Impact of coronavirus and online exam anxiety on self-efficacy: the moderating role of coping strategy

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Abstract
Purpose – The novel coronavirus pandemic is projected to cause an elevation in anxiety levels across the globe. With everything shifting to online mode, the teaching-learning has also gone virtual. This study aims to analyze the impact of novel coronavirus and online education on student’s anxiety and self-efficacy, investigate the role of coping strategies as a moderator between anxiety and self-efficacy. Also, develop and validate an online exam anxiety scale.

Design/methodology/approach – The data is collected by undertaking a cross-sectional survey of 434 higher education students from various universities. For conceptualization of the construct of online exam anxiety, the principal component analysis is carried out. Thereafter, the conceptual model is validated and tested using confirmatory factor analysis and hierarchical regression analysis.

Findings – The hypothesized model demonstrated good reliability and validity. The results showed that students’ anxiety has an adverse impact on their self-efficacy. Findings indicate that the sample in this study reported more anxiety owing to online examinations in comparison to coronavirus induced anxiety. Also, it was found that the relationship between anxiety and self-efficacy was stronger at low levels of coping strategy whereas it got considerably weakened at high levels of coping strategy.

Research limitations/implications – The study is limited to students who belong at other levels of education. Further studies can attempt to capture the impact of COVID on student anxiety. This study was restricted to students in the age group of 18–25. The impact of COVID can be studied in a different age group in the future.

Practical implications – This study offers important implications for educators, practitioners and policymakers working in the education sector. It presents an interesting insight into how the sudden change in pedagogical delivery to online mode is preventing a smooth transition for students and becoming a cause of anxiety. It recommends higher education institutions to develop an innovative and robust approach to promote and address mental health issues among students. It also stresses the need for ensuring that the process of conducting online examinations are streamlined and adequate guidance is given to students.

Social implications – The study proposes the need for training students and teachers on the application of an blended learning approach and efficient adoption of information and communication technology resources in teaching-learning.

Originality/value – The current study contributes to the existing body of knowledge by stressing that adaptive-behavioral and emotion-focused coping strategies are significantly helpful in tackling coronavirus related anxiety. It also recommends the need for Higher education institutions to play an active role in strengthening their preparedness strategies for effective management of outbreaks and pandemics.

Keywords Behavior, Stress, Educational psychology, Higher education, E-learning, Assessment and Anxiety, Coronavirus

Paper type Research paper
1. Introduction
In March 2020, the World health organization (WHO) declared the outbreak of novel coronavirus (COVID-19) as a pandemic and threat to human lives across the world (WHO, 2020). Coronavirus, generally pathogenic to mammals, is a family of enveloped RNA viruses, causes mild to severe upper respiratory tract infections (Burrell et al., 2016). On June 25th, 2020, approximately 9 million confirmed cases and half a million deaths were reported from 204 countries of the world (WHO, 2020). The state of lockdown was imposed across countries by their respective governments, which halted almost all activities and the world came to a standstill. Along with the physiological, psychological and emotional impact of COVID-19 gradually started surfacing in varied forms and degrees of despair, confusion resulting in amplified anxiety levels (Roy et al., 2020). It is worth mentioning that isolated in quarantine, people experienced distress such as anger, confusion, anxiety and post-traumatic stress symptoms (Brooks et al., 2020). The resulting impact of a multitude of factors affected every walk of life is it social, political, economic, etc. The education sector got impacted in a very big way by the closure of academic institutions, delays in academic schedules and migration to virtual teaching-learning platforms as Hobson’s choice. The problem of education further got aggravated with an evaluation of students through online mode (Cao et al., 2020; Talidong and Tocuero, 2020). It left students with hardly any time for preparation and coping with new context culminating in high anxiety levels adversely affecting their self-efficacy. Some educational institutions engaged the services of counselors to manage anxiety among students caused by the pandemic and changed educational texture, to no avail (Akan et al., 2010). Against this backdrop, it is imperative to investigate how anxiety caused due to coronavirus and resultant online examinations impacting the self-efficacy of students.

Though there were studies to gauge the psychological impact of a pandemic on the general public, health-care providers, corona patients, old adults (Chen et al., 2020; Yang et al., 2020), there was found a paucity of studies evaluating anxiety among students caused by a coronavirus and imposed online education. Few researchers had attempted to probe the mental-health status of students during pandemics (Cao et al., 2020) but there was no study that assessed the impact of coronavirus on students’ self-efficacy levels. In addition to this, the research on ways to cope up with anxiety caused due to the current pandemic situation was also scarce. Also surprisingly, it was noted that there were instruments to measure exam anxiety among students but online exam anxiety. This gap in the literature built fertile ground to study the impact of coronavirus and online exam anxiety on student’s self-efficacy and investigate the role of coping strategy as a moderator between anxiety and self-efficacy. This paper also attempted to develop and validate an instrument to measure online exam anxiety among students.

Drawing cues from the above, the following objectives were framed:

- To ascertain the level of anxiety among higher education students due to coronavirus and online examinations.
- To explore the impact of anxiety on the self-efficacy of students.
- To investigate if coping strategy acts as a moderator between anxiety and self-efficacy.
- To develop and validate a scale to measure anxiety due to online examinations.

2. Theoretical background and conceptual model
The current section deals with a review of the literature of variables in the study – anxiety, self-efficacy and coping strategy. Following which, the hypothesized model derived from the literature was conceptualized.
2.1 Anxiety

Anxiety was described as the “fundamental phenomenon and the central problem of neurosis” (Freud, 1936). It was a complex emotional reaction or state that may vary in intensity over time as a function of the intra-psychic or situational reasons that affect an individual (Spielberger, 1966). Anxiety was also found consisting of feelings of tension, fear, apprehensions and an increase in autonomic nervous system activity. The universal nature of anxiety was reflected clearly in literature, arts, religion and other facets of life (May, 1950).

Theories of anxiety were categorized into psychoanalytic, physiological, existential, behavioral and cognitive. The psychoanalytic theory of anxiety started with Freud (1917), who considered anxiety as an everyday phenomenon and an explanation to neuroses. Anxiety was considered as a signal from the ego about potential danger. The physiological theories accounted for anxiety to be related to particular parts of the central nervous system. Gray (1982) regarded the behavioral inhibition system as the foundation of anxiety mediated by hypothalamic circuits. This is like a fight/flight system to an unexpected outcome controlled by parts of the brain. The other school of thought was a phenomenological/existential theory. The anxiety was seen as a natural state of a person present at every point. Another category of theories of anxiety derived from Watson’s (1920) research which explored the dimensions of learning and cognition arguing that individuals learn to avoid unpleasant stimuli through mediating mechanism i.e. fear or anxiety. In other words, a threat of discomfort may lead to anxiety and resulting in the new behavior. Mowrer (1953) viewed anxiety as a form of fear when the source of fear was unknown or repressed.

As in the current study, the anxiety among students was considered from two perspectives – anxiety caused due to Coronavirus and online exam anxiety. Therefore, the following section presents the literature pertaining to Coronavirus based anxiety and online exam anxiety.

2.1.1 Coronavirus anxiety. The current pandemic brought not only the risk of death but also unbearable mental pressure to people across the world (Xiao, 2020; Duan and Zhu, 2020). Although substantial measures were taken to diagnose infection among people, mental health-care particularly of students was relatively neglected (Xiang et al., 2020; Lee, 2020). Balaratnasingam and Janca (2006) noted that infectious disease triggered massive disturbance to the psychological well-being of people. This was also evident in a current study by Liu et al. (2020) wherein Covid-19 caused traumatic stress (73.4%), depression (50.7%), anxiety (44.7%) and insomnia (36.1%) among people. The corroborative impacts of a pandemic on related anxiety, post-traumatic stress, contamination concerns and suicidality (Chong et al., 2004; Wheaton et al., 2012; Wu et al., 2009) were found, however, their impact on students’ was found absent. The aim of this study was to fill this gap by investigating the levels of Covid-19 induced anxiety among students.

The next section deals with a literature review of online exam anxiety:

2.1.2 Online exam anxiety. The effects of anxiety were observed in educational settings as well. Examination-related anxiety was the most prominent source of anxiety found in students across higher education (Furr et al., 2001). Test/exam anxiety was considered as a situation-specific form of trait-anxiety and was often related to poor academic performance (Chapell et al., 2005), dropout rates (Amrein and Berliner, 2003), mental and physical well-being concerns (Greenman et al., 2000). Past scholars had conceptualized exam anxiety constructs in a diverse manner. Earlier, exam anxiety was seen as a gauge of one’s “drive.” Students who were exam-anxious experienced anxiety resulting in irrelevant and avoidant behaviors leading to poor academic performance (Sarason and Mandler, 1952). Not only this, Nottelmann and Hill (1977) found out that students with high anxiety also felt distracted, restive and had fidgety behavior in evaluative situations. Alpert and Haber (1960)
introduced the bi-directional theory of exam anxiety as Debilitating and Facilitating anxiety. Where, facilitating anxiety motivates an individual to perform well in a test, debilitating anxiety, in contrast, cause avoidance behavior. Facilitating anxiety demonstrated positive task-related behaviors such as preparing for the exam in advance and increased focus during the exam. While debilitating anxiety causes an increase in irrelevant thoughts and behavior among students. They avoid studying and experience self-deprecatory thoughts. Thus, facilitating anxiety increased student’s performance while debilitating anxiety hindered student’s academic performance (Zeidner, 1998; Raffety et al., 1997). Liebert and Morris (1967) stated that exam anxiety consisted of two components – worry and emotionality. The worry component involved fear and consequence of failing tests whereas the emotionality component was the automatic reaction students experience in test situations. Similarly, Wine (1971)’s model of test anxiety included tenseness, social derogation and cognitive interference. “Tenseness” was similar to Liebert and Morris’s emotionality component. The social derogation was the student’s fear of disparagement they felt from peers and significant others if they failed in the test. Exam anxiety could be measured by various instruments such as Test Anxiety Inventory (Spielberger et al., 1980) and The State-Trait Anxiety Inventory (STAI) (Spielberger, 1983). Researchers concurred that anxiety was a complex and multidimensional construct. It was complex to summarize due to its intricacy. Lowe’s et al. (2015) Test Anxiety Measure for College Students (TAM-C) had attempted to measure anxiety on the basis of different dimensions such as social concerns, cognitive interference, emotionality, task behavior and worry. However, the scale was specifically designed for US college students and did not include anxiety for online exams. Moreover, the current Covid-19 pandemic resulted in a sudden shift to online education which challenged conventional teaching-learning (Sharma, 2020; Kaup et al., 2020). The decision to conduct online examinations further added to the anxiety of the students (Joshi et al., 2020). Therefore, it created the need to gauge anxiety specifically in an online examination context. This called for a new instrument, which can capture the unique attributes of anxiety arising due to the online conduct of exams.

The next section deals with a review of the literature of the second variable in the study.

2.2 Self-efficacy
Self-efficacy, an individualistic factor, signifies the “belief in one’s capabilities to organize and execute the course of action required to produce desired attainment” (Bandura, 1993). It is what a person believes he/she can do with available skills and abilities, rather than the actual skills they possess (Bong and Skaalvik, 2003). Literature suggested that high self-efficacy created a sense of confidence and serenity when one approaches a difficult task. While low self-efficacy led to a false perception which caused stress and depression, thereby resulted in a myopic view of problem-solving (Pajares, 1996). When students worry, they tend to get distracted or preoccupied with stressors such as the outcome that burdens them (Liebert and Morris, 1967). In a study of 610 students’ self-efficacy levels, Mulkey and O’Neil (1999) asserted that students with high self-efficacy projected strong belief in their ability to accomplish the exam and vice versa. Additionally, high levels of self-efficacy allowed better handling of physiological responses such as an increase in heart rate, sweating in reaction during stressful situations such as exams (Bandura, 1993). Thus, it could be concluded that students with high self-efficacy are less anxious about their performance and test results.

Various empirical studies have supported the relationship between self-efficacy, test anxiety and academic achievement. Yildirim (2012) discovered a positive relationship between high math self-efficacy and math achievement, whereas, inverse relation was found in high exam anxiety and math achievement. In addition to this, Hsieh et al. (2012) found
that self-efficacy and test anxiety together predicted the final grades in math class. Nelson and Knight (2010) showed that students can avoid negative outcomes of test anxiety by thinking of their past achievements, which, in turn, built courage and self-efficacy. In their study, Abdi et al. (2012) found test anxiety and self-efficacy having a significant impact on the overall grades of the students. Student’s anxiety levels during exams resulted in negative outcomes, however, self-efficacy was found to be moderating this effect (Adewuyi et al., 2012). In a longitudinal study conducted by Roick and Ringeisen (2017) it was found out that self-efficacy positively impacted student’s test anxiety levels and academic performance. Lowe et al. (2008) depicted the complex relationship between self-efficacy, anxiety and academic performance in their holistic test anxiety model. The model suggested that personality characteristics such as trait anxiety and self-efficacy determine the extent to which a test is considered as an evaluative threat leading to cognitive, physiological and behavioral anxiety symptoms.

The next section deals with the theoretical construct of a coping strategy.

2.3 Coping strategy

Coping is a basic process which depicts how an individual detects, appraise, deal and learn from stressful situations. Decades of research focusing on the measurement of individual differences and correlates of coping indicated that coping can guard or exacerbate the effects of stress, despair, fear on the mental and physical health of a person. Coping strategies are, to put it simply, a collection of possible responses to stressful situations. They are cognitive restructuring, problem-solving, information seeking, emotional ventilation, avoidance, distancing, acceptance, seeking social support and denial (Billings and Moos, 1981; Parker and Endler, 1996). Lazarus and Folkman (1984) investigated the coping strategy from two perspectives on the basis of function—problem-focused coping and emotion-focused coping. Problem-focused coping involved strategies that included acting on the environment or the self (seeking support from others or cognitive restructuring). On the other hand, emotion-focused coping consisted of strategies used to regulate stressful emotions (such as emotional ventilation). Critics of this framework argued that these two dimensions were too broad and one strategy might include both functions (eg: seeking support from others might help in solving a problem and pacify one’s feelings). Subsequently, Roth and Cohen (1986) conceptualized coping with respect to the “direction” of coping response to a threat/stressor. Approach coping is a behavioral, cognitive, emotional activity directed toward a threat (eg: seeking information, problem-solving). While avoidance was cognitive activity directed away from a threat such as denial and withdrawal.

Most of the attention in the literature had centered on how to help students reduce test anxiety rather than on what students were actually doing to reduce it (Hembree, 1988; Sarason and Sarason, 1990). There was evidence about students having high exam anxiety experiencing more task-irrelevant thoughts during examination setup (Sarason et al., 1991; Sarason, 1984; Ganzer, 1968). Kondo (1997) identified 79 basic tactics that cohered into five coping strategies to reduce exam anxiety “positive thinking, relaxation, preparation, resignation and concentration.” However, there was a paucity of research on students’ anxiety due to online examination. The sudden change in the mode of pedagogical delivery due to the coronavirus pandemic was difficult for students worldwide. Therefore, this study aims to fill this gap and investigate students’ anxiety across the globe owing to COVID-19 and online examinations and their coping strategy.
2.4 Conceptual model

Undertaking deep exploration of literature, a conceptual model was hypothesized depicting precedence of relationships among study variables. This model explained the causal relation between anxiety (AN) and self-efficacy (SE). Then, the role played by coping strategy (CS) as a moderating variable between the two (Figure 1).

On the basis of a review of the literature and objectives of the study, the following hypotheses were framed:

\[ H1. \] There was a significant negative relationship between Anxiety and Self-efficacy.

\[ H2. \] Coping Strategy (CS) positively moderated the relationship between anxiety (AN) and self-efficacy (SE) such that a negative relationship between anxiety (AN) and self-efficacy (SE) would be stronger (vs weaker) at low (vs High) level of CS.

3. Methodology

The current research was conducted in two phases. Phase 1: Construction of online exam anxiety scale (OEAS).

3.1 Method, participants and procedure

In the first phase (\( N = 162 \)), the construct of online exam anxiety was conceptualized and OEAS was developed by examining the relevant literature (Spielberger and Vagg, 1984; Lowe, 2016; Kaup et al., 2020), taking note of aspects representing online exam-related anxiety. Churning of existing literature indicated the absence of any standardized instrument to measure anxiety caused due to online mode of examinations. Therefore, by meticulously adopting the steps of scale development and validation as recommended by Boateng et al. (2018), the scale to measure online exam anxiety (OEAS) was attempted. At Step 1 Item Generation, by undertaking a systematic review of literature, the underlying dimensions and corresponding items of the construct were identified. Step 2 Content validity was assessed by getting the items examined and refined after discussion with experts from industry and academia. At Step 3 Pre-testing was carried out by conducting cognitive interviews (\( n = 24 \)) with undergraduate students of the University of Delhi. Thereafter, the final pool comprising 12-items representing the various aspects of online exam anxiety was finalized. Each item was carefully worded to best capture the essence of this form of anxiety. Items were, “I am nervous about the unknown aspect of online mode of examinations”, “I fear that I will not be able to complete my exam on time,” “I am worried that I might not be able to successfully access the question paper” and “I am anxious about the online proctoring.” To reflect anxiety frequency over the previous 15 days, every item was rated on a five-point Likert scale – 0 (not at all) to 4 (Everyday). This was consistent with the American Psychiatric Association’s guidelines for measuring psychiatric symptoms.
(American Psychiatric Association Division of Research, 2013). At Step 4 Scale administration, this 12-item OEAS scale was administered to a sample of \( N = 162 \) college students belonging to different universities of India funded by the federal government, state government and private agency. The data was collected during the month of May 2020. A total of 200 questionnaires were distributed. Out of which, 175 responses were received and only 162 (81\% response rate) were found usable. The sample consisted of 84 men and 78 women with a mean age of 22 years (SD= 1.47). The majority of students belonged to the University of Delhi (DU) (\( N = 86, 53.09\% \)), followed by Indraprastha University (IP) (\( N = 34, 20.99\% \)), Indian Institute of Technology and Management (IITM) (\( N = 27, 16.66\% \)) with least from Amity University (\( N = 15, 9.26\% \)). Step 5 Item reduction analysis was carried out by subjecting the scale items to Principle component analysis (PCA) using varimax rotation. It aimed to identify the parsimonious, internally consistent and functional items. The SPSS version 26 was used for the same. At Step 6 Factor Extraction, PCA resulted in the emergence of a single factor with nine out of 12 items having factor loading greater than 0.40 and small factors suppressed at 0.50. With a KMO value of 0.939, well above the threshold limit of 0.6 (Tabachnick and Fidell, 2001) and significant results of Bartlett’s Test of Sphericity (Bartlett, 1954) at \( p < 0.05 \), we retained the single factor. This factor explained 65.94\% of the variance. The correlation matrix confirmed the linear relationship between the items (with at least 0.03) and communalities were well above 0.5 (Display Table 1).

Subsequently, at Step 7 Test of internal consistency was carried out to gauge the reliability of the newly conceptualized 9-item scale. A higher score suggested a high anxiety level. The Cronbach’s alpha statistic indicated adequate internal reliability of 0.953 (\( \text{Mean} = 19.20, \text{SD} = 11.25 \)) well above the acceptable value of 0.80 (Nunnally, 1978). The factor was named Online exam anxiety and the 9-item Online Exam Anxiety Scale (OEAS) was confirmed. In the second phase of the study, the last steps of scale validation i.e. test of validity were carried out by adopting confirmatory factor analysis (Appendix).

Phase 2: Validity of OEAS and hypothesis testing.

In the second phase (\( N = 434 \)), measurement model assessment was carried out by using Confirmatory Factor analysis (CFA) to further establish the reliability and validity of newly conceptualized OEAS along with other study variables. Hypothesis testing was also carried out to test the causal relationship hypothesized in the proposed conceptual model.

3.2 Research design and data collection
To achieve the study’s objectives, the cross-sectional survey research design was adopted using a convenience sampling method. According to Guadagnoli and Velicer (1988), the

<table>
<thead>
<tr>
<th>Items</th>
<th>Factor loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>OEA1_uncertainity about online mode</td>
<td>0.881</td>
</tr>
<tr>
<td>OEA2_unable to finish exam timely</td>
<td>0.822</td>
</tr>
<tr>
<td>OEA3_access issue</td>
<td>0.844</td>
</tr>
<tr>
<td>OEA4_upload failure</td>
<td>0.895</td>
</tr>
<tr>
<td>OEA5_technical glitches</td>
<td>0.897</td>
</tr>
<tr>
<td>OEA6_uncomfortable</td>
<td>0.818</td>
</tr>
<tr>
<td>OEA7_anxious about online proctoring</td>
<td>0.879</td>
</tr>
<tr>
<td>OEA8_apprehensive about fairness</td>
<td>0.758</td>
</tr>
<tr>
<td>OEA9_fear of underperformance</td>
<td>0.893</td>
</tr>
</tbody>
</table>

Note: Extraction method, principal component analysis, rotation method, Varimax with Kaiser normalization

Table 1. Factor loadings of OEAS
recommended sample size is at least 400 and; for quantitative studies, the rule of thumb is 10 respondents per item (Nunnally, 1978). Therefore, we targeted across the globe 600 students belonging to the USA (Arizona State University and Texas A&M), Canada (York University), Russia (Ural Federal University), India (DU, Amity University, IITM and IP) and Malaysia (Universiti Tun Abdul Razak) for the second phase of our study. The profile of the respondents is presented in Table 2. By means of survey technique, a self-completion structured questionnaire was administered in two phases. As recommended by Podsakoff et al. (2003), to alleviate the concern of common method bias, the data was collected from two individual samples i.e. India and other countries in two waves separately. The study’s final sample consisted of 434 students (72.33% response rate). The proportion of male respondents was (N = 198, 45.62%) while the female was (N = 236, 54.37%).

3.3 Instruments
The survey instrument was a self-administering questionnaire, which was used to assess the student’s Anxiety and Self-efficacy during Covid-19. It contained an introductory face sheet, which provided basic details about the study and requested the readers to participate in the same, ensuring confidentiality and anonymity. It comprising two sections. Section I, asked the participants to report their age, gender, college/university. Section II required the participant to express their opinion about corona anxiety, online exam anxiety, coping strategy and self-efficacy. It had a total of 39 items, analyzing 5 variables which were measured by adopting standardized scales except for online exam anxiety. The details are as follows:

Corona anxiety: Corona caused anxiety was measured by using Sherman Lee (2020) Coronavirus Anxiety Scale (CAS). It was a mental health scanner, which measured psychological anxiety caused due to the novel coronavirus. Sample items included “I felt dizzy, lightheaded or faint when I read or listened to news about the coronavirus” and “I had trouble falling or staying asleep because I was thinking about the coronavirus.” It measured anxiety experienced in the past two weeks through 5 items on a four-point Likert scale – 0 (not at all) to 4 (Everyday). A higher score indicated a high level of anxiety experienced. The scale reported good reliability with Cronbach’s alpha equal to 0.892.

Self-efficacy: Self-efficacy was assessed using the General Self-efficacy Scale developed by Schwarzer and Jerusalem (1995). It was a uni-dimensional, 11 item instrument, which captured the respondents’ self-efficacy through items like, “It is easy for me to stick to my

<table>
<thead>
<tr>
<th>Variable</th>
<th>Phase 1 N = 162</th>
<th>Phase 2 N = 434</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>84 (51.8)</td>
<td>198 (45.62)</td>
</tr>
<tr>
<td>Female</td>
<td>78 (48.2)</td>
<td>236 (54.37)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelors</td>
<td>105 (64.81)</td>
<td>325 (74.88)</td>
</tr>
<tr>
<td>Masters</td>
<td>57 (35.18)</td>
<td>109 (25.12)</td>
</tr>
<tr>
<td>Nation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>162 (100)</td>
<td>250 (57.6)</td>
</tr>
<tr>
<td>USA</td>
<td>–</td>
<td>107 (24.65)</td>
</tr>
<tr>
<td>Russia</td>
<td>–</td>
<td>64 (14.7)</td>
</tr>
<tr>
<td>Malaysia</td>
<td>–</td>
<td>13 (2.9)</td>
</tr>
</tbody>
</table>

Table 2. Sample description
aims and accomplish my goals” and “I can solve most problems if I invest the necessary effort.” It used a four-point Likert scale ranging from 1(Not at all) – 4 (Exactly true). The total score was calculated by finding the sum of all items ranging between 10 and 40, with a higher score indicating more self-efficacy. The construct Self-efficacy (SE) reported overall Cronbach’s alpha equal to 0.906.

Coping strategy: For examining the respondent’s coping strategy, 13-item Personal Coping Strategy Scale developed by Khalid et al. (2016) was adopted. It used a four-point Likert scale ranging from 0 (Never used) – 3 (Always used). It was a unidimensional scale with sample items like, “I follow strict personal protective measures (e.g. mask, hand wash, etc.), “I pray/worship” and “Avoid media news about COVID-19 and related fatalities.” The construct Coping Strategy (CS) reported overall Cronbach’s alpha equal to 0.837.

Online exam anxiety: The newly conceptualized 9-item OEAS was used to assess the online exam anxiety among respondents. Sample items included “I am nervous about the unknown aspect of online mode of examinations” and “I fear that I will not be able to complete my exam on time.” It measured anxiety experienced in the past two weeks through 9 items on a four-point Likert scale – 0 (not at all) to 4 (Everyday). Higher scores indicated a high level of anxiety experienced. The scale reported good reliability with Cronbach’s alpha equal to 0.953.

4. Data analysis and results
Data were analyzed using IBM SPSS (version 24) and AMOS (version 26) software. After checking for missing values, outliers and normality, the mean and standard deviation were calculated. As evident in Table 3, with N= 434, CA (Mean = 4.784; SD = 4.735), OEA (Mean = 19.98; SD = 11.07), SE (Mean = 14.61; SD = 5.51) and CS (Mean = 18.83; SD = 7.59), respectively. While assessing the level of anxiety among students, it was found that students reported low coronavirus induced anxiety (23%) as compared to online exam anxiety(55%). Chi-square test and T-test established the absence of any socio-demographic differences between Phase 1 sample (N = 162) used for PCA and Phase 2 sample (N = 434) subjected to CFA (Table 3).

4.1 Measurement model and validity assessment
Confirmatory Factor Analysis was used to validate the proposed item structure of the newly conceptualized online exam anxiety construct that emerged from PCA and, to check the reliability and validity of the full measurement model. CFA results were consistent with PCA findings, as a single-factor model \( \chi^2(9) = 95, p = 0.005 \) emerged with impressive model fit \( \chi^2/df= 3.513; CFI = 0.935; NFI = 0.927; RMSEA = 0.143; SRMR = 0.038; \)

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Online exam anxiety</td>
<td>434</td>
<td>19.20</td>
<td>11.25</td>
<td>0.953 (0.836)</td>
</tr>
<tr>
<td>2. Self-efficacy</td>
<td>434</td>
<td>14.61</td>
<td>5.51</td>
<td>0.906 (0.727)</td>
</tr>
<tr>
<td>3. Corona anxiety</td>
<td>434</td>
<td>4.78</td>
<td>4.73</td>
<td>0.892 (0.791)</td>
</tr>
<tr>
<td>4. Coping strategy</td>
<td>434</td>
<td>18.83</td>
<td>7.59</td>
<td>0.837 (0.739)</td>
</tr>
</tbody>
</table>

Notes: *Square root of average variance extracted (AVEs) are represented by diagonal items in the parentheses and correlation between constructs is represented by off-diagonal items Significance of correlations: ****p < 0.001

Table 3. Descriptive statistics, reliabilities, inter-correlations and the square root of average variance extracted

Moderating role of coping strategy
CI = 90% for all indices. All standardized factor loading was higher than 0.5 and significant at \( p < 0.05 \). With this, the construct reliability (\( \alpha = 0.953 \)) and validity of OEAS got established.

Next, a full measurement model assessment was done to check the reliability and validity (Construct, convergent and discriminant) of all studied variables (constructs). First, internal consistency was calculated using reliability statistics, Cronbach’s \( \alpha \). With each construct’s \( \alpha \) being greater than 0.7 (Corona Anxiety, \( \alpha = 0.892 \); Online exam anxiety, \( \alpha = 0.953 \); Self-efficacy, \( \alpha = 0.906 \); Coping Mechanism, \( \alpha = 0.837 \)), all constructs reported good degree of reliability and were found suitable for further analysis (Sekaran, 2003). In addition to this, the convergent validity was further established as each construct’s respective factor loadings ranged from 0.77 to 0.94, which were above 0.5. Finally, discriminant validity was assessed to determine the unique distinctness of each construct. For this, average shared variance (ASV), marginal shared variance (MSV) and average variance extracted (AVE) of all constructs were calculated. As the AVE of all constructs was more than their ASV and MSV, the discriminant validity was established. Further, the discriminant validity emerged to be satisfactory at the construct level also (Table 4) as the correlation among constructs was less than square roots of AVE (Fornell and Larcker, 1981). Thereafter, the model fit indices were examined. With, chi-square (\( \chi^2 \)) 640.33 with a degree of freedom (df) = 246 at a significant \( p \)-value of less than 0.05 the overall model displayed good model fit [\( \chi^2/df = 2.603 \); CFI = 0.943; NFI = 0.911; RMSEA = 0.061; SRMR = 0.043; CI = 90\%] for all indices. Hence, on the basis of CFA results, the measurement model was found to possess a good fit and robust for hypothesis testing. However, before proceeding with hypothesis testing, the common method bias was scanned by using the common latent factor (CLF) method. The Chi-Square difference test comparing constrained and unconstrained models resulted in invariant models, at the significance level of \( p < 0.05 \). This result signified the absence of common bias in data.

4.2 Hypothesis testing
For testing the causal relationship hypothesized in the proposed conceptual model, hierarchical regression analysis was conducted. The results of the first step of the analysis showed anxiety (AN) accounted for considerable variability in SE, \( R^2 = 0.31 \), \( F(2,433) = 97.47 \), \( p < 0.005 \), indicating that students having high anxiety levels tend to have a significant negative impact on self-efficacy. Hence, \( H1 \) signifying the relations between AN and SE was accepted, as AN (\( \beta = -0.369 \), \( p < 0.05 \)) was significantly and negatively predicting the SE. Also, with \( R^2 = 0.31 \), showed that 31% variance in SE was because of exogenous latent construct AN (Table 4).

4.3 Moderation analysis
A second step was conducted to test \( H2 \). Which postulated that Coping Strategy positively moderated the relationship between anxiety and self-efficacy such that the negative relationship between anxiety and self-efficacy would be stronger (vs weaker) at low (vs High)

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Causal relation</th>
<th>Estimate (( \beta ))</th>
<th>( R^2 )</th>
<th>( P^* )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( H1 )</td>
<td>AN ( \rightarrow ) SE</td>
<td>-0.369</td>
<td>0.310</td>
<td>**** Supported</td>
</tr>
<tr>
<td>( H2 )</td>
<td>ZAN_X_ZCS ( \rightarrow ) ZSE</td>
<td>0.584</td>
<td>0.341</td>
<td>**** Supported</td>
</tr>
</tbody>
</table>

Notes: **** \( p < 0.005 \); \( \Delta R^2 = 3\% \)
level of Coping Strategy. Results showed CS accounted for considerable variance in SE after controlling for effects of AN, $R^2$ change = 0.34, $F(1,432) = 3.998, P < 0.005$. Indicating that CS as a moderating variable significantly and positively predicted SE ($\beta = 0.380, p < 0.05$. As evident from Table 4, $R^2$ increased to 34% in the presence of CS as a moderator. Next, as recommended by Dawson (2014) interaction effect test was also carried out. It was found that Inter ($\beta = 0.584, p < 0.05$) was having a significant causal effect on ‘Self-efficacy. As illustrated in Figure 2, we plotted this significant interaction at ± SD from the mean of coping strategy (Aiken et al., 1991). For low levels of coping strategy (i.e. –1SD) anxiety was significantly negatively related to self-efficacy, whereas for high levels of coping strategy (i.e. +1SD) anxiety was not related to self-efficacy. Therefore, it could be concluded that the negative relationship between anxiety and self-efficacy was stronger at low levels of coping strategy, whereas, it got considerably weakened at high levels of coping strategy. Thus, the study’s second hypothesis, $H2$ was supported.

5. Discussion
In this study, we examined the impact of anxiety caused due to COVID-19 and online exams on students’ self-efficacy. We also explored how coping strategies adopted during the course moderates the impact of anxiety on students’ self-efficacy. The results showed that anxiety and self-efficacy were negatively related. This signified that an increase in anxiety leads to a decrease in one’s self-efficacy. The result was supported by studies conducted by Nelson and Knight (2010), Yildirim (2012), Abdi et al. (2012), Mulkey and O’Neil (1999); Hsieh et al. (2012), Pajares, 1996 and Rizun and Strzelecki (2020). In addition to this, it was found that COVID-19 anxiety was low in contradiction to studies by Roy et al. (2020), Brooks et al. (2020), Baloran (2020) and Evren et al. (2020). To address, COVID-19 related anxiety students are resorting to personal protective gear, yoga, meditation, etc., in tune with studies of Khalid et al. (2016) and Faye et al. (2015). It is worth noting that the result of this study came to respite in the present pandemic situation. It indicated that the mental health of the students was not severely affected by the pandemic as they were hopeful of the future. This may be indicative that a positive future orientation helps to manage anxiety even in a pandemic situation where terra incognita horrifies humanity at large. In other words, one of the means to help people coping with anxiety that too in a pandemic situation is to show a brighter tomorrow. This may also be reasoned by the perceived higher immunity of youngsters.
Further, findings indicated higher anxiety owing to online examinations in comparison to coronavirus induced anxiety. Perhaps, this was because the transition in pedagogy was not smooth for students, in addition to anxiety about the fairness of online examinations. This is a very interesting piece of finding that pandemic which is horrifying the globe is causing less anxiety among students as compared to anxiety caused due to immediacy of online exam. We may say, that education institutions may ensure that online exam-related anxiety is addressed with better communication, transparency, streamlining and adequate guidance to students. Online mock tests before the actual examination may be useful. This will help in reducing online test anxiety among students. To address the anxiety concern, the processes need to be built around humans and technology. In other words, with good counseling and better technology interface the anxiety may be arrested.

6. Implications of the study
This study has important theoretical, practical and social implications. The findings of the current exploration will help educators, practitioners, policymakers to bring about positive changes in the higher education sector.

6.1 Theoretical contribution
From a theoretical standpoint, it has added to the literature on the impact of COVID-19 in higher education. The physical health impact of COVID is visible in society but mental health remains neglected. This study has filled this gap and investigated the effects of COVID-19 on students. Not only this, the current study has explored the issue of online exam anxiety which has escaped the attention of past researchers investigating online education. Given this, the online exam anxiety scale (OEAS) is an important contribution to the study. To date, there were many scales available to measure test anxiety of students, but the literature on measuring test anxiety in an online mode remained scarce. Therefore, this study has also added to the literature and contributed an important instrument, which is crucial in the present times. The moderating influence of coping strategy on the relationship between anxiety and self-efficacy is also a significant contribution to the study.

6.2 Practical implications
The results of the study also have a practical and social bearing in the higher education sector. Higher education institutions should play a dynamic role in strengthening their management strategies concerning outbreaks and pandemics. Higher education institutions should develop an innovative and robust approach to promote and address mental health issues among students. Most importantly, as online education is still at a nascent stage and embracing this paradigm shift in pedagogical delivery, educational institutions should train students and teachers on the application of the online-blended learning approach. The mental health of college students is significantly impacted due to a sudden shift in the mode of education and they require attention, help and support from their families, colleges and society at large. Introduction of any new online learning tool or any policy change related to e-learning should be done with keeping the mental state of students in mind. It is recommended that government and educational institutions should collaborate to resolve this issue to provide high-quality crisis-oriented psychological services to students.

7. Covid-19 opportunities and challenges
COVID-19 pandemic has challenged the entire educational system, but in hindsight, has opened up opportunities for universities to revamp their content delivery and transfer
attention to emerging cloud-based technologies. Owing to these structural changes, the higher education institutions were forced to shift their entire instructional apparatus from offline mode to online. Although it allowed students to learn at their convenience from home, it impeded the delivery of an interactive, face-to-face, personalized experience-based learning in lively campus life. Adaptation to online assessment at such short notice was a challenge interrogating rigor and standards. The demanders of work from home were stressed with blurring boundaries of work and home. In case the change in the system is not given its cooling period for adaptation, the pandemic will leave its scars for a very long period. Therefore, Higher education institutions should seize this opportunity to strengthen their teaching practices, promote blended learning, provide accessible mental health-related services and make the course curriculum responsive to the changing needs of current times. The focus should be on enhancing the online-driven competencies of the teachers so that they can effectively contribute to the digital literacy mission.

8. Limitations of the study
The study was limited to students belonging to the age group of 18–25 in higher education institutions. There may be the inclusion of students from other geographies to make this study robust. Also, the impact of COVID could be studied on a higher age group in the future.

The other variables such as culture and learning approaches can also be incorporated in future studies. The online proctoring and its relation to exam anxiety can also be further researched. The results of the current cross-sectional exploration can be supplemented by undertaking a longitudinal study in the future.

References


Further reading


## Appendix. Online Exam Anxiety Scale (OEAS)

How often have you experienced the following thoughts over the last 2 weeks regarding online examination?

<table>
<thead>
<tr>
<th>Online Exam Anxiety scale: Items</th>
<th>Not at all</th>
<th>Rare, Less than a day</th>
<th>Several days</th>
<th>More than 7 days</th>
<th>Nearly every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am nervous about the unknown aspect of online mode of examinations.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2. I fear that I will not be able to complete my exam in time.</td>
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<td>3. I am worried that I might not be able to successfully access the question paper.</td>
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<tr>
<td>4. I am afraid I might not be able to timely upload/ submit my answer script.</td>
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<tr>
<td>5. I am fearful about technical glitches like weak internet connection/ speed.</td>
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<td></td>
<td></td>
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<tr>
<td>6. I feel uncomfortable about giving exams in online mode.</td>
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<td></td>
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<tr>
<td>7. I am anxious about the online proctoring.</td>
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<tr>
<td>8. I am apprehensive about the fairness of online mode of examinations.</td>
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<td></td>
<td></td>
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<tr>
<td>9. I dread that I might not perform well because of online exam pressure.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The total score is calculated by summation of all 9 items. It ranges from 0 to 36.

- **Score of 0-9**: Low levels of online exam anxiety
- **Score of 10-27**: Moderate levels of online exam anxiety
- **Score of 28 and more**: High levels of online exam anxiety.

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