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ORIGINAL RESEARCH

# Cognitive Flexibility's Role in Reducing Academic Stress During the COVID-19 Pandemic

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**Background:** Cognitive flexibility (CF) in the psychological literature has been described as an individual's ability to produce several solutions and retain control in novel situations. Recently, the COVID-19 pandemic appeared to be an ideal scenario that demanded the application of adaptive thinking by students to deal with several challenges of the pandemic.

**Aim:** This study aimed to assess the role of CF in reducing academic stress among university students due to the sudden and strict implementation of online education during the COVID-19 pandemic.

**Methods:** This study employed a cross-sectional survey design and data collection was completed during the 2020–2021 academic year. The study sample comprised 328 university students from Saudi Arabia. The online survey method was used, and study tools comprises of reliable and valid psychological measures to assess CF, academic stress, the negative impact of the COVID-19 pandemic, and emotional symptoms. IBMSPSS25 was used for statistical analysis of data. Multiple regression analysis was applied to determine the role of CF in reducing academic stress after controlling for other factors such as gender, age, academic year, negative impact of COVID-19 on daily life, and unpleasant emotional experiences.

**Results:** CF was significantly decreased the risk of experiencing academic stress (b = –0.196, t = –3.54; $p < 0.001$; 95% CI = –3.53 to –0.11) after controlling for the negative impact of the COVID-19 pandemic on daily life (b = 0.119, t = 2.09; $p < 0.05$; 95% CI = 0.02–0.63) and emotional repercussions (b = 0.109, t = 1.91; $p < 0.05$; 95% CI = –0.01–0.15).

**Conclusion:** The current findings suggest that CF could be fostered among university students as a useful mental tool to cope with academic stress during less-structured educational and social circumstances that may impact their daily lives and emotional wellness.

**Plain Language Summary:** Cognitive Flexibility (CF), also known as the capacity for adaptive thinking, has been recognized as an important mental coping tool. The prolonged implementation of full-time online studies during the COVID-19 pandemic has been a source of academic stress among university students. This study examined the positive impact of cognitive flexibility on academic stress by collecting data from university students who underwent full-time online studies during the COVID-19 pandemic in Saudi Arabia. The study findings validated the protective role of CF, and recommended devising appropriate educational strategies that could foster adaptive thinking and enable students to cope with study-related stressors during uncertain times.

**Keywords:** academic stress, adaptive thinking, cognitive flexibility, COVID-19, digital studies, online education, Saudi Arabia

## Introduction

Cognitive flexibility (CF) has been recognized as an important psychological construct that indicates an individual's capacity for adaptive thinking.[1,2] Individuals with higher cognitive flexibility are usually adept at using cognitive restructuring skills to either find alternative ways of dealing with novel situations or devise innovative solutions to retain control during unusual circumstances.[3] The functions and processes of cognitive flexibility are explained in the

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context of academic achievement through Cognitive Flexibility Theory (CFT) in the mid-80s.[2,4] This framework assumes that acquiring complex and advanced levels of knowledge requires the ability to assemble information retrieved from diverse sources and execution of adaptive capacities to apply this conceptual knowledge in real-life scenarios. This theoretical framework has been used to develop new educational tools and strategies that employ technology and meet the goals of acquiring advanced knowledge in relatively complex and ill-structured domains.[2,5]

In neuropsychological literature, the construct of CF has been explained as deployment of executive mental processes such as identification of goals, planning, a higher level of attentional control, and discrete responses to complete the performance-based mental tasks.[6,7] The communication scholars view cognitive flexibility as a competence in inter-personal communication because this involves social dexterity and communication skills that enables a person to be aware of the alternatives in most social situations, demonstrate readiness to be flexible, and internal efficacy to retain this flexibility in the diverse nature of communications.[8,9] The construct of cognitive flexibility in this study is defined as "the type of mental flexibility essential to successfully challenge and restructure beliefs that impact performance with more balanced and adaptive thinking".[10] This flexibility enables individuals to observe and understand various underlying reasons and produce several solutions and retain control regardless of circumstances to gain desired results. Literature shows that students with higher cognitive flexibility have a greater sense of belonging to their academic institutions because of the mediating role of adaptability.[11,12]

The need to instill CF and adaptability among university students has been emphasized in the literature;[2,3] and recent literature underscores its importance in enhancing learning self-efficacy in online mediums of instruction.[12] This is because the modern world in the 21st century is becoming increasingly complex and unpredictable and is projected to increase in its complexity in the forthcoming eras. The demand for adaptive thinking to solve issues in everyday life, academic performance, and professional duties has increased. The requirements for such capacities among people from all walks of life were further demonstrated during the COVID-19 pandemic, as this pandemic exposed individuals and societies to unprecedented challenges in various domains of functioning.[13] Students in higher education were among the vulnerable groups to bear the psychological, social, and economic consequences of this crisis due to strict implementation of social distancing measures and complete lockdown disrupted the implementation of on-campus teaching.[14] Most of the higher education institutes in developed countries that were hit by the pandemic shifted to full-time online studies.[15–17] In this context, it was important for university students to make use of cognitive flexibility abilities and meet the challenges of online education, along with other hazards at the community level, due to the massive impact of COVID-19 on community health, psychological, social, and economic repercussions.

Several studies have been conducted during the COVID-19 pandemic period to tap on online learning experiences and their physical, psychological, and social correlates among students at various levels of education.[18–20] A review of the literature provides a shared insight that it will take years to unravel the factors that facilitate or hinder students' academic experience. Most studies conducted in Saudi Arabia[21,22] and other parts of the world have focused on assessing psychological symptoms and attested to the repercussions of the pandemic on mental health.[23] Others have investigated the role of cognitive and affective factors such as Internet self-efficacy, cognitive fatigue, academic self-perceptions, motivations, and satisfaction with e-learning methods and online classes.[12,24] However, none of these studies focused on cognitive flexibility, which could be an important factor in the unusual circumstances created due to the unique nature of this pandemic that pushed half of the world to find alternative solutions to carry on everyday life chores, healthcare, studies, and businesses.

Currently, there are several gaps in the literature, and empirical evidence is needed to determine the role of CF in university students' online learning experiences during the COVID-19 pandemic. One prior study provided important insights into the negative impacts of cognitive fatigue and mind wandering on the effectiveness of online learning among students who were first involved in online studies during the pandemic, yet has limitations because it was restricted to school students and did not investigate the element of cognitive flexibility.[25] Another study assessed CF among Saudi students studying in universities located in Western countries to reveal variations in CF attributable to the duration of cross-cultural experience and degree of competence in the second language.[26] Findings revealed that those who had higher competence in the second language showed higher levels of CF, and students who had less than 1 year of residency had significantly lower scores on CF than those who had more than 1 year of residence in the country of study.

One important limitation of this study was that it did not assess the relationship between CF and any kind of academic experience and outcomes. A study from Jordan reported a negative relationship between mental fatigue and cognitive flexibility among university students and suggested support programs for students to reduce mental fatigue and enhance cognitive flexibility skills considering its reciprocal relationship.[27] The study provided limited insight due to two major shortcomings: first, it only explored the relationship of mental fatigue on CF, and the sample comprised 174 university students recruited from a single university.

The current study was designed to advance the literature in the field of educational and cognitive psychology by assessing the impact of CF on reducing the academic stress experienced by students during the COVID-19 pandemic due to a sudden shift to online education and confronted with other social and emotional challenges. Based on previous literature demonstrating that students with high cognitive flexibility are likely to have higher academic performance,[26,27] we assume that cognitive flexibility may facilitate students during uncertain circumstances, such as the COVID-19 pandemic.

Figure 1 shows the proposed direction of relationship between predictor variables and outcome variable after controlling the impact of demographic variables.

This study tested the following hypotheses using data collected from university students:

(i) The impact of the COVID-19 pandemic on daily life and emotional repercussions was significantly and positively associated with academic stress.
(ii) Cognitive flexibility had a significant negative relationship with academic stress.
(iii) Cognitive flexibility will effectively reduce academic stress after controlling the effect of the negative repercussions of the COVID-19 pandemic on daily life and emotional health.
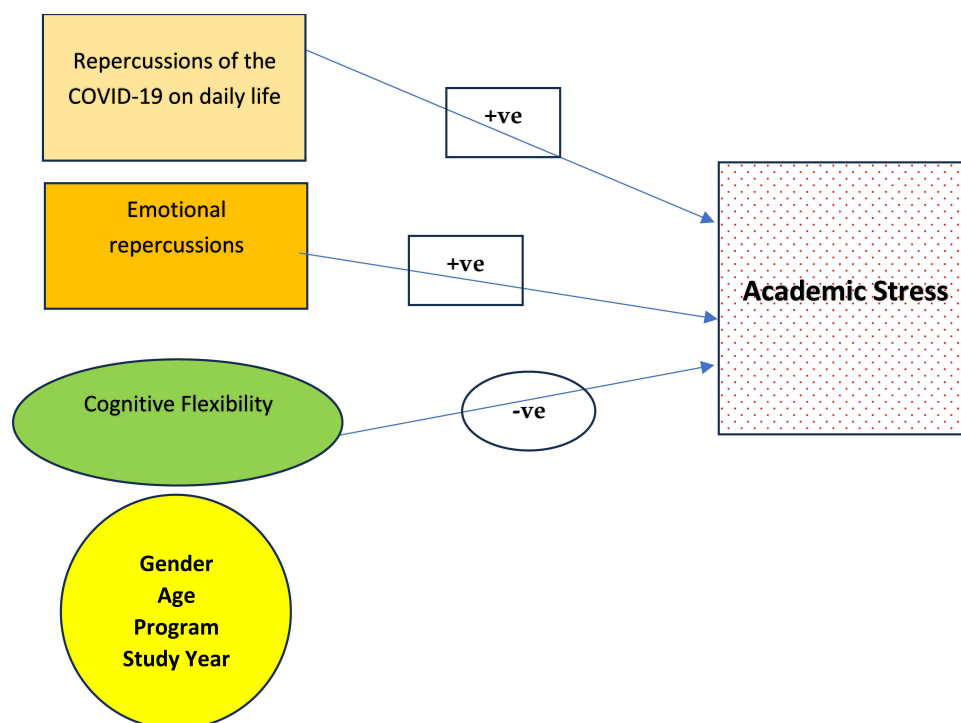


**Figure 1** Schematic diagram to demonstrate direction of relationship between three predictor variables (cognitive flexibility, emotional repercussions and repercussions of the COVID-19 on daily life) on academic stress while controlling for the demographic variables.

Assessing the positive influences of CF in a sample of university students who were simultaneously exposed to two unusual circumstances, the pandemic and full-time online distance education, will be useful in determining the potential of using mental resources, such as cognitive flexibility, by students during uncertain times.

# Materials and Methods

## Study Design, Study Population, and Sample

This research employed a quantitative cross-sectional survey design. This observational study design enables investigators to measure the outcome and exposure(s) in the target population. It also allows them to determine the direction and strength of the association between study variables.[28] The study population comprised students studying in bachelor's and master's programs at higher educational institutes in Ha'il City, Saudi Arabia. Cochran's sample size formula for continuous data (n = [(t * s)^2 * 2] / d^2), was applied to calculate the sample size for this study. The formula used by this online calculator is by using an online calculator by choosing α = 0.05, Standard Deviation (S.D. = 9) for the continuous outcome variables, and the value of absolute precision (d = 1).[29]

The inclusion criteria were that participants should be full-time students enrolled in either a Bachelor's or Master's Program offered by higher educational institutes in Ha'il city, Saudi Arabia. Data collection was completed during the 2020–2021 academic year. All the educational institutions had already started offering online studies to adhere to the COVID-19 pandemic social distancing restrictions imposed during this period. Thus, online survey was the most appropriate method to collect data. We collected 343 responses and after excluding forms with missing/incoherent data the final sample size was 328.

## Data Collection

Data were collected during the pandemic period; therefore, online educational platforms were used to circulate the survey link to the target population.

## Study Tools

### Cognitive Flexibility Inventory (CFI)

A self-report validated measure known as the Cognitive Flexibility Inventory (CFI) was used to assess cognitive flexibility.[3] It determines cognitive flexibility by assessing a person's ability to perceive challenging situations as controllable, think about various explanations for stressful life events and human behaviors, and derive alternative solutions to handle problematic situations. The measure comprises 20 items. The sample items on the scale are "When in difficult situations, I consider multiple options before deciding how to behave" and "I am good at adjusting myself according to the situations". Each item is rated on a five-point scale from 1 = Strongly Disagree to 5 Strongly Agree. The scale demonstrated adequate psychometric properties with a test-retest reliability coefficient with a gap of 7 weeks (α = 0.81).[3] The Cronbach's alpha reliability coefficient in this study was α = 0.86.

### Impact of the COVID-19 on Daily Life

This was measured using the COVID-19 Adolescent Symptom & Psychological Experience Questionnaire (CASPE) sub-scale.[30] Students were asked to report the degree of the negative impact of COVID-19 on their daily lives. This was calculated using a set of 10 items. The first item asked the respondents to rate the negative impact of the COVID-19 pandemic on their daily lives using a five-point rating scale from 0 = Not at All to 4 A Great Deal. This was followed by a set of nine items that assessed the impact on nine aspects of daily life, such as having to stay at home, direct or indirect exposure to COVID-19, lack of access to things they need, loss of income, and not going to university. A higher score indicated a higher intensity of impact on daily life.

### Emotional Symptoms

This is also measured by employing a sub-scale of the COVID-19 Adolescent Symptom & Psychological Experience Questionnaire (CASPE).[30] Students were asked to report the severity of emotional symptoms experienced by them in the past 15 days due to online teaching/distance learning during COVID-19. A list of 15 unpleasant emotions, such as

anxiety, anger, fear, sadness, worry, and irritability, was assessed on a five-point rating scale from 0 = Not at All to 4 Extremely.

### Perceived Academic Stress

The assessment of academic stress was carried out by the psychological measure called "The Perception of Academic Stress Scale".[31] It is a well-known, valid, and reliable measure of perceived academic stress among university students. The sample item on the positively worded statement is "I believe the amount of work assignment is too much" and the sample item on the negatively worded statement is "I fear failing courses this year". The items were rated on a 5-point Likert Scale. The sum of the scores on both scales provides a total score on academic stress, and Cronbach's alpha reliability was found to be $\alpha = 0.80$.

## Ethical Considerations

The current study followed ethical principles in accordance with the Declaration of Helsinki throughout the research process. All participants signed the electronic version of the informed consent that was presented to them before the main survey questionnaire. Moreover, they were explained that participation in the study is on voluntary basis, and they were also informed of their right to withdraw from the research at any point. There was no apparent risk in completing the survey questionnaires, and it is believed that completing the CFI inventory may have provided students with a chance to reflect on their thinking styles. Additionally, students were provided with resources for supportive counseling and electronic information leaflets about self-help resources, should they require emotional or psychological support. The confidentiality and anonymity of their responses were ensured during data collection, analysis, and reporting. This study received approval from the Research Ethics Committee at the University of Ha'il with the approval number H-2020-091.

## Data Collection

The online survey link was shared with the students through online communication. The study invites contained basic information about the study aims, their expected role as a study participant, and assurance of adherence to ethical considerations for this research. Students who consented to participate in the study proceeded to a section on study tools. Data collection was completed in the third week of the first semester of the 2020–2021 academic year, when all higher educational institutions in KSA conducted online distance education through the Learning Management System (LMS).

## Data Analysis

Data were analyzed using the IBM SPSS software (25.0 version). The data were assessed for assumptions of normality using Q-Q plots, skewness, and kurtosis values. Descriptive findings were reported using mean scores. Parametric tests (independent sample $t$-test and $f$-test) were applied to determine the significance of mean differences in academic stress across categories of demographic variables, and Pearson's correlation was computed to determine the bivariate association between the impacts of COVID-19 on daily life, psychological impacts, and cognitive flexibility with academic stress. Multiple regression analysis was applied to determine the independent positive influences of CF in reducing academic stress after controlling for the negative impacts of COVID-19 on daily life, emotional repercussions, and demographic variables. Both the VIF and Tolerance statistics were computed to rule out multicollinearity. The level of significance was set at $p < 0.05$, and 95% CIs were reported for beta coefficients.

## Results

The study participants included males (n = 80; 25%) and females (n = 248; 75%). In this sample, 79 (24%) were in the age group of 18–20 years and 249 (76%) in the age group of 21–25 years. The majority were studying in bachelor-level programs (n = 297; 90%), while the remainder were studying in master-level programs (n = 31; 10%). Most students who participated in this survey were in the fourth year (n = 141; 43%) and third year (n = 109; 33%), followed by the first year (n = 42; 13%) and the second year of the study (n = 36; 11%).

Table 1 shows that there were significant mean differences across gender in academic stress, and females had higher scores on academic stress (M = 28.52; SD = 6.21) than males (M = 25.90; SD = 5.94) (t(326) = 2.04; $p < 0.05$). These

**Table 1** Significance of Mean Score Differences on Repercussions of COVID-19 on Daily Life, Emotional Repercussions, Cognitive Flexibility, and Academic Stress (n = 328)

| Variable | Repercussions on Daily Life M (S.D.) | Emotional Repercussions M (S.D.) | Cognitive Flexibility M (S.D.) | Academic Stress M (S.D.) |
|---|---|---|---|---|
| **Total Mean scores** | 7.76 (2.71) | 23.95 (14.07) | 61.60 (12.26) | 28.00 (5.69) |
| **Gender$^{¥}$** | | | | |
| Male (25%) | 7.99 (2.93)$^{ns}$ | 23.89 (13.86)$^{ns}$ | 60.20 (11.93)$^{ns}$ | 25.90 (5.94)* |
| Female (75%) | 7.69 (2.62) | 23.98 (14.17) | 62.05 (12.36) | 28.52 (6.21) |
| **Age Group$^{¥}$** | | | | |
| 18–20 years (24%) | 7.86 (2.59)$^{ns}$ | 23.58 (14.31)$^{ns}$ | 61.63 (11.51)$^{ns}$ | 28.46 (6.44)$^{ns}$ |
| 21–25 years (76%) | 7.73 (2.74) | 24.07 (14.03) | 61.69 (12.51) | 28.02 (6.11) |
| **Program$^{¥}$** | | | | |
| Bachelors (90%) | 7.82 (2.71)$^{ns}$ | 24.27 (14.25)$^{ns}$ | 61.73 (12.33)$^{ns}$ | 28.17 (6.27)$^{ns}$ |
| Masters (10%) | 7.16 (2.53) | 20.94 (11.99) | 61.29 (11.67) | 27.74 (5.27) |
| **Study year$^{\#}$** | | | | |
| First Year (13%) | 7.43 (2.80)$^{ns}$ | 20.74 (13.88)$^{ns}$ | 61.10 (10.1)$^{ns}$ | 28.74 (5.24)$^{ns}$ |
| Second Year (11%) | 8.28 (2.39) | 24.86 (15.22) | 61.92 (13.0) | 26.42 (6.80) |
| Third Year (33%) | 7.52 (2.65) | 23.26 (13.48) | 62.98 (12.5) | 28.25 (6.13) |
| Fourth Year (43%) | 7.91 (2.77) | 25.22 (14.24) | 60.60 (12.4) | 28.29 (6.30) |

**Notes**: M, Mean; S.D, Standard Deviation; p-value significance= *p<0.05; ns=non-significant; ¥= $t$ test; #= $f$-test.

findings demonstrate and implies understanding of various factors that increase their vulnerability to experience academic stress during the online studies.

Table 2 presents the analysis from the Pearson correlation analysis. Findings demonstrated a two-tailed significant positive relationship between the repercussions of COVID-19 on daily life and emotional repercussions (r = 0.259; $p$ <0.001) and academic stress (r = 0.171; $p$ < 0.001). There was a negative relationship between repercussion of the COVID-19 on daily life and CF (r = –1.51; $p$ < 0.01). Emotional repercussions also demonstrated a significant relationship with CF (r = –.129; $p$ < 0.05). CF had a significant negative association with academic stress (r = 0.197; $p$ < 0.001). The correlation between these study variables were statistically significant, though strength of relationships lies in the low to moderate range. These findings suggest that the repercussions of COVID-19 increased the risk of experiencing both emotional symptoms and academic stress. These findings imply the need for psychological interventions to mitigate those impacts and one of the possible psychological tools could be inculcating CF among university students.

**Table 2** Pearson Correlation ($r$) Between Study Variables (n = 328)

| | Repercussions of COVID-19 on daily life | Emotional Repercussions | Cognitive Flexibility | Academic Stress |
|---|---|---|---|---|
| **Repercussions of COVID-19 on daily life** | - | 0.259*** | −0.151** | 0.171*** |
| **Emotional Repercussions** | - | - | −0.129* | 0.106 |
| **Cognitive Flexibility** | - | - | - | −0.197*** |

**Notes**: p-value significance= ***p<0.001; **p<0.01; *p<0.05.

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**Table 3** Multiple Regression Analysis to Determine the Positive Role of CF in Reducing Academic Stress in University Students During the COVID-19 Pandemic (n = 328)

| Predictors | Unstandardized Coefficients | | Standardized Coefficients | t | 95% CI for B | | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | B | Std. Error | β | | Lower Bound | Upper Bound | Tolerance | VIF |
| (Constant) | 3.61 | 0.43 | | 8.33*** | 2.76 | 4.46 | | |
| Gender | −0.01 | 0.09 | −0.01 | −0.08[ns] | −0.197 | 0.181 | 0.93 | 1.07 |
| Age | 0.01 | 0.11 | 0.01 | 0.11[ns] | −0.187 | 0.209 | 0.85 | 1.16 |
| Academic Program | 0.18 | 0.16 | 0.07 | 1.15[ns] | −0.129 | 0.499 | 0.73 | 1.36 |
| Year of Study | −0.02 | 0.04 | −0.029 | −0.45[ns] | −0.114 | 0.071 | 0.68 | 1.45 |
| Repercussions of the COVID-19 on daily life | 0.32 | 0.15 | 0.11 | 2.09* | 0.020 | 0.636 | 0.89 | 1.12 |
| Emotional Repercussions | 0.07 | 0.04 | 0.10 | 1.91** | −0.002 | 0.158 | 0.89 | 1.11 |
| Cognitive Flexibility | −0.22 | 0.06 | −0.19 | −3.54*** | −0.353 | −0.101 | 0.94 | 1.05 |

**Notes**: p-value significance= ***p<0.001; **p<0.01; *p<0.05; ns=non-significant.

Table 3 shows computations from the multiple regression analysis. Findings demonstrated that the model fit significance (F = 3.78; df = 7; $p < 0.001$), and the Adjusted $R^2$ value was found to bring 7.6% variation in the dependent variable, which is not very large but acceptable in the case of psychological variables. CF significantly contributed to decreasing academic stress experienced by students during the COVID-19 pandemic (b = –0.196, t = –3.54; $p < 0.001$; 95% CI = –3.53 to –0.11) after controlling for the impact of demographic variables and repercussions of COVID-19 on daily life (b = 0.119, t = 2.09; $p < 0.05$; 95% CI = 0.02–0.63) and emotional repercussions (b = 0.109, t = 1.91; $p < 0.05$; 95% CI = –0.01–0.15). The multiple regression analysis clearly demonstrated the protective role of CF in academic stress among university students after controlling the effect of the COVID-19 repercussions on daily life and emotional symptoms. These findings imply to promote flexible thinking styles among university students which is possible by encouraging them to participate in activities that foster creativity and problem-solving and group discussions.

## Discussion

This study focused on determining the protective role of CF in reducing academic stress experienced by students during the COVID-19 outbreak, which disrupted the functioning of daily life at several levels and had psychological impacts. The current data and analysis were sufficient to answer our key research questions. Based on the current findings, we can validate the positive influence of cognitive flexibility in reducing academic stress. Considering the strengths and limitations of online cross-sectional survey designs, we discuss the key insights from this study in view of previous educational and psychological studies and make recommendations for educational interventions.

The current study is distinguished from previous studies in that it focuses on inspecting the role of CF in students' study experiences during the unique situation of the COVID-19 pandemic. This study demonstrated that CF was significantly negatively associated with academic stress and, in multiple regression models, it also demonstrated its protective role, despite the significant negative impact of COVID-19 on daily life and emotional health. Moreover, both the repercussions of the COVID-19 pandemic and emotional symptoms have significantly contributed to academic stress. The sudden shift to full-time online studies and the broader social and public health context during the COVID-19 pandemic in Saudi Arabia have ensured the strict implementation of social distancing measures for a relatively longer duration in some regions of the country, causing emotional symptoms and academic stress. The majority of educational institutes first established their portal systems to conduct digital classes during the pandemic, and both teachers and students faced several practical issues, such as access to Internet connection, speed, uploading and downloading study

materials, and assessment hazards that influenced teaching and learning processes.[32] These technical difficulties might strongly influence students' perceptions of study load and time constraints and be a source of academic stress. However, we also found that adaptive thinking processes, as measured by the cognitive flexibility scale, were influential in coping with academic stress to some extent.

Academic stress is embedded in all educational environments, and previous literature has supported the positive influence of cognitive flexibility on academic achievement, and cognitive flexibility equips students with attention and mindfulness that enable them to meet the demands of academic performance.[33,34] Our findings provide important evidence of the role of CF in the COVID-19 pandemic period and insights to build future research that should also explore the impact of full-time online studies on the attentional and mindfulness states of students. These explorations will be useful for devising appropriate online teaching methods to increase flexibility through the underlying psychological processes. A systematic review of studies also demonstrated that people were at an increased risk of developing feelings of entrapment due to social distancing restrictions, economic difficulties, an unaccredited future, and poor coping skills that impacted their mental health and well-being.[35]

The current findings have practical implications for educationists and strongly recommend the development and use of educational tools that enhance CF capacity among university students. Equipping students with personal mental resources to overcome academic apprehensions during online studies will ensure beneficial learning outcomes and well-being in the longer run. The researchers, based on personal teaching experiences during online studies, found that many students employed alternative ways of solving problems during the pandemic; for example, students shared their concerns about difficulty in focusing during online classes, requested teachers to extend deadlines for assignments during the pandemic, and teachers were also more responsive to such requests to support task completion. This may have provided relief for students to meet deadlines. Moreover, most assignments and tasks during online studies do not require any fieldwork, and students have the choice to find several ways to complete assignments due to increased access to a variety of online teaching resources. The online exam environment might have provided a better sense of control because of the absence of physical monitoring. CF is traditionally seen as an inherent ability of human beings to enable multitasking, problem-solving, and informed decision-making. However, given the increasing demand for this skill in current times, educationists are encouraged to devise teaching strategies that can foster this capacity among students. One effective approach is through diverse and challenging coursework that requires students to think critically and approach problems from different perspectives. Another way is to encourage participation in activities that foster creativity and problem-solving, such as group discussions, debates, or project-based learning. Additionally, incorporating opportunities for reflection and self-assessment can help students develop the ability to adapt their thinking and consider alternative viewpoints.

There are a few limitations that should be considered before attempting to generalize these results to all students, as our study sample comprised university students and there was an over-representation of female students compared to male students. Moreover, the use of self-report methods, where students might not pay much attention while filling online survey forms due to saturation with online learning environments, was used because we found that females had higher scores on both the control subscale of CF and negative perceptions of study load, which is a somewhat unusual pattern and does not match the rest of the picture in this analysis. The sample was retrieved from one city in Saudi Arabia and did not include students at the national level. Future studies should be conducted with a large sample size, retrieved not only from all cities in the country but also at the regional level, to increase the generalizability of the study findings. There is a need to see the role of cultural factors as broader social norms and practices in this country which promote conformity rather than flexibility; thus, how they influence students' experiences during online studies needs further exploration.

## Conclusion

This study preliminarily confirmed the protective role of CF in mitigating academic stress among university students taking online classes during the COVID-19 pandemic in Saudi Arabia. Developing educational tools that foster adaptive thinking styles among students will be useful in enabling them to cope with study-related stressors during uncertain

times. To develop holistic interventions, the role of other factors, such as attentional abilities, social support networks, and mindfulness tools, should be explored to deal with academic stress.

## Data Sharing Statement

The data presented in this study are available on reasonable request from the corresponding author.

## Ethical Review

The project was reviewed and approved by the Ethical Review Committee of the University of Ha'il on May 10, 2020 (approval number: H-2020-091).

## Funding

## Disclosure

The authors declare no competing interests.

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