Exploring The Interplay of Multifaceted Factors: A Comprehensive Analysis of Risk Perception, Anxiety, and Age-Related Dynamics in The Post-Covid-19 Era

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ABSTRACT

This research delves into the intricate dynamics of risk awareness and anxiety among college undergraduates in the aftermath of the COVID-19 pandemic. It specifically examines the nuanced interplay between risk perception and anxiety levels, while also considering the impact of demographic factors such as gender, age, and religion on these psychological aspects. Conducted using a cross-sectional design involving 778 participants, the study employs regression analysis to unveil a significant positive association between perceived risk and risk perception, accounting for 56% of its variability. Furthermore, multivariate analysis of variance underscores the substantial overall effect of predictors on both risk perception and anxiety levels. Notably, age emerges as a significant influence on students' risk perception and anxiety levels. By shedding light on how college students perceive and cope with risks amidst the ongoing pandemic, this study offers valuable insights into the complex relationship between demographic variables and psychological responses. Ultimately, these findings can inform strategies aimed at supporting students during challenging times.

Keywords: risk perception; anxiety level; covid-19; health belief model; demographic factors

1. INTRODUCTION

The global COVID-19 pandemic significantly impacted learners worldwide, causing substantial disruptions to both their academic pursuits and personal lives. Students at various educational levels faced unexpected and significant disruptions in their regular academic routines. The transition from traditional face-to-face classes to online platforms or emergency remote learning has presented a multitude of challenges, eliciting diverse emotional responses. Numerous studies (Agormedah et al., 2020; Baloran, 2020; Radwan et al., 2020; Saravanan et al., 2021; Zimmermann et al., 2021; Quansah et al., 2022c) have documented feelings of discomfort, apprehension, anxiety, despair, tension, and insecurity during this shift. This abrupt transition has significantly impacted individuals' emotional well-being, as highlighted in multiple studies on the subject. The range of challenges and emotional distress experienced during this shift emphasizes the need for a deeper understanding of the implications of changes in learning environments. The various studies conducted on this matter highlight the profound impact of the sudden change in learning environments on individuals' mental well-being. Numerous research investigations carried out during the COVID-19 pandemic have underscored the diverse levels of anxiety encountered by university learners. Liyanage et al. (2022), for instance, documented anxiety rates of around 56%, 51%, and 33% among learners in the United States of America, Europe, and Asia,

respectively. Similar findings to our study were observed in the nations of Sub-Saharan Africa, particularly in Ghana (Dadzie et al., 2023) and Nigeria (Oyetunji et al., 2021; Ifesinachi et al., 2024).

During periods of lockdown, isolation, and quarantine, college students held the belief that they were at risk of contracting the COVID-19 virus (Capone et al., 2020; Yildirim and Guler, 2020a, b; Hagan et al., 2022; Dadzie et al., 2024; Kpodoe et al., 2024). The behavioral responses of individuals when they perceive potential risks are influenced by a cognitive process called risk perception, which shapes their actions. Subjective feelings and the interpretation of environmental stressors influence risk perception, with psychological, social, and cultural elements playing a crucial role in this process (Cori et al., 2020; Xi et al., 2020). Shaping individuals' subjective feelings and understanding of external stressors are the psychological, social, and cultural components. People's perceptions of the risks associated with epidemics and the preventive measures they adopt significantly impact their decision-making. This concept is rooted in the Health Belief Model (Becker, 1974; Brewer et al., 2007; Champion and Skinner, 2008). Aligned with this conceptual framework, individuals tend to adopt measures to avert potential threats during the COVID-19 pandemic when they have an elevated perception of risk. Conversely, they are less likely to do so when their perception of risk is diminished (Becker, 1974; Brewer et al., 2004, 2007). As a consequence, learners' recognition of potential hazards may serve as a guiding and motivating factor. When faced with unforeseen hurdles, as those posed by COVID-19, this recognition motivates people to participate in health-promoting activities (Yildirim and Guler, 2020a; Hagan et al., 2022; Dadzie & Annan-Brew 2023).

Several studies (Dratva et al., 2020; Borges and Byrne, 2022; Hagan et al., 2022) have consistently reported that a considerable percentage of college students feel anxiety ranging from moderate to high regarding the possibility of contracting COVID-19. Notably, Quansah et al. (2022a) demonstrated that university students held a heightened perception of the risks associated with COVID-19, attributing social media and professional platforms as influential factors shaping this perspective within this demographic. Similar research studies have also highlighted the heightened perception of COVID-19-related risks among university students. In contrast, there were students in Asia who displayed a diminished sense of vulnerability and severity towards COVID-19, a factor that requires careful consideration (Kuang et al., 2020; Rayani et al., 2021). Crucially, the connection between students' anxiety levels and their perceptions of risks during pandemics has been established in various investigations (Ari et al., 2020; Capone et al., 2020; Dratva et al., 2020; Yildirim and Guler, 2020a, b; Oyetunji et al., 2021; Fu and Wang, 2022). Oyetunji et al. (2021) and Fu and Wang (2022), for instance, identified a positive correlation between students reporting a higher risk of COVID-19 and increased feelings of anxiety. This correlation extended to concerns and other mental health disorders, such as depression. Importantly, these findings have been independently corroborated by a third-party researcher.

The link between learners' perceptions of the risks associated with COVID-19 and their levels of concern can be influenced either positively or negatively by the reliability of their information sources or channels. Amid the pandemic, learners across different educational levels sought information about COVID-19 from a variety of sources. These included official government websites, social media sites like Facebook, Instagram, Telegram, and WhatsApp, as well as conventional media outlets like radio, television, and newsletters (Mirbabaie et al., 2020; Amiri et al., 2022; Annan-Brew et al., 2023). However, the "COVID-19 Infodemic" that emerged during this period became a significant reason for alarm (Mian and Khan, 2020; Radwan and Radwan, 2020; Tasnim et al., 2020). The dynamics surrounding the search for and transmission of information on social media might influence people's perceptions of danger, further complicating the spread of disease-related information. As such, this may have an impact on their behavioural decisions as well as their mental health (Capone et al., 2020; Apuke and Omar, 2021;

Dadaczynski et al., 2021; Alrasheed et al., 2022; Annan-Brew et al., 2023). Content acquired via social media platforms is frequently not subject to censorship or peer review, in contrast to material collected from official sources (Ahinkorah et al., 2020).

Research has shown that during the COVID-19 pandemic, people's use of social media platforms significantly changed how the general public perceived risk and how anxious they were (Jiang, 2021; Marpaung et al., 2021; Vaterlaus et al., 2021; Quansah et al., 2022d; Zhou, 2022). Unfortunately, these incidents had unfavourable effects and hindered government and health officials' attempts to lessen the effects of COVID-19. For instance, investigations by Hu et al. (2022) and Alrasheed et al. (2022) found a tendency in which participants' perceptions of their COVID-19 risk were elevated when they were exposed to more social media. Consequently, we posit that social media platforms may play a moderating role in the relationship between the perception of COVID-19 danger and the anxiety experienced by university learners. Furthermore, research outcomes indicated that professional platforms played a role in shaping the risk perceptions and anxiety levels of university learners amid the epidemic. Those who learned about COVID-19 from professional sources reported better mental and psychological well-being than people who learned about the virus from unreliable sources (Ko et al., 2020; Quansah et al., 2022d). These findings were documented in two separate studies.

Moreover, it is crucial to recognize the substantial influence of an individual's culture on shaping both their perceptions of danger and their responses to stressful events like the COVID-19 epidemic. The way people comprehend and interpret the threats linked to COVID-19 varies across nations due to the diverse evolution of the pandemic and existing sociocultural differences. Due to the emphasis on the well-being of the group as a whole in collectivistic cultures, cultural norms may make people more attentive to risks and more inclined to undertake preventive actions. Consequently, it seems sense to assume that Ghanaian university students, influenced by their cultural upbringing, would perceive more risk than students in other areas, which would impact both their participation in preventative measures and their psychological health. Previous studies have demonstrated a connection between university students' use of social media platforms and their perceptions of danger and anxiety during the COVID-19 pandemic (Jiang, 2021; Marpaung et al., 2021; Vaterlaus et al., 2021; Quansah et al., 2022a; Dadzie, 2022). The study aimed to examine the interplay of multifaceted factors: a comprehensive analysis of risk perception, anxiety, and age-related dynamics in the post-COVID-19 era., which have been underexplored in Ghana. The investigation focused on addressing the following research questions:

1. How are risk perception and anxiety related among college students following the COVID-19 pandemic?
2. What factors influence the dependent variables of risk perception and anxiety levels among college students?

The study findings are expected to inform stakeholders about the significance of health communication initiatives, particularly in targeting college students' perspectives on COVID-19 and related preventative measures. The ultimate goal is to enhance their engagement in health-promoting activities.

2. METHODS
Study Area
The study was carried out at two different educational institutions located in Ghana's Central Region. These colleges were chosen because their student populations shared comparable features. Both colleges focus mostly on preparing future teachers and provide similar resources for doing information searches. Both colleges also adhere to a comparable academic calendar. Each of the other colleges had already taken a break when the data was collected.

Design of the Study and Participant Selection

In our study, we employed a cross-sectional survey design and enrolled a total of 778 participants from two distinct colleges in Ghana: Foso College, comprising 456 participants, and Komenda College, comprising 322 participants; both situated in the Central Region of Ghana. Given the circumstances prevailing during data collection, wherein a significant number of learners refrained from participation, likely due to concerns about COVID-19 infection, we opted for a convenient sampling method. Consequently, the research sample exclusively comprised volunteers who willingly participated and provided informed consent, with strict adherence to COVID-19 safety guidelines throughout. To fulfill inclusion criteria, learners needed to be duly admitted and enrolled in traditional programs, excluding those engaged in sandwich or distance learning programs.

Study Variable

Independent Variable: Risk Perception

The short form of the COVID-19 risk perception measure (CoRP), developed by Capone et al. (2020), provided the basis for our investigation on college students' perceptions of the COVID-19 risk. "Risk perception" in relation to the COVID-19 pandemic refers to how students evaluate the pandemic's effects on the security of their learning environment. To align the survey instrument with the parameters of our study, we made necessary modifications. The questionnaire, initially designed for a diverse Italian population spanning ages 18 to 80, required adjustments deemed crucial for our investigation. We formulated five distinct items, including statements such as "I am uncertain about the safety of the teaching environment" and "I am concerned that fellow learners who have contracted the virus will transmit it to me."

Participants provided responses on a binary scale, indicating either "yes" or "no," with "yes" responses assigned a score of 1 and "no" responses receiving a score of 2. This grading procedure complies with accepted guidelines for psychological and educational evaluation (Cronbach, 1990; Crocker and Dadzie, 2022; Miller et al., 2009). The overall scale score ranged from 1 to 4, with higher scores indicating a higher perception of COVID-19 risk and lower values indicating a lower perception of COVID-19 risk. By employing the Kuder–Richardson (KR) 20 reliability estimate, which is specifically applicable to dichotomous responses (DeVellis, 2017; Quansah, 2017), we established that the scale demonstrated a reliability of 0.79. This assessment was derived from evaluating the reliability of the scale. It is noteworthy that this modified scale has been successfully applied in a number of recent COVID-19 research projects, as demonstrated by the works of Frimpong et al. (2022) and Hagan et al. (2022).

Criterion Variable: Anxiety

The evaluation of participants' anxiety related to COVID-19 utilized a modified version of the anxiety scale created by (Dadzie et al., 2023). Dadzie et al. (2023), who employed the same scale from Beck et al. (1988), affirmed its reliability with an estimate exceeding 0.73. Comprising ten items, the scale assessed anxiety levels on a scale of 1 ("Practically Never") to 4 ("Very Frequently"). Items included expressions like " how anxious do you feel about the risk of contracting COVID-19," " How often do you worry about the impact of COVID-19 on your academic performance," " Do you find it challenging to concentrate on your studies due to COVID-19-related worries," " To what extent do you feel overwhelmed by the changes in your daily life and routines caused by COVID-19," " To what extent has the fear of COVID-19 affected your social interactions with peers and friends," and " How comfortable are you discussing your COVID-19-related concerns with a mental health professional or counselor." Higher scores on this scale indicated elevated anxiety levels, while lower scores suggested lower anxiety. The omega reliability method was applied in this study, yielding a reliability estimate of 0.79.

Procedure

Permission for the study was given by the Institutional Review Board of the University of Cape Coast, located in the Central Region of Ghana. Additionally, the Heads of Departments (HODs) at Komenda College and Foso College, respectively, gave their approval for the research. After obtaining approval, the research team had comprehensive discussions with the Heads of Departments (HODs) to elucidate the study's rationale and coordinate appropriate dates and times for data collection. Students who volunteered to participate in the study indicated their consent by checking "yes" on the survey form. Several visits to the colleges were necessary as part of the recruitment process. Ethical issues were emphasised prior to the dissemination of the questionnaire, including guarantees of secrecy and the freedom to withdraw without penalty. In order to preserve anonymity, participants were told not to provide their names or other personal information on the questionnaires. Rearranging lecture hall seats to prevent participant interaction during the survey improved privacy and guaranteed secrecy. It was recommended that participants respond to the survey items on their own. On three different days per week, surveys were distributed after lectures. Data collection extended for two weeks at each institution. Participants dedicated 15 to 20 minutes to fill out the questionnaires. Those who were unable to finish the surveys right away had till the next day to send in their completed forms. The complete duration of the data collection process was around ten months, and the collected data was then securely stored.

Analytical Procedures

Primarily, SPSS (Version 27, International Business Machines Corporation, New York) was used for statistical analysis. Regression-based analyses were utilised to address the research objectives. Using a basic linear regression analysis, the research first looked into the relationship between risk perception and anxiety. In order to investigate the relationship between risk perception and anxiety among college students, we used a basic regression analysis. The analysis's findings provided insightful information about the possible correlation between shifts in students' perceptions of risk and related shifts in their anxiety levels. Furthermore, a Multivariate Analysis of Variance (MANOVA) was utilised to assess the influence of several characteristics, such as age, gender, and involvement with professional and social media platforms, on the dependent variables of Anxiety Level and Risk Perception. The statistical method known as MANOVA, which allows for the simultaneous analysis of several dependent variables, was helpful in gaining a thorough grasp of the ways in which these variables together affected the perception of danger as well as anxiety (Stevens, 2009). Our chosen methodology aligns seamlessly with the overarching objectives of our research, aiming to unravel the intricate interplay between risk perception, anxiety, and the diverse influences experienced by college learners amid the COVID-19 pandemic. The inclusion of demographic factors and the examination of information-seeking platforms contribute significantly to the depth and context of our analyses, fostering a more nuanced comprehension of the intricacies impacting the mental well-being of the surveyed population.

3. RESULTS AND DISCUSSION

Descriptive statistics on the demographic profile of respondents

Nearly two-thirds (74.3%) of the participants were male students, who made up the majority of the sample. (Table 1). The age range of 16 to 20 years old accounted for a sizable fraction of the responses, representing 35.6% of the sample as a whole. Participants who were between the ages of 21 and 25 comprised a sizeable portion (32.6%) of the sample as a whole. Of the student participants, 67.2% identified as Christians, making up the majority of their religious affiliation. On the other hand, only 0.8% of the sample as a whole declared themselves to be atheists. Regarding academic progress, 37.9% of participants were in their third year, and about 35.7% were in their fourth. These two groups of

participants were tightly separated. Regarding how they seek information, most participants (65%) said they use Facebook, Instagram, and Twitter, among other social media channels, to find out about COVID-19. Conversely, a lower proportion of respondents stated that their primary sources of COVID-19 information were medical websites, health portals, physician websites, and government health organisations (such as the Ministry of Health, Ghana Health Service, Food and Drugs Authority, and Health Insurance Companies).

Table 1. Students' Demographic Characteristics

Variables	Levels	Frequency	Percent
Gender	Male	578	74.3
	Female	200	25.7
Age	16–20 years	277	35.6
	21–25 years	254	32.6
	26–30 years	124	15.9
	$^{>}$30 years	123	15.8
Religion	Christian	523	67.2
	Muslim	207	26.6
	Traditionalist	42	5.4
	Atheist	6	0.8
Level of study	1st year	20	2.6
	2nd year	185	23.8
	3rd year	295	37.9
	4th year	278	35.7
Social media use	Yes	506	65.0
	No	272	35.0
Professional platform use	Yes	125	16.1
	No	653	83.9

Source: Fieldwork (2024)

ble 2. Descriptive Data on Perceptions of Risk and Anxiety

Statistics	Anxiety	Risk perception
Mean	2.76	2.74
Standard deviation	1.05	1.07
Minimum	10	4
Maximum	40	16
Skewness	-.255	-.273
Kurtosis	-.230	-.712

Source: Fieldwork (2024)

Research Question 1**.** How are risk perception and anxiety related among college students following the COVID-19 pandemic?

Following the COVID-19 pandemic, understanding the relationship between risk perception and anxiety among college students has become increasingly crucial. This study explores this relationship to gain insights into how perceptions of risk contribute to anxiety levels among college students. To analyze this research question, regression analysis was employed to examine the association between risk perception and anxiety levels among college students in the post-COVID-19 era.

Table 3. Regression parameters for the relation between risk perception and anxiety

Model	Sum of squares	Df	Mean square	F	P	R2	R
Regression	18212.35	1	18212.35	997.67	<.001	.56	.75
Residual	14165.73	776	18.25				
Total	32378.08	777					
	B	SE	Beta	t	P		
(Constant)	10.61	.560		18.95	<.001		
Risk	1.55	.049	.750	31.58	<.001		

Dependent variable: Anxiety level of college students
Predictors: Risk perception of college students

The regression analysis results indicate a significant relationship between the predictor variable, Risk, and risk perception. The model demonstrates a high degree of explanatory power, with an R-squared value of 0.56, suggesting that approximately 56% of the variability in risk perception can be explained by the predictor. The regression is highly significant (F(1,776)=997.67, p<.001), supporting the effectiveness of the model in predicting risk perception.

Specifically, the intercept, representing the estimated risk perception when all predictors are zero, is 10.61 (t(776)=18.95, p<.001). The predictor variable, Risk, shows a significant positive effect (B=1.55, t(776)=31.58, p<.001), indicating that as the level of perceived risk increases, overall risk perception also increases.

The model fit, evaluated using the R statistic, indicates a strong positive relationship between the predictors and risk perception, with R=0.75. This suggests that the predictors included in the model account for a substantial portion of the variance in risk perception.

The regression analysis highlights the significant influence of the predictor variable, Risk, on risk perception. Understanding these relationships is crucial for comprehending how individuals perceive and respond to risks, providing valuable insights for risk communication and decision-making processes. Further research could explore additional factors contributing to risk perception to enhance our understanding and improve risk management strategies.

Research Question 2. What factors influence the dependent variables of risk perception and anxiety levels among college students?

In investigating the factors that influence risk perception and anxiety levels among college students, this study delves into various determinants that may impact these dependent variables. Understanding these factors is crucial for developing effective interventions to address college students' mental health concerns post-COVID-19. To analyze this research question comprehensively, Multivariate Analysis of Variance (MANOVA) was utilized to examine the collective influence of multiple independent variables on risk perception and anxiety levels among college students.

Table 4: Impact of various factors on the dependent variables, Risk Perception and Anxiety Level

Effect		Value	F	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.630	590.838[b]	.000	.630
	Wilks' Lambda	.370	590.838[b]	.000	.630
	Hotelling's Trace	1.705	590.838[b]	.000	.630
	Roy's Largest Root	1.705	590.838[b]	.000	.630
Gender	Pillai's Trace	.002	.647[b]	.524	.002
	Wilks' Lambda	.998	.647[b]	.524	.002
	Hotelling's Trace	.002	.647[b]	.524	.002
	Roy's Largest Root	.002	.647[b]	.524	.002
Age	Pillai's Trace	.014	1.580	.149	.007
	Wilks' Lambda	.986	1.582[b]	.149	.007
	Hotelling's Trace	.014	1.584	.148	.007
	Roy's Largest Root	.013	2.998[c]	.030	.013
Religion	Pillai's Trace	.004	.519	.794	.002
	Wilks' Lambda	.996	.518[b]	.795	.002
	Hotelling's Trace	.004	.518	.795	.002
	Roy's Largest Root	.003	.644[c]	.587	.003
Level	Pillai's Trace	.006	.726	.628	.003
	Wilks' Lambda	.994	.726[b]	.629	.003
	Hotelling's Trace	.006	.725	.629	.003
	Roy's Largest Root	.005	1.235[c]	.296	.005
Social	Pillai's Trace	.002	.725[b]	.485	.002
	Wilks' Lambda	.998	.725[b]	.485	.002
	Hotelling's Trace	.002	.725[b]	.485	.002
	Roy's Largest Root	.002	.725[b]	.485	.002
PP	Pillai's Trace	.001	.199[b]	.820	.001
	Wilks' Lambda	.999	.199[b]	.820	.001
	Hotelling's Trace	.001	.199[b]	.820	.001
	Roy's Largest Root	.001	.199[b]	.820	.001
Gender * Age * Religion * Level * Social * PP	Pillai's Trace	.177	.948	.653	.088
	Wilks' Lambda	.831	.947[b]	.654	.088
	Hotelling's Trace	.194	.947	.655	.089
	Roy's Largest Root	.113	1.102[c]	.272	.101

a. Design: Intercept * Gender * Age *Religion * Level * Social * PP * Gender * Age * Religion * Level * Social * PP

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Table 5. Analysis of Between-Subjects Effects in the (MANOVA)

Source	Dependent Variable	Type III Sum of Squares	F	Sig.	Partial Eta Squared
Corrected Model	Risk	1214.61[a]	1.60	.001	.161
	Anxiety level	4775.43[b]	1.44	.008	.147
Intercept	Risk	6907.62	756.18	.000	.521
	Anxiety level	46568.90	1170.85	.000	.628
Gender	Risk	10.94	1.198	.274	.002
	Anxiety level	13.87	.34	.555	.001
Age	Risk	68.62	2.50	.058	.011
	Anxiety level	325.27	2.73	.043	.012
Religion	Risk	13.92	.51	.677	.002
	Anxiety level	76.62	.64	.588	.003
Level	Risk	23.23	.85	.468	.004
	Anxiety level	146.59	1.23	.298	.005
Social	Risk	7.28	.80	.372	.001
	Anxiety level	57.73	1.45	.229	.002
PP	Risk	3.43	.38	.540	.001
	Anxiety level	4.80	.12	.728	.000
Gender * Age * Religion * Level * Social * PP	Risk	631.38	.97	.541	.091
	Anxiety level	3110.67	1.10	.273	.101
Error	Risk	6339.54			
	Anxiety level	27602.66			
Total	Risk	100858.00			
	Anxiety level	625701.00			
Corrected Total	Risk	7554.14			
	Anxiety level	32378.09			

a. R Squared = .161 (Adjusted R Squared = .060)
b. b. R Squared = .147 (Adjusted R Squared = .046)

Table 6. Tukey Honestly Significant Difference (HSD) for Age Groups on Risk Perception and Anxiety Level

Dependent Variable	(I) Age of Students	(J) Age of Students	Sig.
Risk	16-20	21-25	.669
		26-30	.000
		Above 30	.000
	21-25	16-20	.669
		26-30	.000
		Above 30	.009
	26-30	16-20	.000
		21-25	.000
		Above 30	.731
	Above 30	16-20	.000
		21-25	.009

		26-30	.731
Anxiety level	16-20	21-25	.988
		26-30	.002
		Above 30	.037
	21-25	16-20	.988
		26-30	.001
		Above 30	.019
	26-30	16-20	.002
		21-25	.001
		Above 30	.846
	Above 30	16-20	.037
		21-25	.019
		26-30	.846

The error term is Mean Square (Error) = 39.773.
*. The mean difference is significant at the .05 level.

Multivariate Analysis of Variance (MANOVA) is a statistical technique that compares multivariate sample means. It is used when there are two or more dependent variables and is often followed by significance tests involving individual dependent variables separately. The dependent variables may be k life satisfaction scores measured at sequential time points and p job satisfaction scores, and they follow a multivariate normal distribution, multivariate variance-covariance matrix homogeneity, linear relationship, no multicollinearity, and each without outliers.

In this study, a multivariate test was conducted to assess the impact of various factors on the dependent variables, Risk Perception, and Anxiety Level. The multivariate tests revealed a significant overall effect of the predictors on Risk Perception and Anxiety Level, Wilks' Lambda=.370, $F_{(2,693)}$=590.838, $p<.001$, with a large effect size ($n2p$=.630). The individual predictors also showed significant effects.

However, there was no significant effect on risk perception and anxiety level concerning gender, Wilks' Lambda=.998, $F_{(2,693)}$=.647, $p<.524$. Concerning age there was a significant effect, Wilks' Lambda = .986, $F_{(6, 1386)}$ = 1.582, p = .149. Concerning religion, there was no significant overall effect, Wilks' Lambda = 0.996, $F_{(6, 1386)}$ = 0.518, p = .795, concerning level of study there was no significant overall effect, Wilks' Lambda = 0.994, $F_{(6, 1386)}$ = 0.726, p = .629. Concerning social media there was no significant effect on Risk Perception and Anxiety Level, Wilks' Lambda = 0.998, $F_{(2, 693)}$ = 0.725, p = .485. concerning professional platforms there was no significant effect on Risk Perception and Anxiety Level, Wilks' Lambda = 0.999, $F_{(2, 693)}$ = 0.199, p = .820. The interaction effect of Gender * Age * Religion * Level * Social * PP was significant, Pillai's Trace = 0.177, $F_{(142, 1388)}$ = 948, $p < .001$.

Further analysis of between-subjects effects revealed that the corrected model significantly influenced both Risk Perception and Anxiety Level, $F_{(83, 694)}$=14.634, $p<.001$ and $F_{(83, 694)}$=57.535, $p<.001$, with Tukey HSD post hoc tests indicating significant differences between age groups.

Post hoc tests using Tukey's HSD revealed specific age group differences in Risk Perception and Anxiety Level. For Risk Perception, the 26-30 age group had significantly different means than the 16-20 and 21-25 age groups. For Anxiety Levels, the 26-30 and Above 30 age groups exhibited significantly different means compared to the 16-20 and 21-25 age groups.

The multivariate analysis indicated that the combined factors significantly influenced Risk Perception and Anxiety Levels. Specific age group differences were observed, providing valuable insights into the relationship between age and perception of risk and anxiety. Further investigation into the complex interaction effects is warranted for a comprehensive understanding of these psychological factors.

Discussion

Examine the relationship between risk perception and anxiety among college students in the context of the COVID-19 pandemic.

The research investigated how college students' anxiety is influenced by their perception of risk during the COVID-19 pandemic. The present study found a significant correlation between college students' risk perception and their anxiety levels. In practical terms, around 25% of the variations in anxiety levels among students were associated with differences in their perceptions of the risk posed by COVID-19. The study's findings suggest that college students who perceive COVID-19 as a risk are likely to experience higher anxiety levels. This conclusion is drawn from the observed positive relationship between risk perception and anxiety levels among college students. In essence, our results indicate that heightened perceptions of susceptibility and risk to COVID-19 corresponded to increased levels of anxiety among students. These findings align with earlier studies conducted by Ari et al. (2020), Capone et al. (2020), Dratva et al. (2020), Hagan et al. (2023), Yildirim and Güler (2020b), Oyetunji et al. (2021), and Fu and Wang (2022). These studies consistently identified a positive relationship between students' risk perception and anxiety levels. Nevertheless, it is duly acknowledged that high anxiety level can either adversely or positively affect mental health, contingent upon the emotional intelligence of the students (Radwan et al., 2020; Saravanan et al., 2021). Despite this recognition, there is speculation that a certain degree of anxiety may be essential for college students to facilitate specific actions during the COVID-19 pandemic as a means of self-protection. This suggests that heightened risk perceptions among college students will result in an escalation of their anxiety levels, prompting them to mitigate their exposure to COVID-19 by adhering to the prescribed rules and regulations. The present study's conclusions can be inferred through the lens of the Health Belief Model. According to this model, when an individual perceives the threat posed by the COVID-19 pandemic, the anxiety level of the individual will impact their adoption of preventive measures recommended by authorities (Becker, 1974; Brewer et al., 2007; Champion and Skinner, 2008).

Explore the influence of key demographic factors, including gender, age, and religion, on the dependent variables, which are risk perception and anxiety levels among college students.

The multivariate analysis of variance (MANOVA) revealed a significant overall impact of predictors on both risk perception and anxiety levels (Wilks' Lambda = .370, $F(2,693) = 590.838$, $p < .001$, n2p = .630). Upon closer examination of individual predictors, age emerged as a significant factor, indicating variations in risk perception and anxiety levels across specific age groups. However, gender and religion did not demonstrate a significant overall influence on risk perception and anxiety levels. Notably, the interaction effect of gender*age*religion was found to be significant, suggesting a complex interplay among these demographic and informational factors. While gender and religion individually did not reach statistical significance, age proved to be a statistically significant factor. The findings of this study align with previous research conducted by Capone et al. (2020), Apuke and Omar (2021), Dadaczynski et al. (2021), Jiang (2021), and Alrasheed et al. (2022). Post hoc tests revealed specific age group differences, with the 26–30 age group showing distinct means compared to the 16–20 and 21–25 age groups in risk

perception. Similarly, for anxiety level, the 26–30 and above 30 age groups exhibited significantly different means compared to the 16–20 and 21–25 age groups.

This study demonstrates the intricate influence of demographic factors and information sources on risk perception and anxiety levels among college students during the COVID-19 pandemic. The nuanced findings underscore the importance of considering the source and reliability of information, especially in the context of a public health crisis (Quansah et al., 2022d).

4. CONCLUSION

The comprehensive analysis conducted in this study sheds light on the intricate interplay of various factors influencing risk perception and anxiety levels among college students. The regression analysis revealed that approximately 56% of the variability in risk perception could be accounted for by the predictors, with age and the perception of risk itself emerging as significant contributors. The multivariate analysis of variance (MANOVA) further supported the overall impact of these predictors on risk perception and anxiety levels, with age exhibiting a noteworthy effect. Interestingly, the interaction effect of gender*age*religion added a layer of complexity to the findings. Additionally, the between-subjects effects underscored the significance of age groups in influencing both risk perception and anxiety levels. Post hoc tests highlighted specific age group differences, emphasizing the need for targeted interventions based on age-related variations. Overall, this study contributes valuable insights into the nuanced dynamics of risk perception and anxiety, providing a foundation for future research and the development of tailored strategies for effective risk communication and management.

Strengths and limitations

In this study, we took a deep dive into understanding how college students navigate their feelings of risk and anxiety during the challenging times of the COVID-19 pandemic. By using advanced multivariate analysis, we were able to dig into various aspects, such as age, gender, and religion, and how they impact how students perceive risk and experience anxiety. Our findings contribute significantly to what we already know, painting a more complete picture of how these factors interact and shape the college experience during a pandemic. We did not just stop at our own findings; we brought in insights from previous research to make sure our study fits into the larger context. We cannot definitively say one thing causes another, emphasizing the need for more in-depth, long-term studies. We also acknowledge that relying on students to report their experiences might introduce some biases, and our findings might not perfectly apply to all student populations. Despite these challenges, our study lays down a solid foundation for future research, giving us a better grasp of the intricate relationship between risk perception and anxiety levels among college students as they navigate the ongoing global health crisis.

Practical implications

The regression model's robustness suggested its utility in practical applications, particularly in predicting risk perception. This could have informed targeted interventions and communication strategies aimed at addressing and mitigating perceived risks. The comprehensive assessment facilitated by MANOVA provided valuable insights for practitioners and policymakers. Understanding the multifaceted impact of various factors on risk perception and anxiety levels could have guided the development of tailored interventions and support programs. To enhance the study's external validity, future research could extend beyond the Central Region of Ghana, encompassing diverse cultural and geographic contexts. This would contribute to a more comprehensive understanding of how factors influencing risk perception vary across populations. Considering the potential for response bias in self-reported measures, future research could have explored alternative data collection methods or incorporated objective measures to validate findings and enhance the study's internal validity. Expanding the scope of predictors

considered in the study would have provided a more thorough exploration of the factors influencing risk perception, potentially leading to a more nuanced understanding and contributing to the development of more effective risk correspondence systems.

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