

## THREAT OF COVID-19 AND PERCEIVED STRESS: THE MEDIATING ROLE OF CHALLENGE, UNCONTROLLABILITY AND STRESSFULNESS

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### ABSTRACT

**Objective:** To find out the mediating role of challenge, uncontrollability, and stressfulness in predicting perceived stress from threat during COVID-19 pandemic in the general public.

**Study Design:** Cross-sectional survey.

**Place and Duration of Study:** Bahawalpur City, from Mar to May 2020.

**Methodology:** A total of 360 participants (men=154, women=206) were recruited from different cities of Punjab province. The stress appraisal measure, perceived stress scale, and coping scale were administered through Google forms using social media platforms. The participation in the online survey implied signing the written informed consent available in the survey.

**Results:** The primary and secondary appraisals of challenge (IE=0.84, SE=0.27, 95% LL=0.31, 95% UL=1.40), uncontrollability (IE=1.03, SE=0.36, 95% LL=0.34, 95% UL=1.76), and stressfulness (IE=-0.28, SE=0.12, 95% LL=-0.56, 95% UL=-0.08) fully mediated the relationship between threat of COVID-19 and perceived stress. Additionally, there was statistically significant positive relationship between threat of COVID-19 and use of coping strategies ( $r=0.14$ ,  $p<0.01$ ). The statistics of women regarding appraisals of threat, uncontrollability, stressfulness and perceived stress ( $2.94 \pm 0.88$ ); ( $2.49 \pm 0.84$ ); ( $2.87 \pm 0.73$ ); ( $19.92 \pm 6.08$ ), were found to be slightly higher on as compared to men ( $2.76 \pm 0.82$ ); ( $2.25 \pm 0.81$ ); ( $2.58 \pm 0.76$ ); ( $18.41 \pm 5.37$ ) respectively with  $p=0.01$ , Cohen's  $d=0.21$ );  $p=0.001$ , Cohen's  $d=0.29$ );  $p=0.001$ , Cohen's  $d=0.38$ ); ( $p=0.01$ , Cohen's  $d=0.26$ ).

**Conclusion:** The threat of COVID-19 significantly led to the experience of perceived stress through the mediating role of primary and secondary appraisals of challenge, uncontrollability, and stressfulness.

**Keywords:** Challenge, Coping, COVID-19, Gender differences, Perceived stress, Primary appraisal, Secondary appraisal, Stress appraisal.

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### INTRODUCTION

The World Health Organization (WHO) declared COVID-19 the sixth Public Health Emergency of International Concern (PHEIC) on 30<sup>th</sup> January 2020. The experience with previous outbreaks in the world informs that both developed and developing countries can become hotspots of an outbreak at anytime. The number of cases of COVID-19 has been on rise rapidly since the detection of first case in the Pakistan.<sup>2</sup> This has also caused a sense of alarm and threat in people throughout the country.<sup>3</sup> Besides, the changes in living patterns and social support systems brought by COVID-19 pandemic caused people to experience stressful psychological outcomes.

Pakistan's 24/7 active news channels are aggravating the stressfulness of COVID-19 pandemic<sup>3</sup>. Additionally, the worldwide lockdown and quarantine situation further strengthened the sense of threat among people. High levels of perceived threat from the new

disease COVID-19 can lead to perceived stress.<sup>4,5</sup>

The environmental stress leads to the use of stress appraisal. Stress appraisal refers to the evaluation of nature and available resources to cope with the stressful situation found in the environment. The stress appraisal is an initial mechanism in using coping strategies to combat environmental stress. The stress appraisal happens at two stages. In primary appraisal, the environmental situation is evaluated for threat and challenge whereas the secondary appraisal involves the analysis of available resources. A primary appraisal of threat or challenge may lead to the experience of stress and use of coping strategies if followed by negative secondary appraisal.<sup>6,7</sup> The pandemics in social settings cause community members feel a challenging situation.<sup>4</sup>

The appraisal of threat and challenge further leads people to use strategies to cope with the new disease. It was found that perceptions of threat, controllability and challenge of stressful situations led people to use more emotional and behavioral coping strategies such as people did during SARS outbreak<sup>8</sup>. Yang and Chu *et al*,<sup>9</sup> found that perceived risk and threat of

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virus led people to experience more stressfulness and negative emotions. People are more likely to use negative coping strategies in times of an outbreak.<sup>10</sup>

Although, many studies are being conducted on various aspects of COVID-19, the studies regarding the psychological aspects of COVID-19 are scarce.<sup>5</sup> In this study, the cognitive appraisal model,<sup>6,7</sup> was employed to study the role of stress appraisal in making the people perceive the stress associated with COVID-19. It was assumed that appraisal of threat is associated with making people perceive the stress of COVID-19 through the mediating effects of appraisals of challenge, uncontrollability, and stressfulness. Moreover, the study aimed to find out the relationship of threat and perceived stress with use of coping strategies. Further, the study also aimed to find out gender differences in perceived stress, primary and secondary appraisals, and coping strategies.

## METHODOLOGY

A cross sectional was conducted at Bahawalpur through Google Forms based online survey from March to May 2020. After approval from Research Ethics Committee (REC-B/G1-41/2020). The online survey contained the written informed consent. The participation in the survey implied the informed consent. The written informed consent contained a description about the confidentiality of the research.

A total of 360 adults participated in the online survey designed to assess the impact of COVID-19 related threat. This sample size was calculated using an online sample calculator<sup>11</sup>, based on number of adult population in Punjab province<sup>12</sup>, with 95% confidence interval and 5% margin of error. These adults were recruited consecutive sampling from the different cities of Punjab province.

**Inclusion Criteria:** The adults living in Punjab province having age  $\geq 18$  years were included in the online survey.

**Exclusion Criteria:** The adults more than 18 years of age and those living in other provinces were excluded from the study.

The online survey contained the demographic information checklist and three scales namely Stress Appraisal Measure, Perceived Stress Scale, and Coping Scale. The demographic data included age, gender, education, profession, and marital status of the participants. The stress appraisal measure is a 28 item, self-reported, 5 point likert type scale consisting of 7 sub scales designed to assess the cognitive appraisal of the

environmental stress. The subscales can be grouped into 3 categories, primary appraisal subscales, secondary appraisal subscales and a subscale to assess overall stressfulness of the situation<sup>13</sup>. The primary appraisal subscales are: Threat, challenge and centrality while the secondary appraisal subscales are: controllable by self, controllable by others and uncontrollability. Each subscale has 4 items in the scale. The internal consistency of subscales ranged from 0.73-0.86 Cronbach Alpha.

The perceived stress scale is a self-report measure in a 5 point likert type format. The scale assesses the feelings and thoughts of a person after the exposure to a stressful situation during the last month. The higher scores indicate higher perceived stress. The Cronbach Alpha internal consistency of the scale ranged from 0.84-0.86 in three different samples<sup>14</sup>.

The coping scale is a self-report 4 point likert type measure containing 13 items designed to assess the coping responses in a stressful situation. The higher scores indicate increased use of coping strategies. The internal consistency of the scale is 0.91 Cronbach Alpha.<sup>15</sup>

The data was analyzed Statistical Package of Social Sciences (SPSS) version 22 and Process Macro v 3.5. The frequencies of demographic variables were calculated for categorical data. The correlation analysis of all study variables and mediation analysis were performed. The t-test was computed to find gender differences in primary and secondary appraisal, perceived stress and coping strategies. The  $p$ -value  $\leq 0.05$  was considered significant.

## RESULTS

There were 360 participated in the study. Around 266 (74%) participants were in the age group of 18-25 years and around 46 (13%) were in the age group of 26-35 years. There were equal number of participants 24 (6.7%) each from the age groups of 36-45 and 46-55. Around 206 (57%) women participated in the study compared to around 154 (43%) men. The majority 216 (60%) of the participants had bachelors education followed by 62 (17%) participants with masters education and 48 (13%) participants with M.Phil/ PhD education. The majority 236 (66%) participants were students and there were only 31 (9%) participants who were Health Care Professionals (HCPs). The majority participants 268 (74%) were single compared to 88 (24%) married participants shown in Table-I.

**Table-I: Frequency distribution of demographic variables (n=360).**

Demographic Variables	Characteristics	n	%
Age	18-25	266	73.9
	26-35	46	12.8
	36-45	24	6.7
	46-55+	24	6.7
Gender	Men	154	42.8
	Women	206	57.2
Education	Inter or Less	34	9.4
	Bachelors	216	60.0
	Masters	62	17.2
	MPhil/PhD	48	13.3
Profession	Public Sector	32	8.9
	Private Sector	27	7.5
	Health Care Professional	31	8.6
	Student	236	65.6
	Other professions	34	9.4
Marital Status	Single	268	74.4
	Married	88	24.4
	Divorced	4	1.1

Table-II gives the correlations among perceived stress, primary and secondary appraisals, and coping skills. There is a statistically significant positive corre-

lation between threat and perceived stress ( $r=0.38, p < 0.01$ ), and between threat and coping skills ( $r=0.14, p < 0.01$ ). There is no significant relationship between perceived stress and coping skills ( $r=-0.03, p=0.50$ ). There is a statistically significant positive relationship of threat with challenge ( $r=0.18, p < 0.01$ ), uncontrollability ( $r=0.60, p < 0.01$ ), and stressfulness ( $r=0.71, p < 0.01$ ).

The results of mediation analysis of challenge, controllability, and stressfulness have been outlined in Table-III. The bootstrapping analyses with 10000 samples revealed a significant indirect effect of threat on perceived stress via challenge, uncontrollability, and stressfulness (LL=0.75, UL=2.47). Results based on 10000 bootstrapped samples indicated that the total effect of threat on perceived stress was also significant (DE=0.97, SE=0.49,  $p=0.04$ ). Challenge, uncontrollability, and stressfulness fully mediated the relationship between threat and perceived stress respectively (IE=-0.28, SE=0.12, LL=-0.56, UL=-0.08); (IE=0.84, SE=0.27, LL=0.31, UL=1.40); and (IE=1.03, SE=0.36, LL=0.34, UL=1.76). The participants who indicated high levels of threat were more likely to experience challenge, uncontrollability, and stressfulness; and through these medi-

**Table-II: Correlations among perceived stress, stress appraisals, and coping skills (n=360).**

Parameters	Pearson Correlation	Perceived Stress	Threat	Challenge	Centrality	CBS	CBO	Uncontrollable	Stressfulness	Coping
Perceived Stress	Pearson Correlation	1	0.38**	-0.07	0.31**	-0.18**	-0.10*	0.36**	0.33**	-0.03
	p-value	-	0.001	0.13	0.01	0.01	0.04	0.001	0.001	0.50
Threat	Pearson Correlation	0.38**	1	0.18**	0.68**	0.22**	0.18**	0.60**	0.71**	0.14**
	p-value	0.001	-	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Challenge	Pearson Correlation	-0.07	0.18**	1	0.45**	0.64**	0.58**	0.18**	0.38**	0.24**
	p-value	0.13	0.001	-	0.001	0.001	0.001	0.001	0.001	0.001
Centrality	Pearson Correlation	.31**	0.68**	0.45**	1	.34**	0.30**	0.46**	0.66**	0.22**
	p-value	0.001	0.001	0.001	-	0.001	0.001	.001	0.001	0.001
Controllable by self	Pearson Correlation	-0.18**	0.22**	0.64**	0.34**	1	0.67**	0.10	0.39**	0.31**
	p-value	0.001	0.001	0.001	0.001	-	0.001	0.05	0.001	0.001
Controllable by others	Pearson Correlation	-0.10*	0.18**	0.58**	0.30**	0.67**	1	0.13*	0.34**	0.25**
	p-value	0.04	0.001	0.001	0.001	0.001	-	0.01	0.001	0.001
Uncontrollable	Pearson Correlation	0.36**	0.60**	0.18**	0.46**	0.10	0.13*	1	0.51**	0.07
	p-value	0.001	0.001	0.001	0.001	0.05	0.01	-	0.001	0.18
Stressfulness	Pearson Correlation	0.33**	0.71**	0.38**	0.66**	0.39**	0.34**	0.51**	1	0.17**
	p-value	0.001	0.001	0.001	0.001	0.001	0.001	0.001	-	0.001
Coping	Pearson Correlation	-0.03	0.14**	0.24**	0.22**	0.31**	0.25**	0.07	0.17**	1
	p-value	0.50	0.001	0.001	0.001	0.001	0.001	0.001	0.18	-

CBS=Controllable by self; CBO=Controllable by others \* $p < 0.05$ ; \*\* $p < 0.01$

ators, more likely to experience perceived stress. Because zero was not in the 95% confidence interval of IE, the IE was significantly different from zero at  $p < 0.05$ .

Table-IV gives the results of t-test computed to find out gender differences in primary and secondary appraisals, perceived stress and coping strategies. There were statistically significant gender differences in threat, uncontrollability, stressfulness and perceived stress. The result of appraisals of threat, uncontrollability, stressfulness and perceived stress of women ( $2.94 \pm 0.88$ ); ( $2.49 \pm 0.84$ ); ( $2.87 \pm 0.73$ ); ( $19.92 \pm 6.08$ ) were found to be slightly higher and as compared to men ( $2.76 \pm 0.82$ ); ( $2.25 \pm 0.81$ ); ( $2.58 \pm 0.76$ ); ( $18.41 \pm 5.37$ ) respectively, although the effect sizes were small for all significant variables  $p=0.01$ , Cohen's  $d=0.21$ ;  $p=0.001$ , Cohen's  $d=0.29$ ;  $p=0.001$ , Cohen's  $d=0.38$ ; ( $p=0.01$ , Cohen's  $d=0.26$ ).

appraisals and stressfulness were more likely to perceive stress. The mediation analysis confirms this hypothesis. A recent survey research indicated that stress and anxiety increased in people in times of COVID-19 as reported by Limcaoco *et al.*,<sup>16</sup> involving 891 participants from 25 countries during March 2020. Similarly, Roy *et al.*, conducted an online survey using Google forms in India and got responses from 662 adult people. The survey reported that nearly half of the respondents felt panic and threatened by the media coverage of COVID-19 cases, the same study reported that around 72% participants reported being worried due to COVID-19 pandemic.<sup>4</sup>

Threat is a primary appraisal which we use to make sense of the environment.<sup>6,7</sup> If we appraise the situation as threatening, then the secondary appraisals are made. The secondary appraisal of uncontrollability tells us that the situation is out of control for us. It is

**Table-III: Results of mediation analyses (with Process, v3.5).**

Effect	Non Standardized Coefficients (Standardized coefficients)	SE	p-value	95% CI LL	95 % CI UL
A (predictor-mediator1)	0.17 (0.18)	0.04	0.001	0.07	0.27
A (predictor-mediator2)	0.58 (0.60)	0.04	0.001	0.50	0.66
A (predictor-mediator3)	0.62 (0.70)	0.03	0.001	0.55	0.68
B (mediator1-outcome)	-1.63 (0.46)	0.36	0.001	-2.36	-0.91
B (mediator2-outcome)	1.45 (0.46)	0.41	0.001	0.63	2.26
B (mediator3-outcome)	1.66 (0.46)	0.55	0.001	0.56	2.75
C (DE)	0.97	0.49	0.04	0.001	1.94
Ab (IE-Total)	1.59	0.43	-	0.75	2.47
Ab (IE-M1)	-0.28	0.12	-	-0.56	-0.08
Ab (IE-M2)	0.84	0.27	-	0.31	1.40
Ab (IE-M3)	1.03	0.36	-	0.34	1.76

$n=360$ . Model 4. Bootstrapping=10000 samples. 95% CI: Corrected 95% Confidence Intervals, SE=Standard Error; LL=Lower Limit, UL=Upper Limit; DE=Direct Effect; IE=Indirect Effect. Predictor: Threat, Mediator: Challenge (M1), Uncontrollability (M2), Stressfulness (M3); Outcome: Perceived Stress,  $p < 0.05$ .

**Table-IV: Gender Differences; results of t-test.**

Variables	Men (n=154)	Women (n=206)	p-value	95% CI	Cohen's d
	Mean $\pm$ SD	Mean $\pm$ SD			
Perceived Stress	18.41 $\pm$ 5.37	19.92 $\pm$ 6.08	0.01	-2.72 - 0.29	0.26
Threat	2.76 $\pm$ 0.82	2.94 $\pm$ 0.88	0.04	-0.36 - 0.00	0.21
Challenge	2.86 $\pm$ 0.84	2.85 $\pm$ 0.79	0.86	-0.15 - 0.18	0.01
Centrality	2.80 $\pm$ 0.92	2.94 $\pm$ 0.88	0.15	-0.32 - 0.05	0.15
CB Self	3.05 $\pm$ 0.87	3.05 $\pm$ 0.82	0.98	-0.18 - 0.17	0.01
CB Others	2.85 $\pm$ 0.82	2.91 $\pm$ 0.87	0.54	-0.23 - 0.12	0.07
Uncontrollable	2.25 $\pm$ 0.81	2.49 $\pm$ 0.84	0.001	-0.41 - 0.06	0.29
Stressfulness	2.58 $\pm$ 0.76	2.87 $\pm$ 0.73	0.001	-0.43 - 0.12	0.38
Coping Strategies	34.75 $\pm$ 6.91	35.46 $\pm$ 6.11	0.30	-2.06 - 0.64	0.10

CB Self: Controllable by self; CB Others: Controllable by others

## DISCUSSION

The current study aimed to find out the mediating role of primary and secondary appraisals in making people perceive stress in times of COVID-19. It was assumed that people who perceived more threat from COVID-19 and employed the primary and secondary

through these primary and secondary appraisals that we perceive stress about COVID-19. Making a primary and secondary appraisal is normal cognitive mechanism when we experience any environmental stressor. When we find the situation threatening, it may lead to the activation of other related appraisals including

challenge, uncontrollability and stressfulness which make the situation as stressful.

The COVID-19 is a new and novel coronavirus and little is known about its pathogenesis and mechanism of action.<sup>1</sup> The previous research with outbreaks tells us that we become more likely to be stressful when confronted with new diseases about which little is known as reported by Fischhoff *et al.*<sup>17</sup> Further, the media reporting of deadly impact of COVID-19 including mortality statistics made this new disease a source of environmental threat in Pakistan as reported by Mukhtar in a recent publication.<sup>3</sup> The threat may lead to evaluating the situation as challenging and eventually uncontrollable, thus leading to the experience of stressfulness which ultimately results in perceived stress.<sup>16,18</sup> The recent study by Vicario-Merino *et al* reported the increased incidence of both stress and anxiety in a sample of 147 Spanish residents during lockdown.<sup>18</sup> Similar results had been reported by Limcaoco *et al*, in a survey study conducted in 25 countries with 891 participants.<sup>16</sup>

The correlation analyses reveal a significant positive relationship between threat and coping skills but not between perceived stress and coping skills. The people who appraise the situation as threatening, challenging and out of control become more likely to use more coping skills in the form of emotional and behavioral coping strategies as reported by famous American theorist Lazarus and Tomaka *et al.*<sup>6,7</sup> However, the current study did not report a significant relationship between perceived stress and coping skills, although, the stressfulness was positively correlated with coping skills. It is through the use of cognitive appraisal of stressfulness that people start employing coping skills in stressful situations.<sup>6,7</sup>

The present study also found statistically significant gender differences in threat, uncontrollability, stressfulness, and perceived stress. The women were found to experience more environmental threat as compared to men. Understandably, women were found to be high in uncontrollability, stressfulness, and perceived stress, although the Cohen's *d* represented the small effect sizes. The recent study by Kangxing with 3088 Chinese adults found female gender as one of the risk factors for experience of perceived stress during COVID-19 pandemic<sup>19</sup>.

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#### LIMITATION OF STUDY

The study sample was recruited only from Punjab province. The people from other provinces should have been included in the sample. The study did not differentiate between emotional and behavioral coping strategies used by participants in the analysis.

#### CONCLUSION

The study concludes that the appraisal of environmental situation as threatening, challenging, and stressful leads to the experience of perceived stress and results in increased use of coping strategies. The females were found slightly more likely than males to experience the appraisals of threat, uncontrollability, stressfulness and perceived stress. The modifiable sources of environmental stress like 24/7 sensational reporting of COVID-19 cases need to be rationalized. The general public should have access to COVID-19 related mental health hotline at district level so as to get free counseling services.

**Conflict of Interest:** None.

#### Authors' Contribution

AB: Conceptualization & design, data analysis, reviewing of important intellectual content, final approval.

MA: Conceptualization, design, acquisition of data, drafting, final approval.

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