COLLEGE STUDENTS' STRESS RESPONSES AND ANXIETY DURING THE 2020 COVID-19 PANDEMIC

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Abstract

The purpose of this current study was twofold: first, to identify the potential ecological risk and resiliency factors that contribute to emerging adult college students' generalized anxiety, as well as physiological and depressive responses to stress during the onset of the COVID-19 pandemic; second, to compare domestic and international college students' sources of stress, social supports, stress responses, and generalized anxiety. Results indicated elevated levels of generalized anxiety and depressive symptoms. Significant differences between international and domestic students were found in generalized anxiety, dating frustrations, and physiological responses to stress. Three separate multiple regressions on physiological responses to stress, depression, and generalized anxiety were conducted. Results and implications will be discussed.

Keywords: COVID-19, college students, international students, stress, anxiety, social support

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The unprecedented, in recent history, global 2020 COVID-19 pandemic had, and will certainly continue to have, consequential impacts on emerging adult college students' lives and behavioral health in the U.S. During the spring of 2020, many college students found their lives suddenly disrupted when universities quickly transitioned to online learning, forcing many students to leave their universities' physical campuses abruptly (Carey, 2020). Moreover, many more experienced job furloughs and additional financial hardships on top of educational disruptions (Safier, 2020). In addition, evidence indicates that most college students, inclusive of all ages, were not eligible for immediate financial relief from the Coronavirus Aid, Relief, and Economic Security (CARES) Act in 2020 (Safier, 2020). The emotional toll and stress from COVID-19-related stressors, confounded with educational and economic disruptions, undoubtedly influenced college students' mental health. In fact, since the onset of the pandemic, there has been an increased prevalence of depression and anxiety in college student populations, which has become a paramount concern for institutional leaders (American College Health Association, 2019).

Although there has been extensive research on the implications of acute and widescale stressors, such as previous epidemics and natural disasters, on individuals' mental health (Orengo-Aguayo et al., 2019), there has been sparse literature assessing the contribution of disparate student samples' academic and environmental sources of stress, social supports, and demographics on their mental health. Limited research has holistically investigated the associations between ecological risk and resiliency factors and the behavioral health outcomes of college students during the COVID-19 pandemic, let alone assessing these variables on international students. The purpose of this current study was twofold: first, to identify the potential ecological risk and resiliency factors that contribute to emerging adult college students' generalized anxiety, as well as physiological and depressive responses to stress during the COVID-19 pandemic; second, to compare the perceptions of domestic and international college students' sources of stress, social supports, stress responses, and generalized anxiety.

Literature Review

Although emerging adults appear to be less vulnerable to the physiological complications of COVID-19, they are not immune to the economic and psychological impacts of the pandemic at a time in which they are facing their own developmental challenges in their transitions to adulthood (Wang et al., 2020). Emerging adulthood is recognized as a developmental period of the life span between adolescence and adulthood, in which individuals residing in industrialized countries are likely to be exploring their identities, undergoing numerous transitions, and experiencing a sense of both possibility and instability (Arnett, 2007). This is a period when many individuals feel in between, in which they are starting to achieve some level of independence but still haven't taken on all the responsibilities of adulthood (e.g., stable job, marriage, and parenthood; Arnett, 2007).

Emerging adulthood was first coined by Arnett in 2000 in response to the social and economic changes inherent within industrial societies (e.g., longer years of schooling, and delays in marriage). It is recognized to last between the ages of 17 to the late 20s, with the end being characterized as a period in which individuals are able to live independently, establish long-term relationships, and have clear career pathways (Arnett, 2007). As individuals are pursuing their educations for longer periods of time and marrying at later ages, scholars are starting to push the end of this distinctive developmental period closer to the age of 30 (Arnett, 2007); researchers have started to include 30-year-olds in their study samples on emerging adults (King et al., 2012).

College students represent a significant proportion of emerging adult populations in the U.S.

(Hanson, 2021). Today, more emerging adult Americans are entering college than ever before, experiencing increased academic pressures, demands, stress, as well as mental health disorders (American College Health Association, 2019). Emerging adults are an important population to investigate since the onset of most mental health disorders tends to happen during this time (Auerbach et al., 2016). Not only are they faced with heightened levels of psychological distress due to their transition into adulthood, but also academic stressors, such as the abandonment of the family home, adjusting to new social and geographical environments, developing new friends and social relationships, experiencing life-stage transitions, and economic instability (Beiter et al., 2015).

Previous literature has found a wide array of risk and resiliency factors related to emerging adult college students' psychological well-being, such as job/income security, socio-economic status, previous experiences of abuse, social supports, academic stressors, access to healthcare/health insurance, gender, and race (Landberg et al., 2019). Moreover, certain emerging adult college student populations, such as those from lower socio-economic statuses, minorities, and international students, have been found to face unique stressors (Beckstein, 2020; McClain et al., 2016; Wood & Harris, 2018). Emerging adults from lower socio-economic statuses are at a heightened risk of experiencing familial turmoil, substandard housing, violence, inadequate access to healthcare, and an overload of work, family, and school responsibilities (Wood & Harris, 2018). Moreover, those from ethnic minority backgrounds face heightened stressors related to experiences with prejudice, discrimination, and microaggressions, which often lead to internalizations of prejudice and imposter syndrome (McClain et al., 2016). Once on campus, both low socio-economic income and ethnic minority students experience lower levels of belonging, limited social and cultural supports, and are consistently having to straddle between two distinct cultures: their own and their institution's (Martin, 2015; Williams & Martin, 2021). In addition, international college students experience their own share of unique stressors, such as acculturation stress, perceived discrimination, language barriers, lack of knowledge about the host culture, homesickness, limited social support, and concerns about getting back home safely (Beckstein, 2020). Under normal circumstances, international students are less likely to report mental health symptoms and seek treatment; however, they are more likely to experience psychosomatic symptoms (Mori, 2000). With a higher proportion of emerging adults attending college, and a significant subsection of them being international students (approximately 5%; Hanson, 2021), understanding the ecological risk and resiliency factors of emerging adult college students' behavioral health during the onset of the COVID-19 pandemic is vital.

Much of the literature on the psychological implications of COVID-19 on college student populations was conducted predominately outside of the U.S. Studies worldwide have reported elevated levels of anxiety, stress, and depression among college student populations during the 2020 COVID-19 pandemic (Charles et al., 2020; Hoyt et al., 2020; Son et al., 2020; Wang et al., 2020). Risk factors, such as COVID-19 related economic implications, lifestyle changes (e.g., social distancing), and delays in academic activities, as well as identifying as a woman, coming from lower socioeconomic status, experiencing higher rates of stressors, and having a relative diagnosed with COVID-19 were found to be related positively to mental health disorders and stress in college students (Beiter et al., 2020; Cao et al., 2020; Ganson et al., 2020; Hoyt et al., 2020; Kecojevic et al., 2020; Kujawa et al., 2020; Rudenstine et al., 2021; Wang et al., 2020). Meanwhile, social support, living with parents, technology, and access to health services (e.g., counseling) were found to serve as resiliency factors for college student populations (Cao et al., 2020; Son et al., 2020).

To date, limited research has assessed the

mental health implications and stress responses of emerging adult college students during the onset of the 2020 COVID-19 pandemic (Charles et al., 2020; Copeland et al., 2021; Hoyt et al., 2020; Kecojevic et al., 2020; Rudenstine et al., 2021; Son et al., 2020; Wang et al., 2020). Of those that did, a majority of the focus was on the predictors of mental health disorders, which have found COVID-19-related worries, stressors, educational and economic transitions, as well as lifestyle changes to be associated with college students' anxiety and depression (Beiter et al., 2020; Hoyt et al., Kecojevic et al., 2020; 2020; Rudenstine et al., 2021; Wang et al., 2020). Although the associations between COVID-19-related stressors, anxiety, and depression have started to be assessed on college student samples within the U.S., there is limited literature examining these associations solely on emerging adult college student populations. Moreover, most studies focused either specifically on one university, university system, or student classification (e.g., freshman) or more broadly on holistic college student populations, inclusive of all age ranges and developmental stages (Charles et al., 2020; Copeland, 2021; Kecojevic et al., 2020; Rudenstine et al., 2021; Wang et al., 2020).

In addition, there has been sparse literature assessing college students' physiological responses to stress, as a separate construct distinct from anxiety or psychological health, during the onset of the COVID-19 pandemic. Although some studies did assess items related to physiological responses to stress in their measures, these items were generally combined with others to represent broader constructs, such as anxiety or psychological health (Yang, 2021). Not surprisingly, there has been sparse literature assessing the mental health and well-being of international students during the onset of the COVID-19 pandemic within the U.S. Although some studies have included international students in their samples, their representation has been minimal, ranging from 1-8.1% (Lee et al., 2021). To date, only one study was found to specifically focus on international college students and their coping during the onset of the pandemic (Lai et al., 2020). That study found that academic stress, perceived health, availability of reliable COVID-19-related information, and lack of social support predicted negative mental health outcomes (Lai et al., 2020). Unfortunately, studies have yet to be able to compare the coping of international students to domestic students during the onset of the COVID-19 pandemic. To help fill the voids in the literature, the current study sought to answer the following research questions: first, what role do demographics, social supports, and stressors (both academic and COVID-19 related) play on the physiological responses to stress, depression, and generalized anxiety of emerging adult college students; second, do the sources of stress, social supports, stress responses, and generalized anxiety symptomology vary between domestic and international college students?

Theoretical Framework

This study utilized a *risk and resiliency ecological* framework to explore the associated risks as well as protective factors related to emerging adult college students' mental health during the spring of the 2020 COVID-19 pandemic (Bronfenbrenner, 1979; Fraser et al., 1997; Luthar & Zelazo, 2003; Masten & Powell, 2003; Zimmerman, 2013). This framework proposes that individual development is influenced by a series of risk and resiliency (protective) factors across multiple ecological systems (e.g., micro, mezzo, and macro), that increase or decrease the likelihood of positive or negative outcomes (Bronfenbrenner, 1979; Fraser et al., 1997; Luthar & Zelazo, 2003; Masten & Powell, 2003; Zimmerman, 2013). The microsystem consists of individual and close relational factors, such as temperament, gender, familial relational pressures, and social supports. The mezzo system consists of the immediate social environment, such as neighborhood and school context as well as access to resources. Lastly, the macro system consists

of broader societal-level factors, such as poverty, COVID-19-related public health changes, and environmental stressors (Bronfenbrenner, 1979; Fraser et al., 1997). Risk factors consist of negative contextual and individual stressors across multiple ecological systems, such as public health emergencies, that lead to unfavorable developmental outcomes; meanwhile, resiliency factors consist of positive contextual and individual variables across multiple ecological systems that mitigate negative outcomes despite evident risks. The risk and resiliency ecological framework supplies "conceptual scaffolding" in helping to explain why certain individuals face unfavorable behavioral and mental health outcomes in the face of stress; meanwhile, others do not (Bronfenbrenner, 1979; Fraser et al., 1997; Zimmerman, 2013 p. 381).

Methodology

A cross-sectional online study was conducted between April 2020 to May 2020, right around the time when many universities transitioned to online learning. This was when the COVID-19 outbreak spread across the U.S., and the number of cases and associated deaths were increasing while shelter-in-place orders were being rolled out by state and local governments (CDC, 2020). Students nationwide were recruited via multiple virtual platforms, consisting of email, online listservs (e.g., the Psychological Research on the Net and the Social Psychology Network), and social networking websites (e.g., Facebook, Twitter, etc.). Due to the current demographic and lifestyle trends and theoretical shifts in consideration of emerging adulthood to last until the age of 30, college students between the ages of 18 to 30 pursuing undergraduate degrees from U.S. institutions nationwide were eligible to take part in this study. Respondents were asked to complete a 30-minute Qualtrics survey regarding their COVID-19-related experiences. The survey included questions on demographics, sources/responses to academic stress, anxiety, depression, social supports, and COVID-19-related stressors. The Institutional Review Board approved all procedures of the researcher's institution.

Measures

The survey included 70 items. The first 13 items assessed demographic factors (see Table 1). Four more sub-sections were included in the survey: a COVID-19-related exposure prompt ("Has anyone in your family contracted COVID-19?"), the Student-Life Stress Inventory (SLSI; Gadzella,1991), the Generalized Anxiety Disorder Scale-7 (GAD-7; Spitzer et al., 2006), and the Abbreviated Duke Social Support Index (SSI; Koenig et al., 1993).

SLSI

The SLSI was utilized to assess students' academic sources of and responses to stress. The SLSI is a 51-item Likert-format questionnaire with a scale ranging from one to five (Gadzella et al., 1991). The questionnaire consists of two parts: stressors and responses. The stressors section includes 23 items that measure five different categories of academic stress (frustrations, conflicts, pressures, changes, and self-imposed). The frustrations subscale attempts to measure levels of frustration related to a wide array of factors, such as academic delays, daily hassles, social exclusion, and dating problems. The conflicts subscale measures academic stress related to two or more desirable and/or undesirable alternatives or outcomes. The changes subscale assesses academic stressors due to life changes or disruptions. The self-imposed subscale measures students' competitiveness, as well as desires to be noticed and loved by all. Lastly, the pressures subscale measures academic stress resulting from deadlines, work overload, and social expectations.

The responses section of the SLSI comprises of 28 items measuring four categories of responses (physiological, emotional, behavioral, and cognitive). The physiological reactions subscale measures physiological responses, such as sweating,

tremors, headaches, etc. The emotional reactions subscale assesses items related to fear, anxiety, worry, grief, and depression. The behavioral reactions subscale measures responses, such as crying, drug use, smoking, etc. Lastly, the cognitive reactions subscale measures respondents' abilities to think about stressful situations and their strategies to reduce stress. Within this inventory, several social stressors are also included, such as "As a student, I have not been accepted socially (became a social outcast)." In addition, one emotional reaction item assesses experiences of depression under stressful situations. In the SLSI, scores can be calculated for the total instrument, each part (stressors or reactions to stressors), or category by summing the responses for respective items. The SLSI has been reported to have acceptable reliability, consistency, and concurrent validity (Gadzella & Carvalho, 2006).

GAD-7

The GAD-7 scale was utilized to identify the symptomatology and severity of generalized anxiety (Spitzer et al., 2006). The GAD-7 is designed to identify probable cases of generalized anxiety and assess the severity of symptoms according to the latest Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). Participants were asked how often, during the last two weeks, they exhibited seven core symptoms of Generalized Anxiety Disorder (GAD). The GAD-7 score ranges from 0-21, with greater numbers indicating higher levels of anxiety. Scores of ten or higher are indicative of elevated levels of anxiety, with ten being considered the threshold for Generalized Anxiety Disorder. The internal consistency and reliability of the GAD-7 were proven to be acceptable (Kertz et al., 2013).

SSI

The SSI was utilized to assess social interactions and support. The SSI is an 11-item index comprising of two subscales (social satisfaction and social interaction), which provide an overall indication of social support (Koenig et al., 1993). Questions are scored on a four-point likert scale. The social interaction subscale asks questions regarding the number of social interactions an individual had within the past week. Questions were edited to include both face-to-face and virtual/remote interactions (e.g., How many times during the past week did you spend time with someone, face-to-face or virtually/remotely?). The SSI overall score is a total combination of the social interactions and social support satisfaction items. The total score for the SSI ranges from 11-33, with higher scores indicating a stronger satisfaction with social support. Previous studies have found this index to have appropriate internal consistency and reliability (Koenig et al., 1993).

Data Analysis

Quantitative data analysis was conducted utilizing the Statistical Package for Social Sciences (SPSS) version 26.0 (IBM). The Little's test (1988) was examined to evaluate missing data; the result was not significant, indicating that data were missing completely at random. Given this pattern, results for specific measures contained data only for those participants who completed those measures. Descriptive, bivariate, and hierarchical multiple regression analyses were conducted to assess the quantitative data.

Results

Descriptive Findings

The final sample was composed of 703 undergraduate emerging adults with an average age of 24 (SD=2.34). Students were recruited from 33 different states within the U.S., with a the significant proportion from Southern (40%) or Mid-Atlantic (20%) regions. Moreover, the sample was ethnically diverse, with approximately 64% self-identifying as Caucasian, 13% as African American, 8% as Hispanic, 10% as Asian, 5% as mixed, and <1% as other. In addition, approximately 24% of the participants were international students, and

77% of the sample identified as female (please refer to the limitations section regarding the conflation of sex and gender). It is important to note that this sample was not representative of U.S. undergraduate college students nationwide. There was an overrepresentation of females (national percentage=55%), international students (national percentage= 4.6%), Caucasians (national percentage=55%), Asians (national percentage=7%), African Americans (national percentage=10%), and mixed ethnicity students (national percentage=4); meanwhile, an underrepresentation of Hispanics (national percentage=20%; Hanson, 2021). Tables 1 and 2 show the demographic and descriptive data of all participants under investigation. Approximately 51% of the sample reported elevated levels of generalized anxiety above the clinical threshold. Moreover, 67.2% reported experiencing depression in response to stressful situations. The mean scores for perceived sources of stress were elevated above the midpoint for pressures, changes, and self-imposed related stressors, as well as depressive responses to stress.

Bivariate Associations Between Demographic/Descriptive Variables, Sources of Stress, and Stress Responses

Correlational analyses were conducted on all continuous criterion and predictor variables in question. Generalized anxiety was found to be related to inadequate accessibility to resources (r=.30, p<.001), social exclusion (r=.32, p<.001), dating frustrations (r=.31, p<.001), pressures related to interpersonal relationships (r=.51, p<.001), satisfaction with social supports (r=-.28, p<.001), frustrations (r=.55, p<.001), conflicts (r=.44, p<.001), pressures (r=.58, p<.001), changes (r=.63, P<.001), and self-imposed stressors (r=.47, p<.001). Similarly, physiological responses to stress was found to be related to inadequate accessibility to resources (r=.30, p<.001), social exclusion (r=.42, p<.001), dating frustrations (r=.34, p<.001), pressures related to interpersonal relationships (r=.48, p<.001), satisfaction with social supports (r=-.22, p<.001), frustrations (r=.57, p<.001), conflicts (r=.47, p<.001), pressures (r=.52, p<.001), changes (r=.56, P<.001), and self-imposed stressors (r=.50, p<.001). Lastly, depressive symptomology was found to be related to inadequate accessibility to resources (r=.25, p<.001), social exclusion (r=.40, p<.001), dating frustrations (r=.32, p<.001), pressures related to interpersonal relationships (r=.48, p<.001), satisfaction with social supports (r=-.30, p<.001), frustrations (r=.50, p<.001), conflicts (r=.43, p<.001), pressures (r=.50, p<.001), changes (r=.56, P<.001), and self-imposed stressors (r=.41, p<.001).

Independent samples t-tests were conducted to assess the unadjusted bivariate associations between categorical predictor variables and criterion variables (Table 3). Results indicated significant independent effects for gender identity (specifically between males and females) on physiological and depressive responses to stress as well as generalized anxiety, with those identifying as female reporting significantly higher levels across the board (Table 3). Moreover, there were significant independent effects of having a family member diagnosed with COVID-19 on physiological and depressive responses to stress as well as generalized anxiety, with higher levels for those who had a family member diagnosed with COVID-19 (Table 3). Lastly, independent t-tests were conducted to compare the differences between international students and domestic students on criterion variables and stress-related predictor variables. Significant differences were found in generalized anxiety and physiological responses to stress criterion variables, with international students scoring significantly lower than domestic students (Table 3). When comparing international and domestic college students on stress-related predictor variables, the only statistically significant difference found was on dating frustrations, with international students (M=1.86; SD=1.14) reporting lower levels of dating frustrations compared to domestic students (M=2.48; SD=1.42; t(693)=-2.52, p=.001).

No other significant independent effects on predictor variables were found for financial security, living with parents, or health insurance variables. ANOVAs were also conducted to assess whether there were significant independent effects on race for outcome variables; all ANOVAs were not statistically significant.

Multiple Regressions on Criterion Variables

Three separate multiple regressions were conducted. To guard against Type I error, Bonferroni adjustments were made in accordance with the eight predictors for each model (.05/8=.006). The results and interpretations of this study are therefore based on a significance set at $p<.006$. This is a conservative practice that is preferred for utilization when multiple linear regressions have larger numbers of predictor variables (Mundfrom et al., 2006; Liu et al., 2020). Significant factors from the bivariate analyses were included in the multiple regressions. In the first regression, gender identity, having a family member diagnosed with COVID-19, relational pressures, social exclusion, changes, self-imposed, and conflict stressors were found to contribute significantly to the variance in physiological responses to stress. In the second regression, satisfaction with social support, relational pressures, social exclusion, dating frustration, changes, and self-imposed stressors were found to contribute significantly to the variance of depressive responses to stress. In the last regression, being an international student, changes, pressures, and self-imposed stressors were found to contribute significantly to generalized anxiety symptomology. The results of these models are displayed in table 4.

Discussion

The main purpose of this current study was to assess the factors associated with the behavioral health of domestic and international emerging adult college students during the onset of the 2020 COVID-19 pandemic through an ecological risk and resiliency lens. This was done by, first, identifying the potential risk and resiliency factors that contribute to emerging adult college students' generalized anxiety, as well as physiological and depressive stress responses. Then a comparison between domestic and international college students' sources of stress, social supports, stress responses, and generalized anxiety was assessed. What makes this study unique is that it examined the associations between a wide array of ecological factors and behavioral health outcomes for emerging adult college students during the onset of the recent 2020 COVID-19 pandemic. Moreover, this study specifically accessed disparate sources of stress rather than conceptualizing stress as one holistic overarching construct or solely focusing on one stressor source, such as COVID-19; this allowed for a deeper understanding of the relationship between specific sources of stress and stress responses. Lastly, this is one of the first studies focused on assessing international emerging adult college students coping during the onset of the COVID-19 pandemic, and how it compared to domestic college students' coping.

The findings of this study highlight the increased prevalence of generalized anxiety (approximately 51%) and depression (approximately 67%) symptoms in emerging adult college students during the onset of the 2020 COVID-19 pandemic. These percentages are considerably higher than previous reports of general anxiety (24%) and depression (20%) on emerging adult college student samples prior to the pandemic (American College Health Association, 2019) and are consistent with some of the preliminary studies on college students during the onset of the COVID-19 pandemic (Berg et al., 2021; Cao et al., 2020; Kujawa et al., 2020; Lee et al., 2020; Liu et al., 2020; Soria & Horgos, 2021). Moreover, the findings of this study also highlight the heightened levels of stressors, such as pressures and changes, as well as physiological responses to stress, faced by emerging adult college students during the onset

of the pandemic, which were considerably higher than findings in previous college student samples utilizing the SLSI scale (Gadzella et al., 2012; Misra & Castillo, 2004). Unfortunately, there has not been more recent literature assessing the stressors of emerging adult college students using the SLSI scale for comparison.

The findings of this study also call attention to the risk and resiliency factors, at all ecological levels, associated with generalized anxiety, and physiological and depressive responses to stress during the 2020 COVID-19 pandemic. At the micro level, those who identified as female were statistically more likely to experience elevated levels of anxiety, depression, and physiological responses to stress compared to those who identified as male, which is in line with the previous literature (Rudenstine et al., 2021; Misra & Castillo, 2004). Interestingly, when added to the multiple regressions, gender identity was only found to be significant in the regression on physiological responses to stress. It seems as though other predictor variables played a more significant role in explaining the variance of depressive responses to stress and generalized anxiety in this sample.

Additionally, another micro-level risk factor found to be related to depression and generalized anxiety symptomology in this sample was having a family member diagnosed with COVID-19. Participants who had a family member diagnosed with COVID-19 were more likely to experience heightened levels of generalized anxiety and depressive responses to stress compared to those who did not, similar to some of the more recently published literature (Cao et al., 2020). In line with this, those who had a family member diagnosed with COVID-19 were also more likely to have higher levels of physiological responses to stress, something that has not been investigated in previous studies. In fact, having a family member diagnosed with COVID-19 was found to be one of the significant predictors of physiological responses to stress in the first multiple regression, highlighting the significance of the micro-level stressor of family exposure to COVID-19 on emerging college students' physiological responses to stress. This may be due to the nature of this stressor, which, in itself, has physiological manifestations on loved ones that may possibly lead to vicarious symptoms.

When it comes to examining distinct sources of stress and criterion variables, it is imperative to highlight that both mezzo and macro-level changes, as well as micro-level self-imposed sources of stress, were found to be statistically significant in explaining the variance in all regression models; this may imply that, during the onset of the COVID-19 pandemic, emerging adult college students may need more guidance and assistance with handling self-imposed and changes related stressors at all ecological levels. Furthermore, the regressions of this study showed that distinct stressors were more significantly related to some criterion variables versus others. For example, social stressors at both micro and mezzo levels, such as relational pressures and social exclusion, were found to significantly explain the variance in physiological and depressive responses to stress, but not anxiety. Moreover, other social factors, such as social support and dating frustrations, were found to significantly explain the variance in depressive responses to stress.

Lastly, when it comes to comparing international students to domestic students, the results of this study found international students reporting lower levels of generalized anxiety symptoms, physiological responses to stress, and dating frustrations, compared to domestic emerging adult college students during the onset of the pandemic. This indicates that international students were less likely to be dealing with micro and mezzo-level dating frustrations, generalized anxiety symptoms, and physiological responses to stress. In fact, being an international student was one of the significant predictive factors in explaining the variance of generalized anxiety in the current study.

Implications

The findings of this study imply that emerging adult college students in the U.S. constitute a particularly vulnerable population, with their elevated levels of generalized anxiety symptomology, as well as physiological and depressive responses to stress. Colleges and universities within the U.S. are strategically situated at the mezzo level to be vehicles of support, protection, and resiliency development for emergent adult college students during the aftermath of the recent COVID-19 pandemic. This can be done through the investment of more resources for the mental health, stress management, and coping of emerging adult college students during the aftermath of the pandemic, such as mezzo-level virtual webinars, mental health, and wellness services, as well as social support groups. Moreover, colleges should target their training to the most vulnerable students, through the identification of micro and macro-level risk factors, such as being a domestic college student, identifying as a woman, having a family member diagnosed with COVID-19, and undergoing significant changes due to the pandemic. It is imperative for college administrators, faculty, and communities to understand that emerging adult college students faced unique stressors during the onset of the pandemic, which were significantly related to negative mental health outcomes. Interventions during the aftermath of this pandemic should be focused on helping emerging adult college students learn how to recognize their sources of stress from all ecological levels and develop healthy coping mechanisms at both micro and mezzo systems, to combat their stressors.

Although many institutions do have pre-established campus-based resources, such as counseling and health centers, at the mezzo level, it is important for institutions to prioritize the funding of these critical investments as they encounter budget cuts in the aftermath of the COVID-19 pandemic. While many colleges have transitioned to offering telehealth services, there is a need to expand these services, by providing more appointment times through the hiring of more counseling staff or networking with third-party vendors. These mezzo-level actions are vital with the prevalence of mental health issues being faced by college students today. This must also be implemented in conjunction with widespread efforts to inform and encourage other institutional members, specifically faculty and academic advisors, to refer students to mental health services and resources on campus. Faculty and advisors are uniquely situated in the mezzo system to recognize student distress since they are on the frontline of institutions and have regular contact with students. Furthermore, in this effort, it is imperative to train faculty on how to recognize distress in students and serve as gatekeepers to campuses' mental health resources.

Lastly, colleges and universities should attempt to address other risk factors associated with negative outcomes, such as mezzo-level social/relational stressors, micro-level self-imposed stressors, and macro level changes related stressors, by helping to build stronger mezzo-level social support networks and extending sustained support services, such as virtual 24/7 access to therapists/psychiatrists and academic tutors, as well as emergency financial grants, laptop/computer loans, hot-spots, and other resources. It is evident that during public health emergencies, emerging adult college students have unique needs and vulnerabilities that require responsive programming by colleges and universities that, at the mezzo level, can have rippling effects on emerging adult college students' well-being at all ecological levels.

Limitations

Despite this study's implications, it had several limitations worth noting. First, the study's design was cross-sectional in nature; therefore, causality could not be established since data represents a single moment in time. Future researchers should longitudinally track emerging adult college students and see how the prevalence and

correlates of mental health problems change over time. Moreover, more studies should be done on the efficacy of intervention programs on college campuses targeting emerging adult college students. A second limitation of this study was its utilization of a convenience sample, a majority of whom were predominantly from South-Eastern or Mid-Atlantic regions of the U.S., attending four year public colleges, and who were not representative of U.S. college students nationwide; caution must be taken in the generalizability of these findings to the broader emerging adult college student population within the U.S.

Another significant limitation was that sexual orientation was not investigated; this would have been tremendously insightful since the literature indicates that LGBTQ+ populations are facing unique stressors during the aftermath of the pandemic (Salerno et al., 2020). Along these lines, another stark and significant limitation of this study was the researcher's conflation of gender and sex. Although gender identity was intended to be investigated, only physical sex options (e.g., female, male, other) were available for selection in the gender-related demographic item; by conflating sex and gender, the researcher acknowledges that this action falsely perpetuates gender to be recognized as a natural/biological phenomenon, which it is not (Catalano, 2021). It is imperative for future researchers to ensure that they are utilizing correct gender identity constructs to prevent the further perpetuation of such falsities that have tremendous implications on already marginalized populations within our communities. Additionally, and not surprisingly, a very minimal number of transgender participants were recruited, which did not allow for any comparative analysis. Future research should have more intentional and inclusive recruitment strategies centered on LGBTQ+ emerging adult college student populations in order to assess their unique experiences during the aftermath of the pandemic.

Conclusion

Overall, this study's findings suggest that the onset of the 2020 COVID-19 pandemic had significant implications on emerging adult college student populations, many of whom were already vulnerable in light of the challenges commonly associated with their transitions to adulthood (Rubley, 2017). Despite these implications, this study's findings suggest that there were several resiliency factors, such as social supports at the micro and mezzo levels, which could help guide the development of evidence-informed interventions to support such populations. The findings of this study indicate that there is a need for immediate attention and support for emerging adult U.S. college students, specifically domestic students, those who identify as women, who've had family members diagnosed with COVID-19, and who've experienced heightened levels of social, self-imposed, and changes related stressors.

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Table 1

Demographic Characteristics

	%	N
Gender		
Female	77.10	542
Male	22.20	156
Other	.71	5
Ethnicity		
African Am.	12.94	91
Asian	9.67	68
Caucasian	64.01	450
Hispanic	7.97	56
2 or more	4.98	35
Other	.43	3
Region		
Rural	32.57	229
Urban	19.06	134
Suburban	48.36	340
Financial Security		
Secure Income	61.74	434
Insecure Income	38.26	269
Living with Family		
Yes	75.53	531
No	24.47	172
Health Insurance		
Yes	83.78	589
No	16.22	114
International Stud		
Yes	24.47	172
No	75.53	531

Note. “International Stud” represents international student.

Table 2

Variable Descriptives

	%	Raw Average Score	SD
GAD		10.09	3.30
< 10	49.01		
≥ 10	50.99		
Conflict Stressors		7.27	2.66
Below Midpoint	66.83		
Above Midpoint	33.17		
Pressures Stressors		14.44	3.78
Below Midpoint	25.00		
Above Midpoint	75.00		
Changes Stressors		9.77	3.36
Below Midpoint	35.82		
Above Midpoint	64.18		
Self-Imp. Stressors		21.51	4.32
Below Midpoint	18.81		
Above Midpoint	81.19		
FrustrationStressors		18.49	5.37
Below Midpoint	63.36		
Above Midpoint	36.64		
Physio Stress Resp		35.90	11.43
Below Midpoint	70.98		
Above Midpoint	29.02		
Depress Stress Resp			
Never/Seldom	32.8	3.17	1.29
Ocas-Most of time	67.2		

Note. “Self-Imp” represents self-imposed. “Physio Stress Resp” represents physiological stress responses. “Depress Stress Resp” represents depressive stress responses. “Ocas” represents Occasionally.

Table 3

Independent Samples T-tests Comparing Categorical Predictor Variables on Physiological and Depressive Responses to Stress, as well as Generalized Anxiety levels.

		Physiological			Depressive			GAD		
		M	SD	T	M	SD	T	M	SD	T
Gender										
	Males	27.77	8.35	-5.41**	2.90	1.30	-2.48*	13.95	3.65	-4.08**
	Females	37.97	4.11		3.25	1.28		17.89	6.31	
FamCov										
	None	35.20	11.26	2.37**	3.09	1.29	1.70*	16.79	6.25	2.03*
	FamCOV	41.27	11.60		3.30	1.28		19.18	7.17	
InternStud										
	Yes	33.00	13.16	-2.00*				8.43	6.37	-1.70*
	No	37.13	11.80					10.27	6.17	

Note. “FamCov” represents the family member with COVID variable. “None” represents those individuals who did report having a family member diagnosed with COVID. “Internstud” represents international student.

* p<.05. **p<.001

Table 4

Multiple Regressions Predicting Physiological and Depressive Responses to Stress as well as Generalized Anxiety (GAD)

	Physiological			Depressive			GAD		
	B	S.E. B	β	B	S.E. B	β	B	S.E. B	β
Gender	5.91	.92	.22**	--	--	--	--	--	--
InternStud	--	--	--	--	--	--	.17	.08	.09*
FamCOV	-1.71	.83	-.07*	--	--	--	--	--	--
Socsupp	--	--	--	-.05	.02	-.11*	--	--	--
RelationPress	1.15	.43	.12*	.18	.05	.16**	--	--	--
SocialExclusi	1.60	.39	.16**	.16	.05	.14**	--	--	--
DatingFrust	--	--	--	.07	.04	.08*	--	--	--
Changes	.81	.17	.22**	.11	.02	.29**	.06	.01	.36**
Pressures	--	--	--	--	--	--	.03	.01	.19**
SelfImposed	.71	.11	.25**	.05	.01	.15**	.02	.01	.12*
Conflicts	.69	.18	.16**	--	--	--	--	--	--
AdjustedR²		.52**			.41**			.34**	
F for R²		69.10**			54.48**			60.00**	

Note. “RelationPress” represents relational pressures. “SocialExclusi” represents social exclusion. “DatingFrust” represents dating frustrations.

*P<.006 ; **p<.001