INDIVIDUAL DIFFERENCES AND PANDEMIC IMPACT ON DIMENSIONS OF
DEPRESSION AND ANXIETY

BY

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THESIS

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ABSTRACT

Background: The global scale of the COVID-19 pandemic provides a novel context in which to assess the role that individual-difference factors play in responses to prevalent environmental threat. Research demonstrating a range in vulnerability to psychological distress during this pandemic warranted evaluation of the impact of interactions between age, previously experienced traumatic events, approach/avoidance temperament, and the onset of COVID-related restrictions on self-reported depression and anxiety symptoms. **Methods:** Undergraduate participants (n=653) completed a battery of online questionnaires that assessed symptom profiles associated with distinct dimensions of depression and anxiety in order to examine relationships among individual differences, stressors, and self-reported symptom endorsements associated with these dimensions. A state-wide stay-at-home order effectively split the sample into groups who completed the questionnaires either on-campus under normal circumstances or off-campus under the added duress of COVID. **Results:** Hierarchical regressions revealed higher depressed mood scores after onset of COVID restrictions. Age interacted with onset of restrictions, such that older (20+) but not younger participants reported higher anxious apprehension and rumination after spring break. Those who endorsed experiencing a previous traumatic life event had higher levels of rumination and depressed mood, regardless of restriction onset. Additionally, approach temperament was negatively associated with depression symptoms, suggesting that encouraging approach coping would help to mitigate depression. **Conclusions:** Present results support the need to consider individual-difference factors and to distinguish dimensions of internalizing symptoms when assessing mental health vulnerability in response to environmental threat.

Keywords: Depression, Anxiety, Approach-Avoidance, Hierarchical Regression, COVID-19

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INTRODUCTION

The 2019 novel coronavirus (COVID-19) has mandated an unprecedented shift in the daily routines of our society and continues to pose a significant threat to public health. COVID-19 has affected our everyday lives, causing financial concerns, school closures, and social isolation, among myriad other things. Research has demonstrated variability in vulnerability and risk for psychological distress depending on age, familial responsibilities, domestic and/or financial stability, preexisting psychopathology and psychological traits (Cao et al., 2020; Carstensen et al., 2020; Taylor et al., 2020; Vindegaard & Benros, 2020). These findings are consistent with evidence that virulent outbreaks, both past and present, are associated with exacerbated symptoms of mental illness and severe psychological distress (Bai et al., 2004; Bao et al., 2020; Hawryluck et al., 2004) due to negative effects of social isolation and uncertainty (Pfefferbaum & North, 2020; Taylor et al., 2020).

Many empirical findings relating to depressive and anxious behavior, such as heightened risk perception or threat-related vigilance, are a result of experimental manipulation or stress induction in the laboratory through the presentation of threatening stimuli such as disturbing tones, threat of pain, or emotional faces. The global scale of the COVID-19 pandemic provides a novel context in which to assess depression- and anxiety-related symptoms with high ecological validity. We have a unique opportunity to assess the role that individual-difference factors, such as age, previously experienced trauma, or motivational dispositions, have on one's response to a prevalent environmental threat, identifying the relationships to depression and anxiety symptoms beyond the confines of the laboratory.

Internalizing symptoms, in particular, have been shown to be increased in the general population as a result of COVID-19 (Serafini et al., 2020; Torales et al., 2020; Vindegaard &

Benros, 2020). Initial reports have revealed differential trends of symptom expression depending on individual differences, such as previous traumatic experience (Guo, Fu, et al., 2020; Kim et al., 2020; Rees & Fisher, 2020). These findings are consistent with the literature claiming that past experiences and perceptions of trauma are a risk factor for elevated depression and anxiety symptoms (Chu et al., 2013; Hovens et al., 2010; Huh et al., 2017; Kuo et al., 2011; Suliman et al., 2009). Furthermore, several studies have provided evidence that individuals who experience symptoms of post-traumatic stress in the aftermath of an initial trauma are vulnerable to increased symptoms after subsequently experiencing a new traumatic event (Breslau et al., 2009; Fossion et al., 2015; Schock et al., 2016). The physical, social, and economic challenges imposed by COVID-19 can be viewed as an experience of real-time trauma (Horesh & Brown, 2020). Therefore, there are strong grounds to consider whether or not one has experienced a previous traumatic life event when assessing the impact of this global pandemic.

Media and current research have highlighted how older and immuno-compromised individuals are particularly vulnerable to the health risks of COVID-19 (D'Adamo et al., 2020; Mueller et al., 2020). However, emerging adults are also an important sector of our society to assess. Emerging adulthood has been considered a life stage characterized by initial exposure to independence and the opportunity to explore one's identity, particularly when considering love, worldviews, and professional pursuits (Arnett, 2000). Although this increasing independence can be quite positive for some, previous work has highlighted possible risks associated with such opportunity, such as lack of structure, directional uncertainty, heightened tendency towards risky behavior, and stress associated with a significant increase in responsibility and self-reliance (Chein et al., 2011; Kuwabara et al., 2007; Steinberg, 2007; Steinberg et al., 2018; Wood et al., 2018). These challenges, especially for those without stable support systems, have been thought

to increase stress levels and subsequent vulnerability to experiencing depression and anxiety symptoms (Brown et al., 2007; Meadows et al., 2006; Schulenberg et al., 2004).

Guided by the goal of containing viral spread, public orders have attempted to dictate the limits of organizational and behavioral conduct (Adhikari et al., 2020). As an example, university settings have been under significant pressure to change their standard operations during this pandemic to mitigate the safety risks of dense classrooms and laboratories, crowded hallways, communal living in dorms, and social gatherings (Witze, 2020; Wrighton & Lawrence, 2020). Early COVID-19 research has shown that pandemic safety precautions and other responses from universities have had a negative effect on students' life experience around the world (Cao et al., 2020; Guo, Feng, et al., 2020), highlighted by increased reporting of depression and anxiety symptoms (Liu et al., 2020; Tang et al., 2020). This systematic shift provided a unique opportunity to assess university-age populations and their self-reported behavioral responses to public shutdown.

To fully understand the effects of COVID-19 restrictions on internalizing symptoms, dimensions of depression and anxiety must be considered. Previous work has identified anhedonic depression factors, anxious apprehension (worry), and anxious arousal as being associated with different symptoms, distinct behavioral, emotional, and cognitive characteristics, and unique patterns of brain activity (Banich et al., 2020; Burdwood et al., 2016; Engels et al., 2010; Sharp et al., 2015; Spielberg et al, 2014; Heller et al., 1997; Nitschke et al., 2001). These findings underscore the need to consider these dimensions when analyzing self-reported symptom data related to depression and anxiety. Using a well-established measure of anhedonic depression (MASQ-AD: Watson et al., 2005), factor analytic studies have shown that this scale can be further subdivided into low positive affect and depressed mood (Bredemeier et al., 2010;

Nitschke et al., 2001). Methodologically, distinguishing these dimensions of depression and anxiety is essential for the identification of symptom profiles and the specific assessment of relationships among stressors, individual differences, and self-reported symptom endorsement.

Particular affective dispositions have been shown to correlate with heightened threat perception and lowered performance and may serve as potential predictors for the development of depression and anxiety (Kotov et al., 2010; Liew et al., 2014; Matsudaira & Kitamura, 2006; Watson et al., 2005). Previous studies have focused, specifically, on the role of trait-like approach and avoidance motivation and its association with behavior (Dickson & MacLeod, 2004; Elliot & Thrash, 2002, 2010; Spielberg et al., 2011; Struijs et al., 2018).

Approach motivation tends to result in behavior elicited by the possibility of a positive event/outcome, whereas avoidance motivation tends to result in behavior elicited by the possibility of a negative event/outcome (Elliot & Covington, 2001). These approach and avoidance constructs have been referred to as temperaments (Elliot & Thrash, 2002, 2010). Temperaments have been understood as individual differences in motivational tendencies (Spielberg et al., 2011) hypothesized to be heritable and to arise early in life (Clark et al., 1994; Clark & Watson, 1991). These approach/avoidance dispositions have been shown to have an impact on psychological health throughout development, specifically depression and anxiety (for review: Barlow et al., 2014; Nigg, 2006; Nigg, 2000). Previous work has shown a negative correlation between approach temperament and anhedonic depression (Davidson, 1998; Spielberg et al., 2011) and a positive correlation between approach temperament and social risk-taking behavior (Li et al., 2019). Avoidance temperament, on the other hand, has been shown to be associated with the onset of anxiety symptoms (Berman et al., 2010; Davidson, 2002; Panayiotou et al., 2014).

Approach/avoidance temperament has also been shown to be related to distinct dimensions of depression and anxiety (Spielberg et al., 2011). Avoidance temperament has been shown to be positively related to anhedonic depression and both anxiety dimensions, exhibiting the strongest connection to high anxious apprehension scores (Spielberg et al., 2011). A better understanding of the extent to which approach-avoidance trait disposition differentially relates to types of depression and anxiety during global distress may help to inform future research devoted to targeted mood interventions.

Because the pandemic occurred during a study already underway, with participants recruited in large numbers both before and after it came to national prominence, we were able to use date of study completion to identify how the onset of COVID-warnings interacted with age, previous traumatic life experiences, and approach-avoidance motivation to account for variance in self-reported symptoms related to depression and anxiety dimensions.

Due to the prolific nature of COVID-related media updates, governmental mandates, continued potential for contracting the virus, and the heavy influence of all these factors on daily routine, we predicted a significant impact on measures of depression and anxiety as a function of when the study was completed in this between-subjects design. Specifically, we dichotomized a large online self-report study according to when participants completed our questionnaires: before vs. after the university sent students home for the rest of the semester. In light of various COVID-19 updates, such as stay-at-home orders or the projected threats to job market vitality, we expected older undergraduates to have higher worry scores than their younger peers due to proximity to graduation, workforce integration, and responsibilities that correlate with increasing age. Additionally, since previously experienced trauma has been shown to predict internalizing symptomatology and exacerbate the effects of experiencing a current life stressor, we anticipated

that participants who endorsed experiencing a previous traumatic life event would report higher depression and anxiety scores than their non-endorsing counterparts, especially in the post-spring-break group. Although the data are cross-sectional, and the analyses of risk factor relationships are predominantly exploratory, based on available literature we expected to find a positive relationship between avoidance temperament and anxious apprehension and a negative relationship between approach temperament and anhedonic depression symptoms. Given this expected negative linearity, we predicted an overall buffering effect of approach temperament on depression scores subsequent to COVID-19 restrictions. In addition, we aimed to explore whether this buffer effect was particularly strong for those that had experienced a previous traumatic life event.

METHODS

Participants

This study was conducted online through departmental group testing at a large midwestern university. The sample consisted of 704 undergraduate students (mean age = 19.8 years ± 1.3) recruited from introductory psychology courses who completed questionnaires for course credit. All students provided informed consent, and the study protocol was approved by the Institutional Review Board prior to data collection. Participants who (a) did not follow directions outlined in the consent form or (b) elected to end participation prior to completing all questions were excluded from subsequent analyses (n=51), resulting in a final sample of 653 undergraduates. Due to IRB constraints, demographic questions relating to gender identity, racial identity, ethnic identity, and socioeconomic status were not required during data collection, resulting in a 29% response rate for such questions (n=189). Due to low response rate and therefore underrepresentation of the full sample, demographic factors were not taken into account in present analyses. Available demographic sample statistics are provided in Table 1.

The start of spring break aligned exactly with the university's mandate to not return to campus due to COVID-19 health risks. Therefore, dichotomizing participants into those who completed the questionnaires before vs after spring break provided an assessment of the impacts of the university's stay-at-home order and increasing updates related to COVID-19 risks that corresponded with time of study completion. The pre-spring-break group (pre) included any participant who consented between January 31st, 2020, and March 13th, 2020 (n=487). The post-spring-break group (post) comprised those who consented on or after March 14th, 2020 (n=166).

Measures

The following measures are a subset of a larger battery of questions aimed at assessing dimensions of depression and anxiety.

Mood and Anxiety Symptom Questionnaire (MASQ; Watson et al., 2005**).** The MASQ is a self-report questionnaire that asks participants to rate how frequently they experienced anxious arousal (MASQ-AA; e.g., "was trembling or shaking"), anhedonic depression symptoms (MASQ-AD; e.g., "felt really slowed down"), and related symptoms. Research has shown that the items on the anhedonic depression subscale load onto two separate factors, low positive affect (14 items: MASQ-AD14) and depressed mood (8 items: MASQ-AD8) (Bredemeier et al., 2010; Nitschke et al., 2001; Watson et al., 1995). The 14-item subscale contains reverse scored items that relate to experiencing pleasant emotions (e.g. "felt really happy" or "felt cheerful"), and the 8-item subscale assesses levels of depressed mood and lack of motivation (e.g. "felt like nothing was enjoyable" or "felt like it took extra effort to get started"), Findings from these studies have supported the use of the MASQ-AD8 as an index of vulnerability to clinical depression as assessed by DSM criteria (Bredemeier et al., 2010). Analyzing the 14-item subscale separately from the 8-item subscale allows us to investigate specific anhedonic depression symptom profiles, their prevalence, and their potentially unique relationships with relevant individual differences and risk factors.

Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990)**.** The PSWQ is a 16-item self-report questionnaire that measures trait worry using a 5-point scale where participants are instructed to describe how true the items are for their experience (e.g., "My worries overwhelm me."). In previous work, factor analytic studies have shown that the use of the PSWQ alongside

other measures that assess aspects of anxiety (e.g. MASQ) further differentiates worry from other anxiety dimensions, such as arousal (Brown et al., 1992; Nitschke et al., 1999, 2001).

Rumination-Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999). The RRQ is a 24-item self-report questionnaire that probes for tendencies to engage in distracting or distressing instances of rumination (e.g. "I spend a great deal of time thinking back over my embarrassing or disappointing moments") or elements of self-reflection (e.g., "My attitudes and feelings about things fascinates me). In the RRQ, rumination is characterized by self-attention geared towards repetitive negative thinking about the past while reflection is characterized by self-examination geared towards openness to experience. Whereas other rumination scales have explored one's response to depression-related symptoms (Nolen-Hoeksema, 1991), the RRQ minimizes the use of symptom-specific terminology allowing for a more precise evaluation of rumination itself (Hur et al., 2017). Trapnell and Campbell found a relatively high coefficient alphas for both subscales (Rumination = .90, and Reflection = .91) and also showed good discriminant validity in that rumination and reflection showed a minimal correlation with each other ($r = .22$) across similar samples.

Approach-Avoidance Temperament Questionnaire (ATQ; Elliot & Thrash, 2010). The ATQ is a 12-item scale developed to assess a participant's approach-avoidance motivational tendency or temperament. Six items target approach (e.g. "Thinking about the things I want really energizes me) and six items target avoidance (e.g. "I react very strongly to bad experiences). Items are rated on a 7-point Likert scale, with higher subscale scores reflecting stronger agreement with the presented items and therefore a stronger affiliation with the relevant temperament. Good internal consistency was demonstrated in both the avoidance ($\alpha = .73$) and approach ($\alpha = .80$) temperament subscales in a similar sample (Bipp et al., 2015).

Life Events Checklist (LEC; Weathers et al., 2013). The LEC is a self-report measure designed to screen for potentially traumatic events in a participant's lifetime. The newest version, reflecting DSM-5 symptoms, assesses whether or not a respondent has experienced or had exposure to 16 various events known to potentially result in Post Traumatic Stress Disorder (PTSD) or extreme distress. The standard form, used to establish whether an event occurred, will be utilized in the present study. Sample items include "Natural disaster (for example: flood, hurricane, tornado, earthquake)" with possible response options "Happened to me; Witnessed it; Learned about it; Part of my job; Not sure; Doesn't Apply." Respondents are asked to endorse varying levels of exposure, if applicable. Although psychometric properties have not been assessed for the LEC-5, there were only minimal changes between the fourth and fifth versions. The psychometric properties of the LEC-4 were thoroughly reviewed and findings showed that test exhibited convergent validity with other related measures, solid temporal stability, and, importantly, the largest correlation coefficients were yielded by the LEC's associations with trauma-specific measures of distress across a variety of populations (Gray et al., 2004). For the purposes of this study, groups were dichotomized by whether or not they endorsed "Happened to me" on any LEC item.

Procedures

Participants were instructed to complete a consent form prior to questionnaire administration. After consent was provided, each participant filled out the questionnaires listed and described above. Questionnaire titles were excluded to avoid priming effects. All participant interaction occurred via Web browser.

Data Analysis

A series of hierarchical multiple regressions were performed to examine the unique and interactive contributions of age, pre/post status, experienced life event (yes/no), avoidance temperament, and approach temperament to variance in MASQ-AD14, MASQ-AD8, MASQ-AA, PSWQ, RRQ-Rumination, and RRQ-Reflection. Prior to conducting the regressions, we assessed the multicollinearity of the independent variables (IV; all Pearson's $r < .06$, indicating overall independence of IVs) and the correlations between dependent variables (DV; Table 2).

In the hierarchical regressions, each DV was assessed independently. Table 3 provides the order of entry of Age, Pre/Post, Life event, Avoidance, Approach predictors and selected interactions. Each regression model added one predictor of interest, then a final comprehensive model, that included all possible higher-order interactions (20 predictors added in one step), was assessed. The order of entry was the same for each DV.

Post hoc hierarchical regressions were conducted to interpret findings if a particular IV (e.g., pre/post) contributed significant variance to multiple moderately/highly correlated DVs (all Pearson's $r > .40$; e.g., PSWQ and RRQ-Rum). To identify unique relationships, the correlated DV (e.g., RRQ-Rum) was added as a prior IV in the prediction of the other correlated DV (e.g., PSWQ). This approach meant that shared variance was accounted for prior to testing for unique variance.

RESULTS

Model comparison statistics for each hierarchical regression step by dependent variable are presented in Table 3. Descriptive statistics for self-report data are presented in Table 4.

Anhedonic depression. The full model accounted for 34% of total variance in MASQ-AD14 scores and 33% of total variance in MASQ-AD8 scores. Pre/post status, avoidance temperament, and approach temperament each contributed unique variance to MASQ-AD14 scores, whereas pre/post status, life events, avoidance temperament, approach temperament, and the interaction between approach temperament and pre/post status each contributed unique variance to MASQ-AD8 scores.

The moderately-high correlations between MASQ-AD subscales and other DVs justified post hoc analyses. Avoidance and approach temperament each contributed unique variance to MASQ-AD14 scores after including correlated outcome measures as IVs. MASQ-AD14 was positively associated with avoidance and negatively associated with approach, regardless of pre/post status.

All significant results from the initial hierarchical regression analysis for MASQ-AD8 remained significant after post hoc testing. In summary, MASQ-AD8 scores were higher in the post- than the pre-spring-break group and higher for those who had experienced a traumatic life event than those who had not. MASQ-AD8 was positively associated with avoidance and negatively associated with approach. Finally, the strength of the negative association between approach and MASQ-AD8 was affected by pre/post status, such that approach temperament had a weaker negative linear relationship, serving as less of a buffer in the post-spring-break group.

Anxious Arousal. The full model accounted for 19% of total variance in MASQ-AA scores. Avoidance temperament, approach temperament, and approach interactions (approach x

pre/post, approach x life events, and approach x pre/post x life events) each contributed unique variance to MASQ-AA scores. The interactions between approach temperament and pre/post status and between approach temperament and life events still accounted for unique variance in MASQ-AA scores after removing variance from other moderately correlated DVs.

Results reflected an overall negative linear relationship between approach and MASQ-AA scores that interacted with pre/post status and life events. Approach had a stronger negative association with MASQ-AA scores in the post-spring-break group than did the pre-spring-break group. For those who experienced a traumatic life event, approach had a weaker negative relationship with MASQ-AA scores than did those who had not, regardless of pre/post status.

Anxious Apprehension. The full model accounted for 54% of the total variance in PSWQ scores. Life event, avoidance temperament, approach temperament, and the interaction of age and pre/post status each contributed unique variance. After post hoc analyses were conducted, avoidance temperament was the only IV that still accounted for unique variance in PSWQ, such that higher levels of avoidance temperament were correlated with higher PSWQ scores.

Rumination. The full model accounted for 43% of the total variance in RRQ-Rumination scores. Life event, avoidance temperament, and the interaction of age and pre/post status each contributed unique variance.

Life event and avoidance temperament contributed unique variance to RRQ-Rumination after removing variance from correlated DVs. Thus, participants who had experienced a traumatic life event had higher RRQ-Rumination scores than those who had not endorsed a traumatic life event, regardless of pre/post status, and higher levels of avoidance temperament correlated with higher RRQ-Rumination scores.

Reflection. The full model accounted for 12% of total variance in RRQ-Reflection scores. Avoidance temperament, approach temperament, and the interaction between avoidance and pre/post status each contributed unique variance. RRQ-Reflection was positively associated with both avoidance and approach temperament, such that higher avoidance or approach scores correlated with increases in RRQ-Reflection. Furthermore, avoidance and RRQ-Reflection scores had stronger positive linearity for participants in the post-spring-break group than those in the pre-spring-break group. RRQ-Reflection was not highly correlated enough with any of the other DVs in question to be included in post-hoc analyses.

DISCUSSION

During the COVID-19 pandemic, disparate adherence to government orders encouraging quarantining, social distancing, sanitation, and other measures has undermined the well-being and mental health of individuals (Imbriano et al., 2020). The present study aimed to assess the impact of a number of relevant variables that may affect self-reported well-being in a university-aged population during the transition from normal operations to an environment characterized by COVID restrictions.

Although some studies have reported increases in anxiety during the COVID-19 pandemic (Huang & Zhao, 2020; Qiu et al., 2020; Wang et al., 2020), present results indicate that, across our sample, higher depressed mood scores were more prevalent than higher anxiety scores. After accounting for the variance shared between DVs, pre/post status contributed unique variance to depressed mood scores only, reflected in substantially higher MASQ-AD8 scores in the post-spring-break group than in the pre-spring-break group. Research has supported the clinical utility of the MASQ-AD8 subscale in predicting current depression status (Bredemeier et al., 2010), highlighting the clinical significance of the present findings. This differential impact on depressed mood may reflect pervasive patterns of loss and grief during this time, as well as the isolating effects of mandated limitations to social interaction, which may have more prominent associations with depression than with anxiety symptoms (Carr et al., 2020; Zhai & Du, 2020).

Initial results partially confirmed the hypothesis that COVID restrictions would be associated with higher levels of worry, as measured by the PSWQ, in that it was observed only for older students. A similar interaction between age and pre/post status emerged in the main regression for RRQ-rumination scores, such that only older students reported higher levels of

rumination after spring break. Follow-up analyses revealed, however, that the interaction

between age and pre/post status contributed to the variance shared between PSWQ and RRQ-

rumination, rather than unique variance associated with worry-specific or rumination-specific

endorsement. Research has indicated that the structural relationship between worry and

rumination, measured by PSWQ and RRQ, can be represented by a bi-factor model (Hur et al.,

2017), which includes a common factor (repetitive negative thinking) that captures their shared

variance. The interaction between age and pre/post status in this study seems to be reflecting this

common factor, indicating that older undergraduates may be more susceptible to repetitive

negative thinking in light of significant environmental threat.

These heightened patterns of repetitive negative thinking for older participants may

reflect the impact of stressors related to post-graduation life transitions, such as entering the

workforce or graduate school, and the increased responsibilities often associated with age

(Arnett, 2000; Arnett & Tanner, 2006). Although the college-to-workforce transition has been

shown to be stressful in non-pandemic societal operation (Perrone & Vickers, 2003; Wood,

2004), present results indicate that the potential consequences of COVID-19, such as the threat

of economic depression and extended uncertainty regarding the job market (Altig et al., 2020;

Baker, Bloom, Davis, & Terry, 2020; Baker, Bloom, Davis, Kost, et al., 2020), may have a more

significant effect on the mental health of older than younger students. In fact, recent research

utilizing dense, repeated assessment found that internalizing symptoms, such as depression and

anxiety, did not increase in first-year students after the onset of COVID (Copeland et al., 2021).

These age-dependent results may serve as a call to action for guidance counselors, academic

advisors, friends, family members, and others crucially involved in supporting young adults

navigating life transitions, employment prospects, and the distress that may be exacerbated by this pandemic.

Although it was assumed that those who endorsed previous traumatic life experiences would report higher levels of depression and anxiety symptoms in light of COVID-19 restrictions, results reflected elevated levels depressed mood and rumination regardless of pre/post status. Those who had experienced a traumatic event had higher rumination/depressed mood scores in general that were seemingly unaffected by present stressful life events. These results corroborate findings of studies that implicate significant patterns of rumination after trauma exposure (Ehring et al., 2008; Kim et al., 2017; Zetsche et al., 2009). Furthermore, the results support the perspective that rumination may be particularly associated with depressed mood and with allocating attention to previous experiences through *past-oriented* negative repetitive thinking (Beaty et al., 2019; Hur et al., 2019; McLaughlin et al., 2007).

Experiences of trauma are multifaceted, and effects on mental health are not static (Agaibi & Wilson, 2005). It was beyond the scope of this study to fully explore the differences in scores between groups when organized by the type of event that was endorsed. Present analyses capture only a general snapshot of the relationship between the endorsement of any traumatic experience and internalizing symptoms. We advocate the continued assessment of current anxiety and depression symptoms to inform research dedicated to improving interventions for those experiencing trauma-influenced psychological distress. This will become increasingly important because, as previously argued, COVID-19 and the global distress that has accompanied it may constitute experienced or perceived trauma for many individuals and should be examined as such in future research (Horesh & Brown, 2020).

Consistent with previous research, the present findings support our hypothesis that a prominent associative relationship between dispositional avoidance and worry scores would emerge (Davidson, 2002; Spielberg et al., 2011). The relationships between avoidance and other negative mood states highlight the significant cooccurrence of avoidant disposition and symptoms of depression and anxiety, beyond anxious apprehension. Avoidance temperament contributed unique variance to rumination and both dimensions of anhedonic depression. These findings suggest that avoidance temperament has a positive association with symptoms that have been thought to characterize major depression (depressed mood, low positive affect, and rumination) and generalized anxiety disorder (worry). Considering that avoidance temperament is generally regarded to be largely a heritable trait, it could be considered a risk factor for the development of internalizing symptoms.

On the other hand, present results suggest that approach temperament serves as a protective factor from some negative mood symptoms, with all but reflection subscores being negatively associated with approach tendencies. For anxious arousal, approach temperament interacted with pre/post status such that anxious arousal scores were more negatively associated with approach temperament in the post-spring-break group. These results provide preliminary evidence for the buffering effect of approach disposition on anxious arousal symptoms, particularly in light of a global environmental threat. However, this approach-related buffer effect was weaker for those who experienced a traumatic life event, highlighting the significant effect of trauma on well-being and a potential limit to the power of this protective effect of approach temperament.

Additionally, present findings support the hypothesis of a particular negative linear relationship between approach temperament and the two anhedonic depression-related outcome

measures. These results show that approach temperament may serve a particular role in moderating anhedonic depressive symptoms. However, approach temperament had a weaker negative relationship with depressed mood scores in the post-spring-break group than in the pre-spring-break group, underscoring the limits of the approach temperament buffer effect on depression symptoms in the face of a substantial, current life stressor. Present findings warrant the inclusion of motivational temperament measures in future research to assess dispositional levels of protection from or vulnerability to depression or anxiety symptoms.

Although temperament is thought to be heritable, to reflect behavioral style, and to be consistent across time and experiences (Derryberry et al., 2003; Elliot & Thrash, 2010; Miller et al., 2009), research has shown that temperament is closely related to coping style, which is malleable and may differ across contexts (Derryberry et al., 2003; Jenzer et al., 2019). Approach-related coping strategies, which include planning, taking specific actions, seeking instrumental and emotional support, positive reappraisal of the situation, and acceptance (Freire et al., 2020), have been shown to be associated with positive adaptive psychological adjustment (Clarke, 2006; Syed & Seiffge-Krenke, 2015). Therefore, present findings suggest that approach coping strategies help to mitigate anhedonic depression symptoms.

The results from this study provide further evidence that considering distinct dimensions of depression and anxiety fosters deeper understanding of the relationships among independent variables and symptom endorsement. The present study categorized symptom profiles of depression and anxiety into previously identified dimensions shown to have distinct neural, behavioral, and cognitive characteristics. Methodologically, this facilitated the identification of relationships among stressors, individual differences, and the self-reported symptom endorsements relevant to these dimensions. For example, without distinguishing between the two

anhedonic depression scales, findings particular to depressed mood, such as the unique variance contributed by pre/post status or having experienced a previous traumatic life event, may have been obscured. Additionally, present results reflect notable differences between the dimensions of anxious arousal and anxious apprehension and the ways in which they relate to the IVs in question. Ultimately, the deliberate consideration of these dimensions contributes to further understanding of the prevalence of particular depression and anxiety symptoms, and the ways these symptom profiles relate to individual differences and environmental circumstances.

A limitation of the present study is the lack of a sample large enough to assess the role of social identity in susceptibility to negative mood symptoms after COVID-19 restrictions. Larger and more demographically diverse samples would permit determination of the effects of race, ethnicity, sexual orientation, socioeconomic status, and gender differences on symptoms. Another limitation is that, at the time of data collection, COVID-19 related assessment questionnaires had yet to be developed. Given the recent work devoted to such measures, future studies would benefit from including questions that assess social reintegration, decision-making, public health order compliance, and stress related to COVID-19 outcomes such as grief and/or occupational instability. An extensive list of available self-report questionnaires attending to issues related to COVID-19 has been compiled by the National Institute of Health's Office of Behavioral and Social Sciences Research ([OBSSR COVID-19 Research Tools](#)). A third limitation is that university students represent only a subset of individuals at this developmental stage. A final and particularly important limitation is that the data were cross-sectional, precluding causal conclusions about the relationships between anxiety and depression symptoms. However, present findings are grounds for further exploration of these relationships in a more elaborate and generative study design.

Despite these limitations, the present results support the need to consider individual-difference factors and to distinguish dimensions of internalizing symptoms when assessing mental health vulnerability in response to environmental threat. Without drawing distinctions between previously identified conceptual facets of depression and anxiety, the findings that emerged in this study may have gone undetected. The relationships that emerged in this study not only serve to deepen the understanding of how emerging adults have been affected during this pandemic era but highlight the impact of individual differences and provide further justification for the need to consider dimensions of depression and anxiety.

TABLES

Table 1. Available Demographic Information

Individual-level Variables	N	%
Age		
18	76	12
19	233	36
20	162	25
21	119	18
22+	63	09
Ethnicity*		
Hispanic or Latino	31	15
Not Hispanic or Latino	179	84
Unknown	2	1
Gender*		
cis-female	164	77
cis-male	46	22
other	1	0
trans-female	1	0
Sexual Orientation*		
asexual	2	1
bisexual	19	9
heterosexual	182	86
homosexual	5	2
other	1	0
pansexual	3	1
Socioeconomic Status*		
Lower Class	11	5
Middle Class	135	64
Upper Class	25	12
Working Class	37	17
No Answer	4	2
Race*		
Asian	45	21
Black or African American	10	5
Native Hawaiian or Other Pacific Islander	2	1
Other or multiracial	21	10
White	134	78

Note: Age statistics are based on the full sample utilized in analyses. All other variables reflect a smaller sample (n=212).

*We acknowledge the many other sub-categories of the starred headers exist. The present demographics table reflects the sub-categories endorsed by participants who completed demographic information. Sub-categories that received no endorsements were not included in this table.

Table 2. Correlations among Dependent Variables

	PSWQ	RRQ - Rum	RRQ - Refl	MASQ - AA	MASQ - AD14
RRQ -Rum	**0.647**				
RRQ - Refl	0.097	0.103			
MASQ - AA	0.225	0.219	0.068		
MASQ - AD14	0.319	0.268	-0.089	0.031	
MASQ - AD8	0.353	0.390	0.031	**0.533**	**0.466**

Table 3. Hierarchical Regressions Analysis for Anxiety, Rumination, and Depression Self-Report Scores

Added IV per model (df)	PSWQ			RRQ - Rumination			RRQ - Reflection			MASQ-AA			MASQ-AD14			MASQ-AD8		
	β	ΔR²	F	β	ΔR²	F	β	ΔR²	F	β	ΔR²	F	β	ΔR²	F	β	ΔR²	F
1. Age (1,651)	0.03	0.00	0.85	0.03	0.00	0.76	-0.02	0.00	0.16	-0.07	0.00	3.21	0.02	0.00	0.23	0.00	0.00	0.01
2. Pre/Post	0.01	0.00	0.05	0.01	0.00	0.03	-0.02	0.00	0.15	-0.00	0.00	0.00	**0.19**	**0.03**	**32.05 *****	**0.31**	**0.09**	**87.25 ***†**
3. Age x Pre/Post	**1.32**	**0.01**	**8.05****	**1.64**	**0.01**	**9.80 ****	0.26	0.00	0.16	0.38	0.00	0.36	0.50	0.00	0.81	0.63	0.00	1.26
4. Life event	**0.07**	**0.01**	**5.79 ***	**0.12**	**0.01**	**14.54***†**	0.07	0.01	3.04	-0.00	0.00	0.01	0.05	0.00	2.18	**0.08**	**0.01**	**5.43 ***
5. Life event x Pre/Post	0.08	0.00	1.93	-0.02	0.00	0.12	0.14	0.00	3.22	-0.11	0.00	2.31	0.02	0.00	0.05	0.00	0.00	0.00
6. Avoidance	**0.72**	**0.51**	**695.7***†**	**0.63**	**0.39**	**416.0 ***†**	**0.12**	**0.01**	**9.17****	**0.28**	**0.08**	**59.96 *****	**0.33**	**0.11**	**99.89 ***†**	**0.39**	**0.15**	**136.5***†**
7. Avoidance x Pre/Post	0.01	0.00	0.00	0.06	0.00	0.27	**0.49**	**0.02**	**11.05 ****	0.08	0.00	0.29	-0.04	0.00	0.10	0.18	0.00	1.93
8. Approach	**-0.06**	**0.00**	**4.22 ***	-0.04	0.00	1.36	**0.20**	**0.04**	**28.08 *****	**-0.19**	**0.03**	**25.75 *****	**-0.40**	**0.15**	**144.6 ***†**	**-0.24**	**0.06**	**51.67 ***†**
9. Approach x Pre/Post	0.00	0.00	0.00	-0.19	0.00	1.34	0.00	0.00	0.00	**-0.38**	**0.01**	**3.94 *†**	0.13	0.00	0.59	**0.38**	**0.01**	**4.58 *†**
10. Approach x Life event	-0.11	0.00	0.48	-0.08	0.00	0.18	-0.08	0.00	0.13	**0.93**	**0.02**	**18.44***†**	-0.38	0.00	3.89	0.30	0.00	2.34
11. Approach x Life event x Pre/Post	0.29	0.00	0.74	-0.33	0.00	0.76	0.71	0.00	2.32	**1.04**	**0.01**	**5.34 ***	-0.37	0.00	0.84	0.63	0.00	2.40
12. Total Variance (20,621)[1]		**0.54**			**0.43**			**0.12**			**0.185**			**0.34**			**0.33**	

Note: *, $p < .05$; **, $p < .01$; ***, $p<.001$; bold numbers reflect significant findings. reference factors for categorical variables are pre-spring break group for pre/post status and no experience of a previous life event for life event.

[1] Total variance is defined here as total variance in each dependent variable accounted for by all predictors above (models 1-11) and all other possible interaction predictors (remaining two-way, three-way, all four-way, and all five-way interactions).

† These effects remain significant after the variance shared between moderately to highly correlated dependent variables is taken into account. To be included in post hoc analyses, DVs had to be moderately to highly correlated ($r > .40$) and had to be significantly affected by the same IV (e.g., MASQ-AD14 & MASQ-AD8 (correlated DVs) and pre/post (IV)).

Table 4. Means and (Standard Deviations) of Self-Report Variables by Factor and Factor Levels

Factors	Group		Life Event	
Factor Levels	Pre	Post	Yes	No
N	487	166	488	165
Worry	53.4 (16.9)	53.7 (17.3)	54.1 (16.9)	51.6 (17.0)
Rumination	34.6 (8.4)	34.7 (8.5)	34.2 (8.8)	32.9 (8.1)
Reflection	33.9 (8.5)	33.6 (9.1)	35.2 (8.5)	32.9 (7.9)
Anxious Arousal	28.7 (9.8)	28.7 (10.)	28.7 (9.3)	28.7 (11.9)
Low Positive Affect	39.7 (11.0)	44.5 (11.1)	41.3 (11.6)	40.0 (10.1)
Depressed Mood	17.8 (5.8)	22.2 (6.1)	19.2 (6.2)	18.1 (6.0)

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