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Our Thoughts Matter: The Mental Health of College Students During the COVID-19 Pandemic

Caitlin Zarzeczny
n01053918@unf.edu

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By

Caitlin Zarzeczny

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Abstract

This study aimed to explore the mental health of undergraduate college students within the context of COVID-19 pandemic, as well as cognitions about health threat and engagement in protective health behaviors during the COVID-19 pandemic. Participants were (N = 276) undergraduate students attending the University of North Florida. Students completed a SONA systems survey between March 2021 and December 2021. Participants received course credit for completing the survey. Survey questions were taken from the Perceived Effectiveness of COVID-19 Prevention Effectiveness Protocols scale (Prasetyo et al., 2020). Three types of variables were assessed: demographics, perceived threat, and planned action. Correlational analyses were conducted to assess potential significant relationships between these variables and self-reported anxiety (GAD-7) and depression (PHQ-9). Hierarchical linear regression analyses were conducted to explore relationship among demographics, perceived threat, and planned action and dependent anxiety and depression. Perceived threat was found to be a significant predictor variable for both anxiety and depression. Further research should look more into cultural factors that impact engagement in health behaviors.

keywords: COVID-19, Health Behavior Model, Anxiety, Depression, GAD-7, PHQ-9, Health Psychology, Cognition

Introduction

On March 11th, 2020, COVID-19 was declared a global pandemic (WHO, 2020). Following the declaration of this pandemic, three precautionary methods were implemented in the United States to slow the spread of the disease: wearing a facemask, staying at least six feet from others in public spaces, and avoiding crowds (WHO, 2020). These public health measures in response to COVID-19 have led to unintentional consequences, including: increased social isolation, inability to access supportive educational services, economic difficulties, and increasing unemployment (Brown et al., 2020). Social isolation has been associated with feelings of loneliness, which can lead to more negative feelings such as feeling unloved and feeling misunderstood (Shaver & Mikulincer, 2014). In turn, feeling unloved has been found to be connected to poor health and psychological outcomes such as insomnia and depression (Loades et al., 2020; Scotta et al., 2021).

The COVID-19 Pandemic through a Bioecological Lens

The Bioecological Model proposed by Bronfenbrenner and Morris (2006) contextualizes how COVID-19 can affect individuals on various levels. They define the microsystem as being an individual's immediate environment, which focuses on one's living situation. Due to the financial impact of the pandemic, an estimated 28,900,000 to 39,000,000 tenants in rentals were found to be at risk of eviction in 2020 in the United States (The Aspen Institute, 2020). While the Centers for Disease Control and Prevention (CDC) issued a federal order to temporarily ban evictions from September 2020 to the end of June 2021, not all states have followed this order (Desmond & Gershenson, 2020). In fact, as of early June 2021, only 14 states are upholding this eviction moratorium (O'Connell, 2021). The CDC's justification for wanting an eviction moratorium was to limit the spread of COVID-19, and that increased homelessness would increase the spread of the disease (Desmond & Gershenson, 2020). Not only was there the stress

of potentially losing one's home, but it was compounded by the stress of being at an increased risk of contracting COVID-19 if one were to become homeless.

The microsystem can also involve environments outside of the home, as long as they can be considered an individual's "immediate" environment. So, the microsystem also involves environments such as school and work. In Fall 2020, undergraduate and graduate student enrollment fell 2.5%, compared to Fall 2019 enrollment (National Student Clearinghouse Research Center, 2020). Enrollment in community colleges was especially hard hit, with enrollment decreasing by more than 10% (National Student Clearinghouse Research Center, 2020). In March 2020, the unemployment rate for recent college graduates was 3.84% (Breeze & Kronzer, 2021). In contrast, unemployment rates for recent college graduates increased during the pandemic by June 2020 to a rate of 13.2% - a robust 9.36% increase from prior rates (Breeze & Kronzer, 2021). Even employed college graduates may be struggling with underemployment as another microsystem stressor. As of February 2021, the underemployed rate ranged from 11.21% to 73.2% (Federal Reserve Bank of New York, 2021).

The mesosystem involves influences from interactions with individuals outside of the home, such as friends and neighbors. During the COVID-19 pandemic, a decrease in interactions with such individuals due to social isolation requirements has been associated with a decrease in reported sense of friendship during the pandemic (Philpot et al., 2021). Goodwin et al. (2020) also supported this result, finding that 37% of participants stated that their relationships with their friends were "worse" or "much worse" than prior to the pandemic. On the contrary, they found that 53% of participants had a "better" or "much better" relationship with their romantic partner. While having a close relationship with a romantic partner can be beneficial to an

individual, it is important to have a more expansive, robust social support network to promote one's health and well-being (Mayo Clinic Staff, 2019).

The exosystem includes factors such as the media and government agencies. In the United States, social media has been a crucial medium for disseminating information about COVID-19 to the public (Tsao et al., 2020). The dissemination of information about COVID-19 over social media has been associated with mental health, with increased COVID-19 related news associated with increased depression and anxiety levels in college students (Huckins et al., 2020).

The macrosystem is theorized to contain ideologies of one's culture. During the pandemic, engaging in precautionary health measures became politicized in the United States, with some political groups displaying greater adherence to CDC advice (e.g., social distancing, mask wearing), while others refused to engage in any of these precautionary health measures due to their political beliefs (Rabinovitch-Fox, 2020). Other countries were able to have an easier transition to engaging in health preventative behaviors due to the commonplace acceptance of such behaviors even before the pandemic (e.g., mask-wearing when sick; Leung, 2020).

The chronosystem is defined as change over time. College students normatively experience dynamic change in their lives during college (Arnett, 2015). The pandemic brought about even more change for college students – such as shifts to teleconferenced class meetings (i.e., over Zoom), asynchronous classes, and in-person classes requiring one to wear a mask and socially distance (CDC, 2020). The advent of initial dose disbursement of the COVID-19 vaccine in December 2020 brought hope for some semblance of normalcy (Loftus & West, 2020). However, college students qualified last among adults for the vaccine in most states (Dennon, 2021). This delayed qualification for vaccine receipt was based on the belief that

young people would be less likely to die from COVID-19 than would older adults (Lockerd & Maragakis, 2020). However, college students were not fully immune from experiencing negative effects of contracting COVID-19. Cunningham et al. (2020) found that 8.1% of young adults discharged from hospitals that logged data into the Premier Healthcare Database had been diagnosed with COVID-19. Out of these hospitalized individuals, 21% required intensive care, 10% required mechanical ventilation, and 2.7% of these hospitalized young adults died. These statistics showcase that COVID-19 proved to be a true threat to college students.

Emerging Adulthood and College Students

Development can be defined as "stability and change in the biopsychological characteristics of human beings over the life course and across generations" (Bronfenbrenner & Morris, 2006, p. 796). In the United States, individuals are seen as legal adults once they reach the somewhat arbitrary chronological age of 18 years. However, some developmental literature argues that individuals continue developing even after they become legal adults (Arnett, 2000). Rather, some developmental literature argues that another developmental period starts at the age of 18. Arnett (2000) conceptualized this developmental period of "emerging adulthood" as occurring with individuals ages 18 to 25 years old that live in industrialized countries. This developmental period is defined by factors such as change and exploration.

The characteristics of individuals during this transitionary developmental period vary greatly, as this time in life can be seen as the most heterogeneous period of the lifespan (Arnett, 2000). This developmental period provides the opportunity for identity exploration. Emerging adulthood often includes less stable living situations such as moving out of the family home and adapting to roommates and living on one's own for the first time (Arnett, 2000).

While stability in one's living situation might lead one to feel less general stress, more frequent changes in living situation might allow a young adult more opportunity to explore and further develop their personal identity, as well as coping skills (Wood et al., 2017). The COVID-19 pandemic caused a shift in the living situations of individuals ages 18-24. At the beginning of 2020, 59.7% of individuals ages 18-24 reported living at home with their parents (McCue, 2020). This rate rose to 62.2% at the beginning of the COVID-19 pandemic, and reached a peak of 67.1% in July 2020 (McCue, 2020). This rate eventually declined to 61.3% in December 2020 (McCue, 2020), with the slight elevation in rate associated with university students living residing with their parents, rather than due to full-time working young adults choosing to remain at home (McCue, 2021).

Pursuing a college education provides an additional facet of emerging adulthood, with additional time and energy for exploration of new ideas and personal development that are less possible when one is busied by full-time employment (Magola & Taylor, 2015). Arnett (2015) offers that college students are a specific subset of emerging adults, with pursuit of a college education advancing personal growth by providing a setting in which one can consider world perspectives that they had not encountered prior (Arnett, 2015). The daily personal responsibilities tackled by students living away from home might allow for further personal exploration. However, with more and more university students living at home during the COVID-19 pandemic, this opportunity for identity exploration is perhaps a lessened influence on young adult development. (McCue, 2020).

Impact of the Pandemic on College Students

The pandemic can be considered a history-graded influence, which are defined as "biological and environmental determinants correlated with historical time" (Baltes, 1987). The pandemic has caused a great shift in how schooling is done, with many classes intended to be taught in-person being shifted to be over Zoom or being taught asynchronously. The pandemic can also be considered an age-graded influence. Age-graded influences can be defined as "biological and environmental determinants correlated with chronological age" (Baltes, 1987). An example of an age-graded influence is the expectation to attend college at the age of 18, as well as spend exactly four years in college to obtain a Bachelor's degree. Societal expectations and pressure to start or complete a college education in a certain duration or time or by a certain age have led many students to choose to attend college during the COVID-19 pandemic. Despite the expectation of attending college remaining, expectations from college classes themselves have changed due to feeling disconnected from instructors and classmates, lessened material access, and less clear instruction (Tasso et al., 2020).

Attending college during the COVID-19 pandemic may have had a profound impact upon students' mental health. In 2017, 4.5% of adults were found to fit the criteria for major depression, while individuals in the college age bracket specifically (ages 18-25) were found to have a 13.1% prevalence rate of depression (SAMHSA, 2017). These statistics are startling when you compare them to a study conducted by the National Center for Health Statistics, which is a part of the Centers for Disease Control and Prevention. They found that 4.7% of adults aged 18 and over regularly report feelings of depression (Clarke et al., 2019). So, significantly more college students report feelings of depression compared to the general adult population.

While stress, anxiety, and depression are often common in college students, the rates of these factors have escalated due to the COVID-19 pandemic (Zaildin et al., 2020). Nearly 33,000 college students participated in The Healthy Minds Study in Fall 2020 (Eisenberg et al., 2020). They found that, according to the Patient Health Questionnaire-9 (PHQ-9), 19% of participants met the criteria for moderate depression, while 21% of participants met the criteria for severe depression. While self-report questionnaires cannot be the only bases for clinical diagnoses (e.g., due to inaccurate or exaggerated reporting), these findings suggest an overall increased in possible depression and anxiety symptoms. The data collected by the Substance Abuse and Mental Health Services Administration (SAMHSA) accounted for all severity levels of major depressive disorder. More college students fit the criteria for solely moderate depression and solely severe depression in The Healthy Minds Study than college-aged individuals across all levels of depression in the SAMHSA study. These findings demonstrate the impact of the pandemic on college-students' mental health broadly.

Zaidlin et al. (2020) identified these risk factors associated with university life: stress, anxiety, depression, and quantity and quality of sleep. While college students were found to have higher rates of depression and anxiety symptoms, significantly fewer students reported having a formal diagnosis of depression or anxiety (Zaildin et al., 2020). Such lower rates of diagnoses for clinical level depression or anxiety might potentially be due to reduced access to mental health services during the pandemic.

In the United States, many university campuses ceased offering in-person mental health services while adjusting to the provision of telehealth services from face-to-face care. Consequently, most college students were unable to receive mental health services during the pandemic's start, with reduced availability of services later during the pandemic as well.

Reduction in service access contrasted with an increased need for mental health services for college students during the pandemic. Unfortunately, funding for these services was cut at many universities during this time (Abrams, 2020). It is especially important to consider the effects of untreated depression and anxiety since these disorders are associated with serious health outcomes such as heart disease, hypertension, and suicidal ideation (Schneiderman et al., 2005).

While the advent of the COVID-19 pandemic has altered recognition and treatment access for mental health issues, there are related considerations about one's physical health. For example, will engaging in certain behaviors decrease the likelihood that one will contract a serious illness? The cognitive process associated with such considerations requires scrutiny, as despite the provision of basic information by sources like the CDC about disease prevention, about 50% of adults in the United States report not wearing a mask when in close contact with non-family members (Key, 2021).

Health Belief Model

The Health Belief Model aims to address one's likelihood to take action to avoid disease (Rosenstock, 1974). The model can be organized into four constructs: perceived susceptibility, perceived seriousness, perceived benefits of taking action and barriers to taking action, and cues to action. *Perceived susceptibility* is defined as "the subjective risk of contracting a condition (Rosenstock, 1974, p. 330)." Susceptibility consists of the extent to which an individual believes they are at risk for contracting a condition, rather than based upon an empirically based or absolute risk calculation. An individual might believe that they are not at risk for contracting a potentially disease due to having a "good immune system", having luck on their side, faith-based protections, or not believing that the disease even exists for them to contract.

Perceived seriousness can be defined by the emotional arousal incited by the thought of a disease, as well as what difficulties the disease would cause an individual if they were to contract the disease (Rosenstock, 1974). These difficulties could include physical health issues, as well as impact on external life aspects, including one's job and family life.

Perceived benefits of taking action cannot be considered without also considering the *barriers to taking action* against a disease. While an individual feels ready or willing to initially engage in a health behavior, they might disengage with that behavior after considering potential barriers or negative aspects of engaging in that behavior. For example, an individual willing to receive the Johnson and Johnson vaccination to reduce risk from COVID-19 might change their mind upon hearing about the vaccine's investigation for side effects (e.g., blood clots) due to deciding that a vaccination is not worth the personal risk (Katella, 2021). Initial misinformation from governmental sources about the size and scope of the threat and how to take action to protect oneself further complicates this dynamic.

Cue to action involves the presentation of a stimulus (internal or external) that triggers a person to engage in a health behavior (Rosenstock, 1974). For example, having a sore throat during the COVID-19 pandemic could be an internal stimulus, leading one to decide to stay at home to recover and/or prevent the potential spread of COVID-19. Hearing that a family member became infected and seriously ill with COVID-19 could serve as an external stimulus, potentially leading one to take more health precautions to protect themselves from contracting COVID-19.

Other Health Behavior Theories

The Theory of Planned Behavior is an extension of the theories of reasoned action by Ajzen and Fishbein (1975). The aim of this theory is to address behavior that one has self-control over, and to understand various factors that affect one's decision to either engage or not engage in a particular behavior. The theories of reasoned action address several elements of decision-making: behavioral beliefs, attitudes, subjective norms, and behavioral intention. *Behavioral beliefs* are the extent to which an individual believes that their behavior will lead to a particular set of outcomes. For example, perhaps an individual does not wear a face mask because they do not think they will experience harm while not wearing one. *Attitude* states the degree to which someone evaluates a particular behavior as favorable or unfavorable. An example of this concept would be an individual who believes that wearing a face mask is unfavorable due to thinking that wearing a mask is uncomfortable, leading them to not wear a face mask. *Subjective norms* are the degree to which someone believes others evaluate a particular behavior as favorable or unfavorable (Rosenstock, 1974). For example, an individual might wear a face mask because they think that others deem wearing one to be favorable, even if the individual is not particularly fond of wearing one themselves. *Behavioral intentions* are the extent to which motivation plays a role in engagement in a behavior (Rosenstock, 1974). For example, if someone does not feel motivated to wear a face mask, they will choose not to wear one.

The more modern theory of planned behavior (Ajzen, 2020) aims to address behavior that one has self-control over, and to understand various factors that affect one's decision to either engage or not engage in a particular behavior. The theory of planned behavior adds on these elements to decision-making: measures of control belief, as well as perceived behavioral control. *Measures of control belief* can be defined as the extent to which an individual perceives factors that can either aid or inhibit engaging in a particular behavior (Ajzen, 2020). For example,

perhaps the only factor an individual perceives about wearing a mask is that wearing one is detrimental to breathing. Since the individual is only perceiving one factor about mask wearing, and this factor is negative, they choose to not wear a face mask. *Measures of control belief* contribute to *perceived behavioral control,* which is defined as the extent to which an individual believes that a behavior is easy or difficult to engage in (Ajzen, 2020). For example, an individual might think that wearing a face mask everywhere they go is difficult, so they choose to not wear one. Armitage and Conner (2001) state that perceived behavioral control is frequently used in social cognition models that are used to predict health behaviors, and that perceived behavioral control is utilized to predict intentions as well as behavior. While the addition of measures of control belief and perceived behavioral control have allowed this theory to be utilized more frequently to predict public health behavior, the Health Belief Model is preferred when one wants to consider more environmental and economic influences.

The Protection Motivation Theory was developed by Rogers (1975). The aim of this theory is to predict how one's motivation affects their behavior in response to a perceived health threat. This theory assumes that one's fear and motivation to engage in a health behavior is made up of three components: the perceived magnitude of the health threat, the perceived likelihood for the event to occur, and the perceived efficacy of the health behavior. The *perceived magnitude* of the health threat is the extent to which an individual believes a health threat poses a general threat (Rogers, 1975). For example, an individual might think that COVID-19 does not pose a great threat, therefore they choose to not engage in any health behaviors to limit the spread of the disease. The *perceived likelihood* for the event to occur is how susceptible an individual believes they are to being affected by the health threat (Rogers, 1975). For example, an individual might be staying at home as much as possible during the pandemic because they

believe they will likely get COVID-19 if they leave the house. The *perceived efficacy* of the health behavior is the extent to which an individual believes that engaging in a behavior will benefit them (Rogers, 1975). For example, the individual might think that COVID-19 poses a great threat, but because they do not believe that wearing masks is beneficial to limit the spread of the disease, they choose to not wear a face mask.

Cognitive Theory and Psychological Difficulties

Various perspectives have argued that inaccurate thinking can lead to struggles with negative emotions and maladaptive behavior. Albert Ellis (1958) defined Rational Emotive Behavioral Therapy (REBT) as containing four basic processes: perception, movement, thinking, and emotion. He argued that when an individual encounters a stressor, an individual will then engage in a particular behavior due to engagement with the stressor. First, the individual thinks about the stressor. Thoughts incite feelings about a stressor, which then lead to behavior in response to the stressor. This behavior could either be adaptive or maladaptive. While REBT explores ways in which an individual can intervene when they begin to have irrational thoughts, the current investigation will instead focus on exploring how college students think and behave in response to a particular stressor, the COVID-19 pandemic. In general, cognitive theory suggests that maladaptive thinking is associated and can lead to more negative emotions such as anxiety and depression, and can even lead to maladaptive behavior (Beck, 1963).

Beck's (1963) cognitive model of depression showcases how negative thoughts can affect someone's overall view on themselves and the world, and how this can lead to maladaptive behavior. His theory states that negative views about oneself, negative views about the world, and negative views about the future work as a triad. So, negative views about one aspect can lead

to negative views about the other aspects. Therefore, having negative views about one's future could lead an individual to have a negative view about the world and themselves. Due to the uncertainty of COVID-19, this has left a lot of college students feeling uncertain about their future careers. According to Beck's theory, college students are likely also having negative views about the world, as well as themselves. Having negative thoughts about oneself could lead to negative feelings about oneself, therefore leading to potentially one engaging in maladaptive behavior to cope with these feelings.

Cognition in the Context of COVID-19

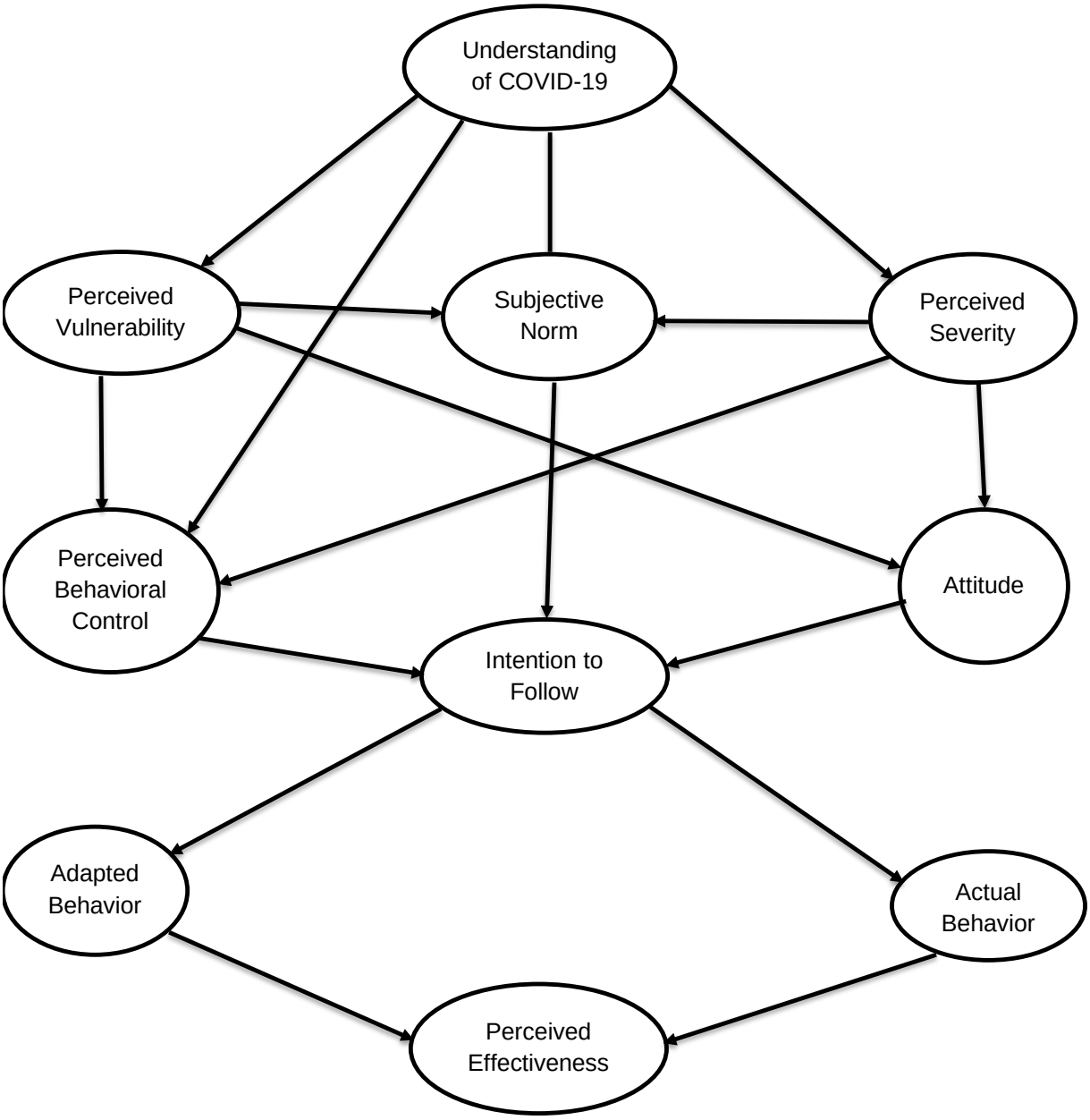
During this pandemic, some individuals have reported feeling overwhelmed with the heavy influx of information about the virus and what precautions need to be taken to prevent the spread of the virus. This influx of information about the pandemic can be referred to as an infodemic - with individuals receiving an influx of both accurate and inaccurate information (WHO, 2019). The emergence of new infectious diseases often leads to increased public consumption of media, especially social media, for information about the disease (Freberg, 2013). This increase of media consumption has been seen during the COVID-19 pandemic, with researchers even creating a term for this phenomenon. Cyberchondria can be defined as "an excessive or repeated online health information seeking that is associated with increasing levels of health anxiety or distress" (Starcevic et al., 2020, p. 1). Fear and uncertainty surrounding what little is known about a disease, as well as struggling to discern and identify credible information sources have contributed to heightened feelings of cyberchondria in individuals (Starcevic et al., 2020).

The Current Study

While research has explored the relationship between stress in adults and mental and physical health, the unique nature of the COVID-19 pandemic allows for an opportunity to evaluate individual's responses to a unique global stressor. In particular, how one's cognitions and perceptions influence one's emotions and behaviors during a pandemic needs investigation. The current investigation will explore the influence of perceptions about the pandemic on university student behavior. The current investigation is a replication of a study conducted in the Philippines by Prasetyo et al. (2020). Instead of using a Filipino population, the study was replicated with use of a sample drawn from the US population. Hypotheses are based on this theoretical framework from Prasetyo et al. (2020):

Figure 1.

Theoretical Framework from Prasetyo et al. (2020)



Hypotheses

To investigate these topics, we propose a series of hypotheses:

Our hypotheses were as follows:

1A. *Demographics* (age, gender, level in school, plans after graduation, graduating this semester) were predicted to be positively related to anxiety levels.

1B. *Demographics* (age, gender, level in school, plans after graduation, graduating this semester) were predicted to be positively related to depression levels.

2A. Students' perceived threat from the COVID-19 pandemic would be positively related to anxiety levels.

2B. Students' perceived threat from the COVID-19 pandemic would be positively related to depression levels.

We decided to define perceived threat as involving both an individual's perceived vulnerability to COVID-19, as well as how severe they perceive COVID-19 to be. Perceived Threat variables were taken from Prasetyo et al.'s (2020) Perceived Effectiveness of COVID-19 Protocols scale. Perceived threat variables included in the analyses were: Understanding of COVID-19, Perceived Vulnerability, Perceived Severity, Subjective Norms, Attitudes.

3A. Students' planned action in response to the COVID-19 pandemic would be negatively related to their reported anxiety levels after statistically controlling for perceived threat.

3B. Students' planned action in response to the COVID-19 pandemic would be negatively related to their reported depression levels after statistically controlling for perceived threat.

Planned Action variables were taken from Prasetyo et al.'s (2020) Perceived Effectiveness of COVID-19 Protocols scale. Planned action variables included in analyses were: Intention to Follow, Actual Behavior, and Perceived Effectiveness.

Method

Participants

Participants were 276 undergraduate students that attended the University of North Florida. Data was cleaned based upon duration spent on the survey (removing participants that spent less than 400 seconds on it) correctly answering two attention checks, and the age of the participant being between ages 18 and 22 to be more representative of the emerging adult population. They were recruited through SONA systems, an online system at the University of North Florida that allows psychology students to participate in research for course credit. Participants had to be 18 or older to complete the survey. Data was collected from March 2021 to July 2021, as well as August 2021 to December 2021. We found that 83.3% of participants identified as women, 14.1% of participants identified as men, and 1.5% of participants identified as “other”. The ages of participants ranged from 18 to 49, with the mean age of participants being 21. Comparatively, the University of North Florida’s population is 57% female and 43% male (College Factual, 2022). Meanwhile, 72.9% of students are between the ages of 18 to 22. The study was conducted with appropriate IRB oversight, having received expedited IRB approval from the University of North Florida’s Institutional Review Board. Participants had to consent in order to complete the survey and were able to withdraw from the study at any time.

Table 1.

Frequency Table of Participant Characteristics

		n	*%*
Gender			
	Women	230	83.3%
	Men	39	14.1%
	Other	4	1.5%
Age			
	18 to 22	210	80.8%
	23 to 27	66	19.2%
Level in School			
	Freshman	56	20.5%
	Sophomore	62	22.7%
	Junior	100	36.6%
	Senior	55	20.1%

Using G*Power (Faul et al, 2007), we found that to achieve an effect size of $f^2 = 0.3$ with power of .80, we would need a minimum of 190 participants. The name of those who completed the survey were made known to the researchers due to needing to manually provide course credit. However, the participant's names were not retained once course credit was provided, and the participant's names were never tied to their answers.

Materials

Demographics

Participants were asked 14 questions that had varied formats including yes or no questions, as well as fill-in-the-blank questions. These items gathered background information on participant characteristics such as age, gender, relationship status, year in school, and the number of classes an individual was taking at the University of North Florida at the time they were completing the survey.

Mental Health

The Generalized Anxiety Disorder scale (GAD-7; Spitzer et al., 2006), with high reliability (α = .89)**,** was utilized to measure severity of anxiety (e.g., *Over the last 2 weeks, how often have you been bothered by the following problems?*). Participants were asked seven questions along a 4-point Likert scale**,** with 0 indicating "not sure at all" and 3 indicating "nearly every day". In the current study, the scale was found to have high internal reliability (***α*** = 0.92). This scale has similar construct validity to the Beck Anxiety Inventory Manual with both scales measuring anxiety levels in individuals older than 18 (Beck & Steer, 1993). We calculated an average score for this scale, with a higher score indicating a higher level of anxiety. No questions were reverse scored. Clinical cut-off scores are as follows: 0 to 4 is indicative of minimal anxiety, 5 to 9 is indicative of mild anxiety, 10 to 14 is indicative of moderate anxiety, and any score 15 or higher is indicative of severe anxiety (Spitzer, 2006).

The Patient Health Questionnaire (PHQ-9, Kroenke et al., 1999), with high reliability (α = .80) was utilized to measure depression severity (e.g., *Feeling down, depressed, or hopeless)* over the last two weeks. Participants answered nine questions along a 4-point Likert scale, with 0 indicating "not at all" and 3 indicating "nearly every day". We calculated an average score for this scale, with a higher score indicating a higher level of anxiety. Question nine was reverse scored. In the current study, this scale was found to have high internal reliability (***α*** = .89). This scale has similar construct validity to the Beck Depression Inventory-II with both scales measuring depression levels in individuals older than 18 (Beck & Brown, 1996). We calculated an average score for this scale, with a higher score indicating a higher level of depression. Clinical cut-off scores are as follows: 0 to 4 is indicative of none or minimal depression, 5 to 9 is indicative of mild depression, 10 to 14 is indicative of moderate depression,

15 to 19 is indicative of moderately severe depression, and 20 to 27 is indicative of severe depression (Kroenke et al., 2002).

It is important to look into both anxiety and depression in terms of mental health because the two have been found to be correlated, r = .08 (Dhira et al., 2021). Both the GAD-7 and PHQ-9 have been found in past studies to have high test-retest reliability (Garabiles et al., 2020). The GAD-7 and PHQ-9 have been found in past studies to have high correlations, and therefore convergent validity with factors such as: life events checklist (r = .32 for GAD-7, r = .26 for PHQ-9, rumination-reflective (r = .44 for GAD-7, r = .55 for PHQ-9), rumination-brooding (r = .45 for GAD-7, r = .51 for PHQ-9), and PTSD symptom severity (r = .61 for GAD-7, r = .71 for PHQ-9) (Garabiles et al., 2020). The GAD-7 and PHQ-9 have been found in past studies to have high correlations, and therefore divergent validity with factors such as discrimination (r = .42 for GAD-7, r = .43 for PHQ-9) (Garabiles et al., 2020).

Perceived Threat

Perceived threat was defined as to what extent an individual believes they are vulnerable to contracting COVID-19, as well as how severe they believe COVID-19 would be if they were to contract the disease. Perceived threat questions were taken from the COVID-19 Prevention Perceived Effectiveness Scale (Prasetyo et al., 2020), which was originally utilized “to evaluate factors affecting the perceived effectiveness of COVID-19 prevention measures” (Prasetyo et al., 2020, *p.* 317). Questions in this scale were asked along a 5-point Likert scale, with 1 indicating “Strongly Disagree” and 5 indicating “Strongly Agree.” These subscales were defined as being concepts involved in perceived threat: Understanding of COVID-19, Perceived Vulnerability, Perceived Severity, Subjective Norm, and Attitude.

The *Understanding of COVID* subscale, taken from Prasetyo et al. (2020), (the current study's reliability was α = .81) contained five items (e.g., *I do understand the protocol if I have symptoms that might* lead *to COVID-19).* Questions from this Prasetyo et al. (2020) subscale were taken from other reputable sources such as Liu et al. (2020). We calculated an average score for this scale, with a higher score indicating higher understanding of COVID-19. One question "*I do understand which hospital can treat COVID-19 patients*" was removed due to low reliability.

The *Perceived Vulnerability* subscale, taken from Prasetyo et al. (2020), (the current study's reliability was α = .74) contained five items (e.g., *I think there is a chance that my family will be infected by COVID-19*). Questions from this Prasetyo et al. (2020) subscale were taken from other reputable sources such as Nicola et al. (2020). We calculated an average score for this scale, with a higher score indicating higher perceived vulnerability to contracting COVID-19.

The *Perceived Severity* subscale, taken from Prasetyo et al. (2020) (the current study's reliability was α = .77) contained seven items (e.g., *I find COVID-19 can affect mental health*). Questions from this Prasetyo et al. (2020) subscale were taken from other reputable sources such as Burgelt et al. (2020). We calculated an average score for this scale, with a higher score indicating higher perceived severity for contracting COVID-19. The combination of these two subscales was found to have high reliability (the current study's reliability was α = .75). No questions were reverse scored.

The *Subjective Norm* subscale, taken from Prasetyo et al. (2020), (the current study's reliability was α = .84) contained five items (e.g., *Most people I know are staying home and work from home*). Questions from this Prasetyo et al. (2020) subscale were taken from other reputable sources such as Yancey-Bragg & Bravo (2020). We calculated an average score for

this scale, with a higher score indicating more adherence to social norms in regards to engagement with COVID-19 protocols.

The *Attitude* subscale, taken from Prasetyo et al. (2020), (the current study's reliability was α = .90) contained seven items (e.g., *I feel anxious during the COVID-19 outbreak*). Questions from this Prasetyo et al. (2020) subscale were taken from other reputable sources such as Roy et al. (2020). We calculated an average score for this scale, with a higher score indicating having stronger attitudes about COVID-19.

Planned Action

Planned Action was defined as being both the actual behavior individuals engaged in response to the COVID-19 pandemic, as well as how an individual adapted their behavior due to the pandemic. Planned action questions were taken from the COVID-19 Prevention Perceived Effectiveness Scale (Prasetyo et al., 2020), which was originally utilized "to evaluate factors affecting the perceived effectiveness of COVID-19 prevention measures" (Prasetyo et al., 2020, *p.* 317). Questions were asked along a 5-point Likert scale, with 1 indicating "Strongly Disagree" and 5 indicating "Strongly Agree." These subscales were defined as being concepts involved in planned action: actual behavior, intention to follow, and perceived effectiveness.

The *Actual Behavior* subscale (the current study's reliability was α = .81) contained seven items (e.g., *I always wear a face mask whenever I go outside during the COVID-19 outbreak*). Questions from this Prasetyo et al. (2020) subscale were taken from other reputable sources such as Shaw et al. (2020). We calculated an average score for this scale, with a higher score indicating higher actual behavior in regards to engagement in COVID-19 prevention protocols.

The Adapted Behavior subscale (the current study's reliability was α = .51) contained five items (e.g., *I don't smoke during the COVID-19 outbreak*). Questions from this Prasetyo et al. (2020) subscale were taken from other reputable sources such as Taghizadeh-Hesary & Akbari (2020). We calculated an average score for this scale, with a higher score indicating higher adapted behavior in regards to engagement in COVID-19 protocols.

The *Intention to Follow* subscale (the current study's reliability was α = .91) contained five items (e.g., *I am willing to follow my government to lock down the country, city, and community*). Questions from this Prasetyo et al. (2020) subscale were taken from other reputable sources such as the University of Michigan School of Public Health (2020). We calculated an average score for this scale, with a higher score indicating a higher likelihood of intending to follow COVID-19 prevention protocols. No items from these subscales were reverse scored.

The *Perceived Effectiveness* subscale (the current study's reliability was α = .77) contained seven items (e.g., *I think proper hygiene can prevent the transmission of COVID-19*). Questions from this Prasetyo et al. (2020) subscale were taken from other reputable sources such as the Centers for Diseases Control and Prevention (2020). We calculated an average score for this scale, with a higher score indicating higher perceived effectiveness of COVID-19 protocols.

Procedure

Participants completed an online consent form on SONA systems. They were shown this message:

"The following surveys are psychometrically validated measures related to stress and coping. After completing a brief demographic survey, you will see surveys related to stress and

coping. We are asking questions that will help us to measure the impact of COVID-19 on student stress as well as update the Undergraduate Stress Questionnaire, which is a checklist you will be completing of stressful events that undergraduates may have experienced. The purpose of this research study is to establish a holistic model of how the COVID-19 pandemic has impacted student stress while also updating the USQ with the hopes that modern research on stress in undergraduates would have a more up-to-date measure."

Participants also were informed that the survey would involve minimal risk, and were invited to contact the researchers with any questions, and were provided with the contact information for the University of North Florida Counseling Center to address any subsequent distress. Individuals who provided consent were directed to complete the Qualtrics survey. They were debriefed with this statement upon completing the survey:

"Thank you for your participation! We were interested in how stress affects undergraduates, and specifically how the COVID-19 pandemic has influenced undergraduate stress. The COVID-19 pandemic has disrupted the lives of many causing unprecedent stress as we all try to navigate and adjust to this pandemic."

Results

In terms of anxiety levels, no participants reported minimal levels of anxiety. The majority of participants reported severe levels of anxiety (*n* = 121, 59.6%), while several participants reported mild to moderate levels of anxiety (*n* = 92, 40.4%; See Table 2)

Table 2.

Frequencies for Anxiety Levels

Levels of Anxiety	**# of Participants**	**%**
Minimal (0 to 4)	0	0%
Mild (5 to 9)	37	13.3%
Moderate (10 to 14)	55	27.1%
Severe (>15)	121	59.6%

In terms of depression levels, no participants reported minimal levels of depression. The majority of participants reported severe levels of depression (*n* = 72, 50.6%), while many participants reported mild to moderately severe levels of depression (*n* = 98, 49.7%, See Table 3).

Table 3.

Frequencies for Depression Levels

Levels of Depression	**# of Participants**	**%**
Minimal (0 to 4)	0	0%
Mild (5 to 9)	8	4.1%
Moderate (10 to 14)	41	20.8%
Moderately Severe (15 to 19)	49	24.8%
Severe (20 to 27)	72	50.6%

To explore the relationship between the continuous demographic of age and the outcome variables, a Pearson correlation was on age on anxiety and depression (GAD-7 and PHQ-9 scores, respectively), with no significance found (See Table 4).

Table 4.

Correlation by Age and Anxiety and Depression Scores

	Anxiety (GAD-7)	Depression (PHQ-9)
1. Age	-.04	-.02

To explore the relationships between categorical demographic variables and the outcome measures, t-tests and ANOVAs were run separately for Age, Gender, Grade Level, Graduation Status, and Plans After Graduation (Yes or No) on outcome anxiety and depression (GAD-7 and PHQ-9 scores). There were no significant differences found between age, gender, grade level, graduation status, plans after graduation, and anxiety (GAD-7) and depression (PHQ-9).

Table 5.

Differences by Age on Anxiety (GAD-7) Scores

Age			*F*	p
n	*M*	*SD*		
			0.43	.79
18 years				
41	2.46	0.93		
19 years				
58	2.31	0.86		
20 years				
50	2.42	0.85		
21 years				
38	2.46	0.83		
22 years				
18	2.23	0.75		

Table 6.

Differences by Age on Depression (PHQ-9) Scores

Age			*F*	p
n	*M*	*SD*		
			0.21	.93
18 years				
40	2.18	0.79		
19 years				
58	2.24	0.76		
20 years				
49	2.14	0.66		
21 years				
38	2.19	0.71		
22 years				
18	2.09	0.67		

Table 7.

Differences by Gender on Anxiety (GAD-7) and Depression (PHQ-9) Scores

	Male			**Female**					
	N	*M*	*SD*	*N*	*M*	*SD*	*df*	*t*	*p*
GAD-7	26	2.22	0.97	177	2.40	0.83	201	-1.02	.311
PHQ-9	26	2.06	0.70	175	2.18	0.72	199	-0.83	.408

Table 8.

Differences by Academic Class on Anxiety (GAD-7) and Depression (PHQ-9) Scores

	Freshman			**Sophomore**			**Junior**			**Senior**				
	N	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*N*	*M*	*SD*	*F*	p
GAD-7	53	2.30	0.90	61	2.28	0.80	35	2.54	0.80	56	2.50	0.90	1.20	.312
PHQ-9	53	2.07	0.79	61	2.23	0.63	35	2.08	0.69	54	2.30	0.76	1.26	.289

Table 9.

Differences by Graduation Status on Anxiety (GAD-7) and Depression (PHQ-9) Scores

	Yes			**No**					
	N	*M*	*SD*	*N*	*M*	*SD*	*df*	*t*	*p*
GAD-7	12	2.75	0.93	193	2.37	0.85	203	1.52	.131
PHQ-9	12	2.44	0.72	191	2.37	0.85	201	1.26	.209

Table 10.

Differences by Plans After Graduation on Anxiety (GAD-7) and Depression (PHQ-9) Scores

	Yes			**No**					
	N	*M*	*SD*	*N*	*M*	*SD*	*df*	*t*	*p*
GAD-7	159	2.35	0.82	46	2.52	0.96	203	-1.16	.248
PHQ-9	157	2.13	0.69	46	2.35	0.79	201	-1.87	.063

A hierarchical linear regression analysis was conducted in IBM SPSS Statistics Software to evaluate the prediction of anxiety and depression from perceived threat and planned action. Anxiety and depression scores were utilized for the dependent/criterion variable. Perceived threat

variables were entered into the first block, and planned action variables were entered into the second block.

The variables utilized for the final analyses were determined based on significant correlational analyses (See Tables 4 and 5). Since demographic variables did not have significant correlations with anxiety or depression, demographics were removed from the planned omnibus regression analysis. So, both parts of the first hypothesis was automatically not supported by our findings.

Table 11.

Correlation Matrix

	Anxiety (GAD-7)	Depression (PHQ-9)
1. Understanding of COVID-19	.11	.09
2. Perceived Effectiveness	.06	-.06
3. Perceived Vulnerability	.12	.13
4. Perceived Severity	.17*	.05
5. Attitudes	.32**	.16**
6. Subjective Norms	.05	-.05
7. Intention to Follow	.12*	.07
8. Actual Behavior	.13*	.06

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

For perceived severity, these correlational analyses indicate that that the average undergraduate student agrees that COVID-19 is a serious disease that can impact mental health or lead to death. In regards to attitudes, correlational analyses reflected those students associated most strongly with others who are not working from home or staying home during the pandemic. In regards to intention to follow, correlational analyses showed that the average student slightly agrees that they are following protocols given by the government, as well as agreeing that they know people following protocols. In regards to actual behavior, the average student agrees that they are engaging in behaviors, such as hand washing and using hand sanitizer to limit the spread of COVID-19.

Perceived threat and planned action variables taken from Prasetyo et al. (2020)'s Perceived Effectiveness of COVID-19 Prevention Measures that were deemed to have significant correlations or marginally significant correlations separately with anxiety and depression were utilized for hierarchical linear regression analysis. For anxiety, the *Perceived Threat* variables entered were: Understanding of COVID-19, Perceived Vulnerability, Perceived Severity, and Attitudes. The planned action variables were: Intention to Follow and Actual Behavior. For depression, the *Perceived Threat* variables entered were: Perceived Vulnerability and Attitudes, with no significant variables found for Planned Action. Since none of the planned action variables were found to be significantly correlated with depression, no second block was implemented for final analyses with depression.

Assumptions

There exists a linear relationship between the independent variables, perceived threat and planned action, and the dependent variables, anxiety (GAD-7) and depression (PHQ-9). The

residuals of the model are normally distributed. The assumption for homoscedasticity was met, as the residuals have constant variance at every level of the independent variables.

To test for multicollinearity, an independence of residuals test titled the Durbin-Watson test was conducted (Field, 2013). The anxiety (GAD-7) model had a score of 1.81. Since this score was between 1.5 and 2.5, we do not have any concerns for multicollinearity. The depression (PHQ-9) model had a score of 1.33. Since this score is not between 1.5 and 2.5, we have some concerns for multicollinearity.

Anxiety (GAD-7)

Table 12.

Hierarchical Linear Regression Predicting Anxiety (GAD-7)

Block	**F**	**R^2**	**b**	**β**	***t*(*p*)**
Block 1	6.36**	.113	1.68**	-	5.12**
Block 2	4.74**	.126	1.67**	-	4.96**

**. Significant at the 0.01 level (2-tailed).

*. Significant at the 0.05 level (2-tailed).

For the first block of analysis, the perceived threat variables were added to the analysis as predictor variables. The results of the second block of hierarchical linear regression analysis indicated that this model was statistically significant ($F = 6.36$, $p = .00$). Additionally, an R^2

value of .113 associated with this model suggests that the addition of perceived threat to the first block model accounts for 11.3% of the variation in anxiety, which means that 88.7% of the variation in anxiety cannot be explained by perceived threat alone. So, Hypothesis 2A stating *that students' perceived threat from the COVID-19 pandemic would be positively related to anxiety* was supported.

For the second block of analysis, the planned action variables were added to the analysis as predictor variables. The results of the second block of hierarchical linear regression analysis indicated that this model was statistically significant ($F = 4.74$, $p < .01$). Additionally, an R^2 change value of .126 associated with this model suggests that 87.4% of the variation in anxiety cannot be explained by demographics alone. Since planned action variables were found to lead to an increase in anxiety and depression levels, Hypothesis 2B stating that *students' planned action in response to the COVID-19 pandemic would be negatively related to their reported anxiety levels after statistically controlling for perceived threat* was not supported.

Depression (PHQ-9)

Table 13.

Multiple Regression for Depression (GAD-7)

Block	**F**	**R^2**	**b**	**β**	***t*(*p*)**
Block 1	3.49*	.034	1.77**	-	10.6**

**. Significant at the 0.01 level (2-tailed).

*. Significant at the 0.05 level (2-tailed).

For the first block of analysis, the perceived threat variables were added to the analysis as predictor variables. The results of the first block of hierarchical linear regression analysis indicated that this model was statistically significant ($F = 3.49$, $p < .05$). Additionally, an R^2 change value of .034 associated with this model suggests that the addition of perceived threat to the first block model accounts for 3% of the variation in depression levels, which means that 97% of the variation in depression cannot be explained by demographics and perceived threat alone. So, these findings do support Hypothesis 2A stating that *students' perceived threat from the COVID-19 pandemic would be positively related to depression*. Hypothesis 2B could not be assessed due to no analyses being conducted for planned action variables, so this hypothesis was not supported by the analyses.

Discussion

The current study aimed to see how college student's demographics (age, gender, level in school, plans after graduation, graduating this semester), perceived threat, and planned action during the COVID-19 pandemic relate to their reported anxiety and depression symptoms. More specifically, undergraduate students were chosen as a subpopulation for participation due to their engagement in transformational development during emerging adulthood.

Correlational analyses were conducted to assess potential significant relationships between cognition variables and the dependent variables of anxiety and depression. Through this process, two factors were identified: perceived threat and planned action. Perceived Threat consisted of: Understanding of COVID-19, Perceived Vulnerability, Perceived Severity, Subjective Norms, and Attitudes. Planned Action was made up of Intention to Follow, Actual Behavior, Perceived Effectiveness. While Demographics variables were hypothesized to be related to anxiety and depression scores, the variables of age, gender, level in school, plans after graduation, graduating this semester were found to be unrelated to the dependent measures of anxiety and depression. As a result, Demographics were removed from the omnibus hypotheses tests. Perceived Threat and Planned action were used in the subsequent hierarchical linear regression analysis for anxiety and the multiple regression for depression.

Demographics were predicted to be positively related to anxiety and depression levels accounting for demographics (age, gender, level in school, plans after graduation, graduating this semester) as a modifying factor for predicting engagement in health behaviors. However, we found that demographics were not significantly related to anxiety or depression levels, so Hypothesis 1A and Hypothesis 1B were not supported. So, factors such as age, gender, and

relationship status were found to not play a role in the engagement in health behaviors and its impact upon mental health.

It was predicted that students' perceived threat from the COVID-19 pandemic would be positively related to anxiety and depression levels. We found that students' perceived threat from the COVID-19 pandemic was positively related to student's reported anxiety and depression levels, so the second hypothesis was supported. Experiencing higher levels of perceived threat was related to higher reported levels of anxiety and depression.

It was predicted that students' planned action in response to the COVID-19 pandemic would be negatively related to their reported anxiety and depression levels after statistically controlling for perceived threat. We found that students' planned action response to the COVID-19 pandemic was not significantly negatively related to anxiety and depression levels, so the third hypothesis was not supported. If this hypothesis was supported, it would have been found that planning an appropriate action to respond to a threat like COVID-19 would be associated with lessened negative emotionality.

Implications

Preliminary t-test and ANOVA analyses (see Tables 5 through Table 9) did not show significant difference between demographics and anxiety and depression. So, there are no significant differences in terms of demographics and reported anxiety and depression levels in students during the COVID-19 pandemic. This information is important in order to know whether to tailor specific mental health interventions towards a specific demographic or not. In this case, the results do not suggest tailoring an intervention towards a particular demographic group. However, the analyses did not account for other potential important demographic

characteristics such as race and income level, which could potentially play a role in mental health during the COVID-19 pandemic. Further research upon these demographic characteristics and the pandemic is suggested.

Preliminary correlational analyses (see Tables 4 and 7) showed that the average student disagreed that they are personally vulnerable to COVID. These findings could be why we found significance in our hierarchical linear regression analyses with perceived threat but not planned action. Perhaps the slight difference between perceived vulnerability for oneself versus perceived threat for family members is what was picked up on in the significant hierarchical linear regression analyses. It also is possible that these emerging adults are affected by a sense of invulnerability, while also having enough self and situational awareness to acknowledge threat as well as acknowledging experiencing negative emotionality (Ravert & Zimet, 2009). Regardless, the perceived threat was not strong enough to be associated with planned action in response to the threat.

These correlational analyses showed that the average undergraduate student agrees that COVID-19 is a serious disease that can impact mental health or lead to death. However, they do not necessarily believe that COVID-19 is more serious than other diseases. This finding could be why we found significance in our hierarchical linear regression analyses with perceived threat but not planned action. While the average participant acknowledges that COVID-19 poses health risks, they appear to believe that these health risks do not outweigh risks from average common diseases. Perhaps this “commonality” perception is related to their limited motivation to engage in planned action.

Next, correlational analyses reflected that students associated most strongly with others who are not working from home or staying home during the pandemic. As emerging adults, seeing others not working from home or staying at home is related to a greater willingness to work outside of one's home or not stay home as well, if provided with that choice. But also, during the time period this survey was administered, there was a shift to more in-person classes, though many classes were still being offered online (Marris, 2020). Having a shift to some in-person classes could have partially impacted the results. If a required class an individual needed to take was only offered in-person, then the individual was unable to engage in planned action and choose to stay home and take the course online. Or, perhaps the average student felt that things were getting safer due to classes being offered in-person in the first place, so they engaged in less planned action and chose to enroll in an in-person class as a result.

Then, correlational analyses showed that the average student slightly agrees that they are following protocols given by the government, as well as agreeing that they know people following protocols. This correlation might not have led to any significant linear relationship between planned action and mental health due to the lessening of precautions over time. As precautions have lessened over time, these lessening of precautions have likely led to less engagement in planned action. The average student is engaging in less precautions because they are not being told to engage in as many precautions as they were told to engage in during the beginning of the pandemic (National Institutes of Health, 2022). So, while the average student might be following the protocols set forth by the government, there have been less protocols over time for the average student to be following in the first place. Planned action in terms of anxiety consisted of not only Intention to Follow but also Actual Behavior. So, planned action not only consisted of intending to follow COVID-19 protocols, but actively engaging in behavior to

prevent the spread of COVID-19. Since individuals felt they were following COVID-19 protocols set by the government and as protocols have lessened over time, this possibly reduced stated of alarm might have been associated with the related non-significance of anxiety, as captured via the non-significant positive relationship between planned action and anxiety.

It is interesting to note that the average student agrees that engaging in protocols such as having a healthy lifestyle, social distancing, and wearing a face mask are effective practices during a pandemic. These findings contrasted with the only slight endorsement among participants of an intention to follow COVID-19 protocols. this conflicting finding suggests that an individual might only be willing to follow those protocols if they feel obligedto follow those protocols. However, the correlational analyses showed that the average student feels neutral about the effectiveness of Federal preventative protocols. Feeling neutral about the efficacy of governmental preventative protocols could be a potential confounding factor. Like the general population, college students may have been divided about the role of government in implementing safeguarding protocols, with a portion of students perceiving too many protocols and another portion of students viewing protocols as insufficient. While the current investigation did not collect data on this topic, exploration of this “politicization” of such health and safety protocols is an important focus for future research.

The average student agrees that they are engaging in behaviors, such as hand washing and using hand sanitizer to limit the spread of COVID-19. Since the average student did not more strongly agree that they intend to follow COVID-19 protocols, this intention would strongly impact one’s engagement in planned action. If an individual does not intend to follow COVID-19 protocols, then they likely would not see a point in planning to engage in these health behaviors.

These correlational analyses were the foundation for the planned linear hierarchical regression analyses. It is interesting to note that none of the planned action variables significantly correlated with depression, so planned action was not included in the hierarchical linear regression analyses for depression. Perhaps participants had a more difficult time recognizing potential depression symptoms than potential anxiety symptoms within themselves.

In terms of the hierarchical linear regression analyses, we found that demographics did not significantly positively relate to anxiety and depression levels. We theorized that demographics would significantly positively relate to anxiety and depression models since the health belief model often incorporates modifying factors, with demographics being considered as a modifying factor (Rosenstock, 1972). So, we believed that there would be at least some type of relationship between demographics and mental health, since demographics have been a modifying factor for engagement in health behaviors. Therefore, the results showed that demographics may not be a modifying factor for mental health in the same way they can be considered a modifying factor for engagement in health behaviors.

Perceived threat was found to have a significant positive relationship with both anxiety and depression levels. It is important to note that perceived threat was defined with different variables for anxiety and depression. Perceived threat in terms of anxiety was made up of the variables: Understanding of COVID-19, Perceived Vulnerability, Perceived Severity, and Attitude. Perceived threat in terms of depression was defined with these variables: Perceived Vulnerability and Attitudes. So, there were more facets to perceived threat for anxiety than there were for depression. There being less facets to perceived threat for depression meant that that definition of perceived threat was less nuanced. Leaving out perceived severity of the pandemic from the final analyses might have left out the acknowledgement of a major factor in what

perceiving threat is, as defined by Rosenstock (1972). However, the results were significant, and we based the conduction of the hierarchical linear regression analyses upon correlational analyses. Also, this finding shows us that college students might be more vulnerable to experiencing anxiety, or that they might be less likely to acknowledge experiencing depression over anxiety. The findings of increased anxiety and depression in association with perceived threat showcases the importance of further addressment of mental health in undergraduate students.

Planned action was not found to have a significant negative relationship with anxiety levels. Planned action in terms of anxiety was defined with these variables: Intention to Follow and Actual Behavior. Correlational analyses showed that people on average disagreed that they are personally vulnerable to COVID-19. So, the average student might not have felt enough anxiety to compel them to take planned action in order to lessen one's chances of acquiring COVID-19. This finding calls into question whether anxiety could be beneficial in this context - could anxiety be beneficial if it is heightened enough to motivate undergraduate students to engage in more health behaviors? However, experiencing heightened anxiety could also lead to physical health problems such as back pain and stomach problems (Dodd et al., 2021). So, while experiencing heightened enough anxiety potentially could lead to more engagement in health behaviors, therefore benefitting physical health on a more global scale, it could potentially harm someone's physical health on an individual level.

Limitations

There were some limitations in regards to applying a survey that was originally administered to an adult Filipino population to a college-aged United States population. Some

questions seemed more culturally applicable to a Filipino population than a United States population, such as questions about frequency of smoking habits as well as whether one continued to or discontinued smoking during the COVID-19 pandemic. This question was a part of the Adapted Behavior subscale by Prasetyo et al. (2020), and this subscale was removed from final analyses due to having low reliability. There were also questions about feeling as if one could go to the hospital for treatment for COVID-19 if need be, which was originally a part of the Understanding of COVID subscale by Prasetyo et al. (2020). This question is more difficult to apply to a United States population due to the confounding variable of the high cost of healthcare (Stokes, 2021). We removed them in the final analyses due to having low reliability.

It is important to note that the vast majority of participants were women. Also, we did not collect data on race. The preponderance of women in the sample was driven by the population of psychology college students from which the sample was drawn. The absences of data on race and annual income were due to the existing prior structuring of the database. Despite these explanations, the current investigation's data lacks ideal diversity of gender and is missing the demographic variable of race. 80% of our participants identified as female, which is not typical of the general United States population. While it is not representative of the University of North Florida population, it is representative of Psychology majors at the University of North Florida (College Factual, 2022). The sample's age range was limited, since only participants aged 18-22 were utilized in the final analyses. This age range was strategic to allow focus on individuals in the "emerging adulthood" period of development. The presence of limited gender and age diversity in the final analyses, as well as missing other factors entirely such as race and income level likely impacted the results and suggest caution when interpreting or generalizing the results

.

This survey investigation was done Ex Post Facto, which means that we were not actively controlling one of our main variables; this variable being the COVID-19 pandemic (Lord, 1973). It would be unethical to actively attempt to cause a pandemic. We could not have predicted this pandemic occurring, and we believe that the pandemic as a unique event worth studying. Therefore, we believe that that justifies conducting the study Ex Post Facto.

The survey measured how an individual felt at that one specific point in which they were completing the survey. How individuals felt while responding to the survey items might not be the most accurate representation of how someone typically felt during the full pandemic period. While data was only collected from individuals at one specific point, these specific points in time were over Spring 2021, Summer 2021, and Fall 2021 semesters. So, having collected data at various points over those semesters helps give insight into how engagement in health behaviors as well as anxiety and depression levels over the COVID-19 pandemic have changed over time in undergraduate students.

Future Directions

For future research, it would be crucial to look more into how culture plays a role in engagement in health behaviors. Our results showed low internal reliability with questions in regards to smoking and being willing to visit the hospital, so it would be of interest to see how other cultures might have internal reliability issues with these same questions or different questions from the Perceived Effectiveness of COVID-19 Prevention Protocols scale (Prasetyo et al., 2020).

More research on emerging adults who are not in college settings also is recommended. College students are a unique population within emerging adults, so they are not necessarily

representative of every emerging adult (Arnett, 2015). College students tend to be of a higher socioeconomic status, tend to be female, and are typically White (Arnett, 2015). It is also essential for future COVID-19 research, or pandemic research in general, to study engagement in health behaviors and its effect on mental health over time instead of only at one point in time. It is essential to do so in order to assess long-term impacts of a pandemic upon mental health. It is essential to do so due to the impact mental health can have on an individual. As stated earlier, anxiety can lead to various physical health problems. Depression can also impact physical health by leading to an increased risk of a chronic illness such as diabetes and arthritis (Moussavi, 2007). Several researchers have looked into how the pandemic has impacted mental health, so there is reason to extend upon this research and look into how mental health has been impacted by the pandemic on a long-term scale (Son et al., 2020; Li et al., 2020; Tasso et al., 2021).

In terms of defining Perceived Threat, anxiety and depression had these variables in common: Perceived Vulnerability and Attitudes. In terms of defining Perceived Threat, anxiety accounted for these variables while depression did not: Understanding of COVID-19 and Perceived Severity. So, it could be beneficial to look more into why anxiety and depression had Perceived Vulnerability in common, while they differed on Understanding of COVID-19 and Perceived Severity. Looking into the similarities could give a better understanding of how anxiety and depression sometimes end up being comorbid, while looking into the differences could give us a better understanding of why sometimes an individual might experience one disorder but not the other.

It is interesting to see that depression was not related to planned action variables. This finding could imply that depression is unrelated to planned action. It also may be that undergraduate students have a difficult time recognizing that they are experiencing depressive

symptoms. If students are having issues recognizing that they are experiencing depressive symptoms, then they are less likely to seek help for these symptoms. In turn, poor awareness could lead to exacerbated difficulties.

Most of the questions gathered from Prasetyo et al. (2020) revolved around the Health Behavior Model by Rosenstock (1972). This model revolves around assessing conscious processes. So, unconscious processes were not addressed by the survey questions. If there is a way to address unconscious processes in the decision-making process in regards to engagement in health behaviors, addressing these processes could provide more insight into why an individual might or might not be engaging in these behaviors.

Conclusion

On March 11th, 2020, COVID-19 was declared a global pandemic (WHO, 2020). The implementation of precautionary measures such as wearing a face mask and staying six feet away from others have impacted how Americans live their lives. Repeated impacts from varied strains of COVID-19 suggest that such precautions may be with us for the long-term. Emerging adults are a unique population, and undergraduate students are a unique subpopulation within emerging adults that merit being studied. Several theories such as the Theory of Planned Behavior and the Health Behavior Model aim to predict potential motivations for engaging in health behavior.

In order to expand more upon these theories, it is essential to look more into why experiencing significant levels of perceived threat might still not be enough to motivate oneself to engage in planned action. Understanding the relation between perceived threat and planning and engagement in protective behaviors is crucial for the development of useful interventions. What motivates individuals to engage in health engagement behaviors in the face

of a pandemic remains a frontline challenge, with implications for longevity, physical health, and mental health fields.

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Appendix

Appendix A

RESEARCH PARTICIPANT CONSENT FORM
The Effectiveness of Stress and Coping Surveys during COVID-19 Pandemic in College Students
Dr. Jody Nicholson
University of North Florida
Department of Psychology

Informed Consent:

COVID-19 was declared a global pandemic in March of 2020 and has since then disrupted the lives of many. While individual outcomes of COVID-19 vary, stress has become a common side effect. Given the uniquely stressful situation students are placed in due the compilation of life stress, work stress, and academic stress, it is likely COVID-19 is exacerbating students senses of overwhelm and stress.

The following surveys are psychometrically validated measures related to stress and coping. After completing a brief demographic survey, you will see surveys related to stress and coping. We are asking questions that will help us to measure the impact of COVID-19 on student stress as well as update the Undergraduate Stress Questionnaire, which is a checklist you will be completing of stressful events that undergraduates may have experienced. The purpose of this research study is to establish a holistic model of how the COVID-19 pandemic has impacted student stress while also updating the USQ with the hopes that modern research on stress in undergraduates would have a more up-to-date measure.

All data collected at the university is monitored by the University's Institutional Review Board (IRB) to ensure protection of human subjects and that ethical protocols are followed. While there is no direct benefit for participating besides course credit or extra credit through the SONA system, we do hope that what we find from this study assists in helping students broadly in handling stress. There is no more than minimum risk. Risk involves include emotional discomfort in thinking about stress and coping. If you feel distressed by these surveys, please contact Skylar St. Clair (n01397555@unf.edu) or Jacqueline Sterghos (n01399612@unf.edu) directly so we can monitor the survey's impact on participants and report any unanticipated adverse events, unexpected problems, and complaints from participants to the UNF IRB. It is also recommended that you contact the University of North Florida Counseling Center (904-620-2602) if this survey causes undue stress. Sometimes reflecting on how much stress you are under can be stressing in itself. The Counseling Center can provide a free individual consultation and specializes in helping with the stress of being in college for our student population.

Please answer each question honestly to ensure validity of our dataset. The survey should take between 30-45 minutes to complete. If there is any question that makes you uncomfortable, you can choose to skip it.

- ○ I have read the consent form & I **do not consent** to my answers being used in the research study.
- ○ I have read the consent form & **do consent** to my answers being used for the research study.

Demographics:

Age: _____

Gender: M F Other

Circle one:

Freshman Sophomore Junior Senior Graduate Student

Are you graduating this semester?

Yes No

Do you have plans made for after you graduate? This would include going to graduate school or knowing the type of job you are applying for and how to gain employment.

Yes No

How many credit hours are you taking at UNF this semester? _____

How many classes are you taking at UNF this semester? _____

How many hours do you currently work outside of school each week, on average? _____

How many hours did you work outside of school each week, on average, before the COVID-19 pandemic (March 2020)?

Have these work hours worked been effected by COVID-19. Yes, increased hours worked No, increased hours work

My job requires me to work in a public setting. Yes. No

I am a front-line worker or work in a hospital setting. Yes. No

Demographic questions for coping questionnaire:

What is your relationship status?

Single In a relationship Married

Has your relationship status changed since the COVID-19 pandemic (March 2020)?

Yes, positive change in relationship status. Yes, negative change in relationship status. No change in relationship status.

Adaptations during the Pandemic:

I believe I contracted COVID-19 and or have tested positive for COVID-19? Yes No

I know someone who has tested positive from COVID-19? Yes No.

I have received or plan on receiving the COVID-19 vaccine? Yes. No

I know someone who has received or is planning on receiving the COVID-19 vaccine?

How many COVID-19 tests have you taken?

I have access to health care. Yes. No

I've had to move since the COVID-19 pandemic started (March 2020) Yes No

I currently live:

With my parent(s) with friends with a partner/spouse by myself

In terms of my pre-pandemic college coursework:

More than 80% of my courses were face-to face Yes No

In terms of my current pandemic college coursework:

More than 80% of my courses are face-to face Yes No

	Disagree 1	2	Neutral 3	4	Agree 5
I have more social support now compared to before the COVID-19 Pandemic					
I spent little money (less than $200) transitioning to distance learning college courses at the start of the Pandemic.					
I had a computer and wifi access at the start of the pandemic.					

I have a quiet space to complete my coursework.					
I have to go outside of my house for wifi access to complete my coursework.					
Others sharing my housing (family/roommates/partner) give me sufficient time and space to complete my schoolwork.					
I have more access to my college instructors than I did before the COVID-19 Pandemic					
I am more connected to my classmates now than before the COVID-19 Pandemic					
I am spending less money on college now than before the COVID-19 Pandemic (e.g., housing, gas, parking).					

GAD-7

Over the last 2 weeks, how often have you been bothered by the following problems?	Not at all sure 0	Several days 1	Over half the days 2	Nearly every day 3
1. Feeling nervous, anxious or on edge				
1. Not being able to stop or control worrying				
1. Worrying too much about different things				
1. Trouble relaxing				
1. Being so restless that it's hard to sit still				
1. Being easily annoyed or irritable				
1. Feeling afraid as if something awful might happen				

COVID-19 Prevention Perceived Effectiveness

Construct	**Measure**	**5-point Likert Scale**				
Understanding of Covid-19 (5 items)	I do understand the transmission of COVID-19	Strongly disagree **1**	Disagree 2	Neither Agree nor Disagree 3	Agree 4	Strongly Agree **5**
	I do understand the incubation period of COVID-19					
	I do understand the symptoms of COVID-19					
	I do understand the protocol if I have symptoms that might lead to COVID-19					

	I do understand which hospitals can treat COVID-19	
Perceived Vulnerability (5 items)	I think I am very vulnerable to COVID-19	
	I think my neighborhood is very vulnerable to COVID-19	
	My past experiences make me believe that I am likely to get sick when my friends are sick	
	I have a history of susceptibility to infection disease	
	I think there is a chance that my family will be infected by COVID-19	
Perceived Severity (7 items)	I find COVID-19 is a serious disease	
	I find COVID-19 can lead to death	
	I find COVID-19 is more severe than any other disease	
	I find COVID-19 can affect mental health	
	I think it's very expensive to pay the medical expenses for COVID-19	
	I think the COVID-19 outbreak will at least until the following 3 months	
	I think the COVID-19 outbreak in my country is more severe than in other countries	

Attitude (7 items)	I worry about the number of people infected by COVID-19	
	I feel stressed during the COVID-19 outbreak	
	I am afraid that one of my family members will get infected	
	I feel anxious during the COVID-19 outbreak	
	I feel insecure if someone stands too close to me during the COVID-19 outbreak	
	I feel insecure if someone is not wearing a mask during the COVID-19 outbreak	
	I feel insecure if someone sneezes or coughs next to me	
Subjective Norm (5 items)	Most people I know are following the preventative protocols given by the government	
	Most people I know are wearing face masks outside	
	Most people I know are staying home and work from home	
	Most people I know are using hand sanitizer	
	Most people I know are doing physical distancing	

Perceived Behavioral Control (4 items)	The preventative protocol are completely up to me	
	I think preventative protocols are easy to be implemented	
	I am confident that I can prevent getting infected by COVID-19	
	I am confident that I have enough knowledge about COVID-19	
Intention to Follow (5 items)	I am willing to follow the recommended precautions until the end of the COVID-19 outbreak	
	I am willing to follow to stay home during COVID-19	
	I am willing to follow every rule made by my government during the COVID-19 outbreak	
	I am willing to reschedule my travel plans	
	I am willing to follow my government to lock down the country, city, and community	
Actual Behavior (7 items)	I am practicing proper handwashing to prevent the spread of the virus	
	I use hand sanitizer more often during the COVID-19 outbreak	
	I always wash my hands whenever I go outside	

	I practice 1-meter social distancing to reduce unnecessary infections	
	The company/school where I work/study implements work from home to prevent the spread of COVID-19	
	I always wear a face mask whenever I go outside during the COVID-19 outbreak	
	I always dispose of my face mask properly	
Adapted Behavior (5 items)	I maintain a healthy lifestyle during the COVID-19 outbreak	
	I keep working from. Home during the COVID-19 outbreak	
	I don’t smoke during the COVID-19 outbreak	
	I don’t drink alcohol during the COVID-19 outbreak	
	I sleep at least 7 h per day during the COVID-19 outbreak	
Perceived Effectiveness (7 items)	I think the preventative protocols for the COVID-19 outbreak in my country are effective	
	I think the preventative protocols for the COVID-19 outbreak in my community are effective	

	I think a healthy lifestyle will enhance my immunity	
	I think social distancing can prevent the transmission of COVID-19	
	I think a face mask can prevent the transmission of COVID-19	
	I think proper hygiene can prevent the transmission of COVID-19	
	I think lockdown is an effective way to prevent COVID-19	

Over the last 2 weeks how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things	○	○	○	○
Feeling down, depressed, or hopeless	○	○	○	○
Trouble falling or staying asleep, or sleeping too much	○	○	○	○
Feeling tired or having little energy	○	○	○	○
Poor appetite or overeating	○	○	○	○

Feeling bad about yourself or that you are a failure or have let yourself or your family down	○	○	○	○
Trouble concentrating on things, such as reading the newspaper or watching television	○	○	○	○
Moving or speaking so slowly that other people could have noticed. Or the opposite - being so figety or restless that you have been moving around a lot more than usual.	○	○	○	○
Thoughts that you would be better off dead, or of hurting yourself	○	○	○	○

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home or get along with other people?

- ○ Not difficult at all
- ○ Somewhat difficult
- ○ Very difficult
- ○ Extremely difficult