor sleep habits, being sedentary, and overusing alcohol. At more extreme levels, health behaviours may have direct associations with vaccine responses or may synergistically interact with stress to predict vaccine response (Segerstrom & O'Connor, 2012). Feasibly related to gender socialization, there is evidence that males tend to care less about their health than females in relation to smoking, preventative health, and dietary habits (Courtenay, 2000), which has a large influence on their well-being and affects males' death rates (Courtenay, 2000).

Consideration and communicating the change of psychological stress levels after taking the COVID-19 PANDEMIC vaccine among the general public may benefit the government to provide comprehensive and accurate information to those who are hesitant or resistant to getting vaccinated, and build up their confidence in the ongoing vaccination campaign. The results of this study found that no significant difference between vaccinated respondents ( $M=33.87$ ,  $SD=11.17$ ) and unvaccinated respondents ( $M=34.50$ ,  $SD=9.57$ ),  $t(707)=-.80$ ,  $p>.05$ ,  $d=.06$ . Even though during the data collection was the period whereby the higher number of serious and critical cases of COVID-19 PANDEMIC infected reported by Worldometer. The findings of current study were inconsistent with previous studies whereby reported that females generally evaluate their COVID-specific risk more highly than males, exhibit higher levels of anxiety about the Pandemic (Petzold et al., 2020), and report higher psychological distress (Qiu et al., 2020) than their male counterparts.

The results obtained was consistent with previous findings that after getting the COVID-19 PANDEMIC vaccine, 58.6% of participants had psychological stress and the reasons for psychological stress about the COVID-19 PANDEMIC vaccination were ranked as follows: 43.6% of participants were concerned about the adverse effects in themselves or their families after vaccination; 25.6% of participants worried about the efficacy of vaccine; and 17.7% of participants concerned the safety and quality of vaccine (Wu et al., 2021). But, the positive outcome of that study reported that vaccinated participants had significantly decreased psychological stress levels about COVID-19 PANDEMIC vaccination after getting vaccinated than before vaccination (Liu, Qin, Liu, & Liu, 2021).

Current findings revealed that the psychological state on perceived risk between gender were no significant difference with male ( $M=10.77$ ,  $SD=4.52$ ), female ( $M=10$ ,  $SD=4.80$ ),  $t(707)=-.57$ ,  $p>.05$ ,  $d=.05$ . The results were inconsistent to the common wisdom across disciplines is that female tend to be more risk averse than male. Female tend to have a broader notion of risk and to adopt less risky behaviours than male. No matter to which discipline of life they refer, most studies conclude that male are more risk taking than female (Harris, Michael, & Dale, 2006) either because risk attitudes are attributes of masculine or feminine psychology (Wilson & Daly, 1985), or because they are culturally and stereotypically learnt (Morgenroth, Fine, Ryan, & Genat, 2017). A meta-analysis of individuals' risk perception of COVID-19 Pandemic also shows that most studies find a gender difference in risk perception, as females tend to perceive higher risks than males (Lewis & Duch, 2021).

Additionally, males are also less likely to take care of themselves and seek for help in case of illness than females (Juvrud & Rennels, 2017), whereas females are incentivized to seek for help (Nathanson, 1977). Generally, males are more likely to take risks that affect health than females (Courtenay, 2000). Also, existing evidence in relation to COVID-19 PANDEMIC complies with the stereotype that females are more risk averse than males. Females are generally more informed about COVID-19 PANDEMIC than males (Sylvester et al., 2022), and more supportive of, and compliant with, the restrictive measures (Bronfman, Repetto, Cisternas, & Castañeda, 2021).



But current results were in line with previous study found that there are only slight gender differences in health risk perceptions associated with COVID-19 PANDEMIC, and yet females are significantly more supportive of strict restrictive measures than males (Stockemer, Plank, & Niemann, 2021). At such, the gender gap in compliance is not dependent on different assessment of risk by females and males whereby, most literature on risk-taking in the health domain tends to endorse the second view, namely, that females are more likely to care for themselves and adopt healthy habits than males.

The outcome of this study revealed that vaccinated respondents ( $M=10.10$ ,  $SD=4.89$ ) were significantly lower than unvaccinated respondents ( $M=11.38$ ,  $SD=4.50$ ),  $t(707)=-3.53$ ,  $p<.001$ ,  $d=0.28$  on psychological state regarding perceived risk. Several epidemic-related factors were associated with perceived risk about COVID-19 PANDEMIC vaccination status, including quarantine experience, participants with a history of chronic diseases, low education level and self-evaluated high risk of COVID-19 PANDEMIC infection. In addition, individuals with neutral or negative attitudes toward the epidemic in China had increased psychological stress levels, compared to those with positive attitudes toward the epidemic in China (Huang & Zhao, 2020).

Although it is obvious that vaccines provide significant protection against COVID-19 PANDEMIC Infection. It may be promoting the efficacy of the COVID-19 PANDEMIC vaccine built up the confidence and reduced the psychological stress of vaccination (Chou & Budenz, 2020). Therefore, combating misinformation and disseminating accurate information about the COVID-19 PANDEMIC vaccine will reduce psychological stress levels about COVID-19 PANDEMIC vaccination in the general population and promote vaccination programs. Those who perceived the disease as mild, often also perceived the vaccine as unsafe. Since vaccines do not completely eliminate COVID-19 PANDEMIC risk, vaccinated individuals must still make subjective trade-offs between the risks and benefits for different behaviours.

## **Conclusion**

Current study revealed that males significantly felt stressed higher than females, it may feasibly have related to gender socialization that is evidence that males tend to care less about their health than females. Results of this study found that no significant difference between vaccinated and unvaccinated respondents on stress levels even though when the data collection, it was a period whereby the highest number of serious and critical cases of COVID-19 PANEMIC reported by Worldometer. This is maybe due to individual's risk perception and determine the prevalence and severity of COVID-19 PANDEMIC. Regarding the psychological states on perceived risk, current results revealed that no significant between males and females' respondents, the results supported that the gender gap in compliance is not dependent on different assessment of risk by females and males whereby, most literature on risk-taking in the health domain tends to endorse the second view, namely, that females are more likely to care for themselves and adopt healthy habits than males. Current study revealed that significant difference between vaccinated and unvaccinated respondent on psychological state on perceived risk. The psychological states on perceived risk for vaccinated and unvaccinated respondents are influence by epidemic-related factors which

associated with perceived risk about COVID-19 PANDEMIC vaccination status, including quarantine experience, participants with a history of chronic diseases, low education level and self-evaluated high risk of COVID-19 PANDEMIC infection. In addition, individuals with neutral or negative attitudes toward the epidemic had increased psychological stress levels, compared to those with positive attitudes toward the epidemic.

### Conflict of interest

The authors declare no conflict of interest.

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