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Individual differences in emotion regulation prospectively predict early COVID-19 related acute stress

Alexandra T. Tyra, Siobhán M. Griffin, Thomas A. Fergus, Annie T. Ginty

1. Introduction

The experience of psychological stress is typically associated with heightened negative emotions, which over time, have been shown to be a risk factor for adverse mental and physical health outcomes (e.g., Cohen, Janicki-Deverts, 2007; Lupien, McEwen, Gunnar, & Heim, 2009). Individual differences in psychological responses to stress can determine the extent to which stress exposure contributes to negative consequences, such as greater negative emotionality, intrusive thoughts, memories, and avoidance (Bardeen, Fergus, & Wu, 2013; Bovin & Marx, 2011; Kumpula, Orcutt, Bardeen, & Vankovitzky, 2011). Emotion regulation is often categorized into types of regulatory strategies, specifically antecedent or response-focused (i.e., either employed before or after an emotional response is fully generated; Gross, 1998). While many emotion regulation strategies have been identified (for review, see Webb, Miles, & Sheeran, 2012), cognitive reappraisal and expressive suppression are the most commonly examined (Gross & John, 2003). Cognitive reappraisal, an antecedent approach, requires the adaptive use of cognitive effort to modify the appraisal of a situation and subsequently alter the emotional response before it fully occurs. In contrast, expressive suppression is a response-focused approach involving a maladaptive behavioral attempt to inhibit the expression of an emotional response that is already in progress (Gross & John, 2003). Research has demonstrated that negative responses following potentially traumatic events are often associated with greater use of response-focused strategies such as expressive suppression, whereas antecedent-focused strategies such as cognitive reappraisal are typically under-utilized (Boden et al., 2013; Eltekhari, Zoellner, & Vigil, 2009; Ehlers & Clark, 2000; Ehring & Quack, 2010;
Feeny & Foa, 2005; Mark & Sloan, 2005; Moore, Zoellner, & Mollenholt, 2008; Shepherd & Wild, 2014). The use of expressive suppression may prevent necessary emotional processing of a potentially traumatic event, thus perpetuating and maintaining symptom severity (Clore, 2008). Cognitive conceptual models suggest that an inability to effectively reappraise the potentially traumatic event and subsequent symptoms is critical to symptom severity maintenance (e.g., Pascoe, Maercker, & Boos, 2000; Ehlers, Mayou, & Bryant, 1998).

While previous research tends to examine these two strategies separately, and indeed factor analyses have shown that expressive suppression and cognitive reappraisal are independent constructs (Moore et al., 2008), the findings of other studies suggest the interaction between cognitive reappraisal and expressive suppression should be considered. For example, a recent study demonstrated that low levels of cognitive reappraisal moderated a positive relationship between expressive suppression and cortisol reactivity and recovery from an acute laboratory stress task (Raymond, Marin, Jaster, & Lupien, 2019). In other words, expressive suppression was associated with greater cortisol reactivity and recovery of individuals reporting low levels of habitual cognitive reappraisal. Another study examining women with/without trauma exposure, found that the combination of high cognitive reappraisal and low expressive suppression was protective, resulting in the lowest reports of anxiety, depression, and posttraumatic stress (Eftekhari et al., 2009). While greater use of expressive suppression is generally associated with negative outcomes (e.g., more negative affect, greater anxiety, depression), it appears from these previous studies that greater simultaneous use of cognitive reappraisal may buffer such effects.

Instead of focusing on the use of specific emotion regulation strategies, other conceptualizations emphasize that effective emotion regulation can be viewed in the context of global emotion regulation difficulties (Gratz & Roemer, 2004). Core difficulties include lack of awareness, understanding, and acceptance of emotions, inability to control behavioral impulses or engage in goal-related behavior, and lack of perceived access to effective emotion regulation strategies (Gratz & Tull, 2010). Global dimensions of emotion regulation difficulties have been associated with increased negative emotionality (Allan, Norr, Macatee, Gajewska, & Schmidt, 2015; Bardeen, Fergus, & Orecutt, 2012; Fowler et al., 2014; Pollock, McCabe, Southard, & Zeigler-Hill, 2016; Ritschel, Tone, Schoemann, & Lim, 2015; Roemer et al., 2009; Roy, Riley, & Sinha, 2018; Rugani & Gencoz, 2010; Salsman & Linehan, 2012; Salters-Pedneault, Roemer, Tull, Rucker, & Mennin, 2006). With regards to reactions to potentially traumatic events, research suggests that a disruption in affect regulatory processes is a primary mechanism in the development and maintenance of sustained symptom severity (Brewin, Dalgleish, & Joseph, 1996; Ehlers & Clark, 2000; Foa & Kozak, 1986; Frewen & Lanius, 2006). Indeed, cross-sectional research has demonstrated that greater global emotion regulation difficulties were associated with greater stress reactions following a potentially traumatic event (e.g., Badour & Feldner, 2013; Barlow, Goldsmith Turow, & Gerhart, 2017; Ehring & Quack, 2010; Pugach, Campbell, & Wisco, 2020; Sundermann & DePrince, 2015; Tull, Barrett, McMillan, & Roemer, 2007; Viana et al., 2017; Woodward et al., 2020). Conceptually, individuals who are unable to effectively regulate their emotions may be more likely to appraise stressors as threatening and may also experience prolonged recovery from stress due to the inability to attenuate emotional distress and arousal (Bardeen, Kumpula, & Orcutt, 2007; DeMarah, Mynko, & Barlow, 2001; Frewen & Lanius, 2007). The perceived inability to effectively regulate emotional experiences can then lead to fear and subsequent avoidance of further stress or trauma reminders, thus preventing habituation and recovery (Foa & Kozak, 1986).

Whereas individual differences in emotion regulation strategies and global emotion regulation difficulties putatively serve as a vulnerability to greater stress responses following a potentially traumatic event, the overwhelming majority of existing studies have used cross-sectional study designs. A lack of prospective research in this area limits the ability to draw conclusions (for a meta-analytic review, refer to Seligowski et al., 2015). However, one prospective study demonstrated that global emotion regulation difficulties, assessed using Gratz and Roemer’s (2004) conceptualization, prior to a mass-shooting on a college campus predicted subsequent stress reactions both in the acute aftermath of the shooting and in the longer-term (Bardeen, Kumpula et al., 2013). In another study, Bonanno, Papa, Lalande, Westphal, and Coifman (2004) recruited a sample of first year New York college students immediately after the 9/11 terrorist attacks, and experimentally examined whether the ability to enhance or suppress emotional responses to unpleasant imagery in the laboratory prospectively predicted psychological distress by the end of their second year. Interestingly, those who were able to both enhance or suppress negative emotional expression upon instruction demonstrated less psychological distress two years post the attacks. That said, no known study to date has directly examined the predictive value of the characteristic use of expressive suppression or cognitive reappraisal on the later development of stress reactions through a prospective study design.

The recent outbreak of the COVID-19 pandemic offered a unique way to prospectively examine the relationships between individual differences in emotion regulation strategies and global emotion regulation difficulties with later reported acute stress during the initial stages of the pandemic. The first COVID-19 case was reported in December 2019 in China and has since spread across the globe, resulting in 62,363,527 confirmed cases and 1,456,687 deaths reported to date worldwide (November 30, 2020; World Health Organization, 2020). The coronavirus COVID-19 was declared a global pandemic on March 11, 2020 (World Health Organization, 2020) and a U.S. national emergency on March 17, 2020 (Centers for Disease Control & Prevention, 2020). The negative psychological effects of COVID-19 have been well-documented, including increases in psychological distress, anxiety, depression, and stress (Brooks et al., 2020; Cao et al., 2020; Karatzias et al., 2020; Liu, Zhang, Woon, Hyun, & “Chris.” Hahn, 2020; Qi et al., 2020; Rajkumar, 2020; Restubog, Ocampo, & Wang, 2020; Rossi et al., 2020; Wang, Pan, Wan, Tan, Xu, McIntyre et al., 2020). Stress responses are important to study in the context of life-threatening medical events, inclusive of the COVID-19 pandemic (Taylor & Asmundson, 2020), as individuals differ in their responses to those events (Glatzer-Levy, Huang, & Bonanno, 2018). Acute stress reactions following a potentially traumatic event (i.e., occurring within the first month) are one area of interest because those reactions can be useful for identifying individuals who may benefit from early intervention or subsequent monitoring (Bryant et al., 2014). The present study aims to extend previous cross-sectional research by using a prospective design to assess whether individual differences in emotion regulation strategies, as well as difficulties, predict reported acute stress during a global pandemic. Measures of emotion regulation strategies and global emotion regulation difficulties were taken prior to the onset of the global pandemic (January 2019 – February 2020) and acute stress was assessed 2–3 weeks after COVID-19 was declared a global pandemic. It was hypothesized that participants who report greater use of expressive suppression as an emotion regulation strategy would later report greater acute stress in response to the pandemic, whereas participants who report greater use of cognitive reappraisal as an emotion regulation strategy would later report less acute stress. Based on prior research suggesting that greater use of cognitive reappraisal can buffer against the negative effects of greater expressive suppression use (e.g., Eftekhari et al., 2009; Raymond et al., 2019), the interaction between cognitive reappraisal and expressive suppression was also examined. It was predicted that higher use of cognitive reappraisal would moderate (i.e., protect against) the proposed positive relationship between use of expressive suppression and later reported acute stress. Lastly, it was predicted that participants who report more global emotion regulation difficulties will later report greater acute stress (e.g., Bardeen, Kumpula et al., 2013).
2. Method

2.1. Participants and procedures

One hundred twenty-four young adults participated in the study. Participants were part of a larger study taking place between January 2019 and February 2020 (Phase 1). All participants from the larger study were contacted via email and phone (text messages) to participate in the present study ($N = 457$). One hundred and twenty-four participants opted to enroll in the present study. Five of the 124 participants who completed the present study were excluded from final data analyses due to missing data at either Phase 1 ($n = 3$) or Phase 2 ($n = 2$), resulting in a final total of 119 participants ($M_{age} = 19.40, SD = 0.95$ years; $71.4\%$ female; $68.9\%$ Caucasian; $22.7\%$ Hispanic/Latino). Surveys at Phase 1 included measures of the following: demographics, adverse childhood experiences, personality (e.g., neuroticism), anxiety, depression, and emotion regulation. The present study (Phase 2) occurred between March 26, 2020 and April 5, 2020, approximately 2–3½ weeks after the COVID-19 pandemic declaration. Surveys at Phase 2 consisted of measures of COVID-19 related acute stress and perceived severity of infection. While Phase 1 took place in Central Texas, participants were located in 22 different states during the Phase 2 follow up and 89.1% of the sample resided in a location with a “shelter in place” order. None of the participants had tested positive for COVID-19. Participants received course credit for completion of Phase 1 and were entered in a raffle to win a $25 gift card (15 cards available) for their completion of Phase 2. This study was approved by the university’s Institutional Review Board. All participants provided informed consent prior to both phases of the study and had the right to withdraw at any point.

2.2. Covariates

To assess the robustness of the proposed relationships, variables known to be risk factors for the development of stress reactions following potentially traumatic events, as well as associated with emotion dysregulation, were identified and controlled in the present study, including anxiety and depression (e.g., Amstadter, 2008; Campbell-Sills, Ellard, & Barlow, 2014; Christiansen & Elklit, 2008; Joormann & Stanton, 2016; O’toole, Marshall, Schure, & Dobson, 1998), adverse childhood experiences (e.g., Burns, Jackson, & Harding, 2010; England-Mason et al., 2017; Lilly, London, & Bridgett, 2014; Weiss, Tull, Lavender, & Gratz, 2013), and neuroticism (e.g., Breslau & Schultz, 2013; Silverman et al., 2019). Demographic variables (sex, race, ethnicity, socioeconomic status) were also assessed and controlled based on the control procedures of previous, similar studies (e.g., Bardeen, Kumpula et al., 2013; Weiss et al., 2013). Lastly, perceived severity of potential COVID-19 infection was controlled to ensure that beliefs about COVID-19 did not influence stress outcomes in this study.

2.3. Measures

2.3.1. Emotion regulation

The Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) is a 10-item self-report questionnaire that is divided into two subscales, which can be separately utilized to assess the use of two key emotion regulation strategies: cognitive reappraisal (six items) and expressive suppression (four items). The cognitive reappraisal subscale includes items such as, "I control my emotions by changing the way I think about the situation I’m in", and the expressive suppression subscale includes items such as "When I am feeling negative emotions, I make sure not to express them". Participants respond to each item using a 7-point ordered-category scale (1 = strongly disagree to 7 = strongly agree), with higher subscale scores indicating higher use of that strategy. In the present sample, internal consistency was acceptable for both ERQ subscales (Cronbach’s $\alpha$ for cognitive reappraisal = .79; expressive suppression = .74).

2.3.2. COVID-19 related acute stress

The Impact of Event Scale-Revised (IES-R; Weiss & Marmar, 1997) is a 22-item questionnaire that is used to assess subjective stress reactions in response to a specific event (in this case, the COVID-19 pandemic). Each individual item depicts a possible difficulty that one may encounter after experiencing the respective stressful event. Participants were requested to indicate on a 5-point ordered-category scale (0 = not at all to 4 = extremely) how much distress they experienced, with respect to each item, during the past seven days with regards to the ongoing COVID-19 pandemic. Example items include, "I thought about it when I didn’t mean to," "I stayed away from reminders of it," and "I felt watchful and on guard". Items can be grouped into three subscales (intrusion, avoidance, and hyperarousal). However, the current study focused primarily on the total score, which can be obtained by summing all the items (0–88) and revealed high internal consistency in the current sample ($\alpha = .92$). Given that 1) the COVID-19 pandemic was in the initial stages during data collection, and therefore not the "post" the traumatic event, and 2) the questionnaire asked people to rate their answers on the past seven days, rather than the past month as it states in the DSM-5 for posttraumatic stress disorder (PTSD) diagnosis, the IES-R should be conceptualized as an assessment of “acute stress” rather than PTSD in the present study (American Psychiatric Association, 2013; Asmundson & Taylor, 2021). The IES-R was given during Phase 2 of the current study.

2.3.3. Perceived severity of COVID-19 infection

Perceived severity of COVID-19 infection was assessed and controlled for using a single item, which was extracted from the 10-item Swine Flu inventory (item #7; Wheaton, Abramowitz, Berman, Fabricant, & Olatunji, 2012). The original item was adapted for the current study by replacing the wording “Swine” with “coronavirus COVID-19” (i.e., “If you did become infected with coronavirus COVID-19, to what extent are you concerned that you will be severely ill?”). Participants responded on a 5-point ordered-category scale (0 = very little to 4 = very much). This item was given during Phase 2 of the study.

2.3.4. Anxiety and depression

The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) consists of 14 items, which are evenly separated into an anxiety subscale and a depression subscale. Using a four-point ordered-category scale (0–3), participants were asked to rate each item with regards to how they have been feeling in the past week. Higher scores indicate higher depression or anxiety. In the current sample, internal consistency was acceptable ($\alpha$ for anxiety = 0.81; depression = 0.69). The HADS questionnaire was given at Phase 1 of the current study.

2.3.5. Adverse childhood experiences

The Adverse Childhood Experiences (ACEs; Felitti et al., 1998) questionnaire was used to assess and control for three domains of difficulties with regulating emotions (total score) as well as six domain-specific difficulties: (1) nonacceptance of emotional responses; (2) difficulties in engaging in goal-directed behavior; (3) impulse control difficulties; (4) lack of emotional awareness; (5) limited access to emotion regulation strategies; and (6) emotional clarity. Participants respond to each item utilizing a 5-point ordered-category scale (1 = almost never to 5 = almost always). Example items include, “When I am upset, I become irritated at myself for feeling that way” and “When I am upset, I believe that I will remain that way for a long time”. An overall total score and six subscale scores were obtained, with higher scores representing increased difficulty in regulation of emotions. In the present sample, the HERS had high overall internal consistency ($\alpha = .93$) as well as good internal consistency within each subscale ($\alpha \geq .80$). Both the DERS and the ERQ were assessed during Phase 1 of the study.
adverse childhood experiences before the age of 18 years (i.e., abuse, neglect, household dysfunction). The ACE questionnaire consists of 10-items which reflect 10 types of childhood adversity, to which participants respond yes or no (1 = yes, 0 = no). The responses are then summed to create a total ACE score (0–10); higher scores reflect a greater number of adverse experiences. The Cronbach’s α in the current sample was .67. The ACE questionnaire was administered during Phase 1.

### 2.3.6. Neuroticism

Trait neuroticism was measured and controlled for using the neuroticism subscale of the Big Five Inventory (John & Srivastava, 1999), a 44-item inventory used to measure the Big Five Factors of personality (Goldberg, 1993). The neuroticism subscale consists of 8 items and participants respond on a 5-point ordered-category scale (1 = disagree strongly to 5 = agree strongly). In the current study, the neuroticism subscale showed good internal consistency (α = .87). This subscale was administered during Phase 1.

#### 2.4. Statistical analyses

Pearson’s product-moment correlations were utilized to assess the associations between the main variables of interest. A hierarchal linear regression was conducted to examine if individual differences in emotion regulation (strategies and global difficulties) during Phase 1 significantly and independently predicted COVID-19 related acute stress (IES-R total) during Phase 2, while also adjusting for perceived severity of COVID-19 infection, sex, race, ethnicity, socioeconomic status (SES), adverse childhood experiences, anxiety, depression, and neuroticism. The emotion regulation variables of interest were together entered into Step 2 (ERQ expressive suppression, ERQ cognitive reappraisal, and DERS total score), while all covariates were entered into Step 1. A follow up model was conducted via PROCESS for SPSS (Version 3.5; Hayes, 2017) to examine the predictive value of a mean-centered interaction term between ERQ expressive suppression and ERQ cognitive reappraisal on IES-R total score (e.g., Eftekhari et al., 2009; Raymond et al., 2019), over and above all covariates, DERS global emotion regulation difficulties, ERQ expressive suppression, and ERQ cognitive reappraisal. If a significant interaction was found, simple slope tests were examined via PROCESS to further break down and understand the interaction effect (Hayes, 2017). Lastly, in order to assess whether different dimensions of global emotion regulation difficulties significantly predicted COVID-19 related acute stress, six supplemental hierarchal linear regression models were employed to separately examine the unique predictive value of each of the six DERS subscales (individually entered into Step 2) while also controlling for covariates, cognitive reappraisal, and expressive suppression in Step 1. All analyses were conducted using standardized predictors. Results were reported as statistically significant if p values were ≤ .05. SPSS version 27 (IBM Corp, USA) was used for analyses.

### 3. Results

#### 3.1. Preliminary analyses

Means and standard deviations for the main variables of interest as well as covariates are presented in Table 1. Pearson’s product-moment correlations indicated a statistically significant positive association between DERS total and IES-R total, as well as between four of the DERS subscales and IES-R total; DERS awareness and DERS goal-directed behavior were not statistically significantly associated with IES-R total. Neither ERQ cognitive reappraisal nor ERQ expressive suppression were statistically significantly associated with IES-R total; however, cognitive reappraisal was statistically significantly and negatively associated with DERS total, while expressive suppression was not. A statistically significant, yet small association was found between cognitive reappraisal and expressive suppression, demonstrating relative independence between the two subscales. Perceptions of COVID-19 infection severity were statistically significantly associated with IES-R total. While SES was not associated with IES-R total, it was negatively associated with the DERS total. Adverse childhood experiences, neuroticism, anxiety, and depression were all statistically significantly and positively associated with IES-R total. Table 2 presents a detailed correlation matrix.

#### 3.2. Cognitive reappraisal, expressive suppression, global emotion regulation difficulties, and COVID-19 related acute stress

The covariates together explained 17.8 % of the variance in acute stress, F(9, 109) = 3.83, p < .001. The addition of ERQ cognitive reappraisal, ERQ expressive suppression, and global emotion regulation difficulties in Step 2 explained an additional 1.2 % of the variance in acute stress, F(12, 106) = 3.31, p < .001. However, only global emotion regulation difficulties (DERS total) was a statistically significant predictor of interest, such that greater global emotion regulation difficulties predicted greater acute stress, B = .17, p = .033, 95 % CI [0.01, 0.33]. Both ERQ cognitive reappraisal, B = .70, p = .650, 95 % CI [−2.34, 3.74] and ERQ expressive suppression, B = −.71, p = .507, 95 % CI [−2.81, 1.40] were not statistically significant unique predictors of acute stress. Table 3 reports the full regression analysis and Fig. 1 demonstrates the positive prospective relationship between global emotion regulation difficulties and acute stress.

#### 3.3. Cognitive reappraisal and expressive suppression interaction

The interaction term between expressive suppression and cognitive reappraisal was a significant, unique predictor of IES-R scores, B = −2.30, p = .012, 95 % CI [−4.09, −0.52]. Follow-up simple slope analyses demonstrated that the effect of expressive suppression was significant when levels of cognitive reappraisal were high (above 1 SD), but not when they were low (below −1 SD; see Fig. 2). A negative association was found between expressive suppression and COVID-19 related acute stress only when levels of cognitive reappraisal were high, suggesting that cognitive reappraisal moderates this relationship. Individuals who reported greater use of both cognitive reappraisal and expressive suppression reported the lowest levels of acute stress, whereas individuals who reported greater use of cognitive reappraisal, but less use of expressive suppression, reported the highest levels of acute stress.

### Table 1

| Mean (SD) | Min - Max |
|----------|-----------|
| **Main variables of interest** | | |
| IES-R Total | 21.14 (14.25) | 0.00–63.00 |
| ERQ Reappraisal | 5.15 (0.88) | 2.00–7.00 |
| ERQ Suppression | 4.22 (1.24) | 1.25–6.75 |
| DERS Total | 86.18 (20.82) | 36.00–149.00 |
| DERS Nonacceptance | 14.60 (6.28) | 6.00–30.00 |
| DERS Strategies | 17.39 (6.49) | 8.00–35.00 |
| DERS Goal-Directed | 15.23 (4.44) | 5.00–25.00 |
| DERS Impulsive | 11.69 (4.70) | 6.00–27.00 |
| DERS Awareness | 15.11 (4.76) | 6.00–30.00 |
| DERS Clarity | 12.19 (3.79) | 5.00–22.00 |
| **Covariates** | | |
| COVID-19 severity | 2.74 (1.20) | 1.00–5.00 |
| SES | 5.93 (1.21) | 2.00–7.00 |
| ACE Total | 1.47 (1.71) | 0.00–6.00 |
| BFI Neuroticism | 2.95 (0.85) | 1.00–4.63 |
| HADS Anxiety | 8.44 (3.92) | 0.00–19.00 |
| HADS Depression | 4.29 (2.79) | 0.00–14.00 |

Note. COVID-19 severity = perceived severity of potential COVID-19 infection.
Table 2

Correlations between emotion regulation variables with other study related variables.

|       | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|-------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
|       |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |
| ERQ Reappraisal | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| DERS Total      | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| DERS Nonacceptance | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| DERS Strategies | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| DERS Goal-Directed | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| DERS Impulsive  | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| DERS Awareness  | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| DERS Clarity    | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| BFI Neuroticism | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| HADS Anxiety    | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| HADS Depression | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |

Note. COVID-19 severity denotes perceived severity of a COVID-19 infection; *denotes p < .05, ** denotes p < .001.

Table 3
Regression model for reappraisal, suppression, and global emotion regulation difficulties predicting acute stress (IES-R), N = 119.

|       | Acute Stress |
|-------|--------------|
|       | B  | SE  | t   | p   |
| Step 1|    |     |     |     |
| Sex   | −0.60 | 3.00 | −0.20 | .841 |
| Race  | −1.31 | 0.54 | −2.42 | .017 |
| Ethnicity | 5.22 | 3.10 | 1.68 | .095 |
| SES   | 0.58  | 1.12 | 0.52  | .603 |
| COVID-19 severity | 3.21 | 1.07 | 3.00 | .003 |
| ACE Total | 0.89 | 0.78 | 1.14 | .257 |
| BFI Neuroticism | −0.44 | 2.03 | −0.22 | .830 |
| HADS Anxiety | 1.01 | 0.45 | 2.25 | .026 |
| HADS Depression | 0.48 | 0.54 | 0.88 | .380 |

Step 2
ERQ Reappraisal 0.70 1.53 0.46 .650
ERQ Suppression −0.71 1.06 −0.67 .507
DERS Total 0.17* 0.08 2.16 .033

Note. COVID-19 severity = perceived severity of potential COVID-19 infection.

3.4. Specific dimensions of global emotion regulation difficulties

A supplementary series of hierarchical linear regressions examined which specific dimensions of emotion regulation difficulties (DERS subscales) predicted acute stress. To begin, all covariates, ERQ cognitive reappraisal, and ERQ expressive suppression together explained 16.2% of the variance in reported acute stress, F(11, 107) = 3.08, p = .001. The separate inclusion of DERS subscales demonstrated that the significant outcome for DERS total was largely driven by 1) nonacceptance of emotional responses, F(12, 106) = 3.25, p = .001, which individually explained an additional 2.4% of the variance in reported acute stress, and 2) limited perceived access to effective emotion regulation strategies, F(12, 106) = 3.28, p < .001, which individually explained an additional 2.6% of the variance in symptoms. Greater nonacceptance predicted greater acute stress, B = .44, p = .044, [0.01, 0.87] and greater perceived lack of access to effective emotion regulation strategies predicted greater acute stress, B = .52, p = .038, [0.03, 1.01]. Difficulties in engaging in goal-directed behavior, lack of impulse control, lack of emotional awareness, and lack of emotional clarity did not independently offer any further significant predictive value of acute stress reactions than that offered by the covariates in Step 1 (refer to Supplementary Table S1 for a complete summary of these findings).

4. Discussion

Using a prospective design, the current study examined if emotion regulation strategies, as well as global emotion regulation difficulties, predicted acute stress in response to the COVID-19 pandemic. When examined separately, greater use of cognitive reappraisal and expressive suppression were not associated with acute stress. However, a significant interaction was found between the two strategies, such that expressive suppression was negatively associated with acute stress only when levels of cognitive reappraisal were high. This finding suggests that cognitive reappraisal moderates the relationship between expressive suppression and acute stress in response to the COVID-19 pandemic. Additionally, participants who reported greater global emotion regulation difficulties were also more likely to later report greater acute stress. Further examination of DERS subscales demonstrated that individuals who specifically reported greater emotional nonacceptance or greater perceptions of limited access to effective emotion regulation strategies were more likely to report later acute stress, whereas the other four dimensions of global emotion dysregulation were not found to be predictive (difficulties in engaging in goal-directed behavior, impulse control difficulties, lack of emotional awareness, and lack of emotional clarity). Notably, the observed results withstood controlling for factors...
known to be related to stress reactions and emotion regulation ability (e.g., anxiety, depression, adverse childhood experiences, neuroticism).

Cognitive reappraisal and expressive suppression, when examined separately, did not predict acute stress; this finding contradicts our initial hypotheses, as well as previous literature. Prior research has suggested that the development of stress reactions following traumatic events is associated with higher use of expressive suppression and lower use of cognitive reappraisal (e.g., Boden et al., 2013; Shepherd & Wild, 2014). However, our results indicate no independent relationships between expressive suppression or cognitive reappraisal and reported acute stress reactions following a potentially traumatic event. It should be noted that symptoms were examined during the initial stages of the pandemic (<30 days), and as such, it is possible there was insufficient time for symptom severity to develop, making these relationships difficult to detect at this assessment point. Rather, the observed results demonstrate an interaction between the two strategies, whereby greater habitual use of cognitive reappraisal moderates a negative relationship between expressive suppression and acute stress. Interestingly, these findings conflict with the findings of prior research (e.g., Eftekhar et al., 2009; Raymond et al., 2019), such that the combination of high cognitive reappraisal with low expressive suppression in the present study was related to the highest reports of stress symptoms, whereas high cognitive reappraisal with high expressive suppression was related to the lowest reports of symptoms.

It is important to note that emotion regulation strategies may have different outcomes in different contexts (Gross, 2014; Sheppes, 2014). For instance, research suggests that cognitive reappraisal is most effective when employed early (antecedent-focused), allowing time for the cognitive alternation of an event’s meaning before the emotional response is fully engaged (e.g., Gross & John, 2003). However, experimental studies reveal that the benefits of cognitive reappraisal are no longer evident if reappraisal is initiated after emotional intensity is already high (Sheppes & Meiran, 2007, 2008; Sheppes, Catran, & Meiran, 2009). Late reappraisal may result in greater physiological responding and cognitive resource expenditure in order to counteract the initial heightened emotional response. The unexpected and unpredictable nature of the COVID-19 pandemic may have prevented the opportunity for cognitive reappraisal prior to its onset, thus reducing the effectiveness of the strategy by forcing individuals to employ and maintain it after their initial emotional response (e.g., online emotion regulation; see Sheppes & Meiran, 2007). The measurement of acute stress in response to the global pandemic took place in the early stages of the pandemic, during one of the most unpredictable periods, with consistently changing guidelines and restrictions (e.g., Wang, Pan, Wan, Tan, Xu, Ho et al., 2020). This early phase assessment may explain why individuals in the current study who were high reappraisers, yet low

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**Fig. 1.** Scatterplot of the fully adjusted relationship between standardized residuals for global emotion regulation difficulties (DEPS total) and COVID-19 related acute stress (IES-R total). Solid line represents line of best fit (linear); dotted lines represent upper and lower 95% confidence intervals around the mean.

**Fig. 2.** Expressive suppression by cognitive reappraisal effects predicting COVID-19 related acute stress.
suppressors reported greater COVID-19 related acute stress. The late initiation of cognitive reappraisal, combined with a lack of expressive suppression of negative emotions, may result in the heightened experience of stress as well as a greater likelihood of reporting stress symptoms.

Alternatively, the combination of high cognitive reappraisal and high expressive suppression predicted the lowest reports of acute stress. The effectiveness of late reappraisal may be dependent on the strength and intensity of the preceding initial emotional response (Sheppes & Meiran, 2007). The flexible and combined use of both strategies may provide a complimentary process for dealing with emotionally unpredictable situations (i.e., the COVID-19 pandemic), such that suppression dampens emotional expression just enough to allow for easier and less emotional cognitive re appraisal of the situation. These findings support the somewhat similar findings of Bonanno et al. (2004), such that college students who were able to both flexibly enhance and suppress negative emotional expression in response to unpleasant images during a laboratory visit revealed less psychological distress two years after the 9/11 terrorist attacks. Healthy emotion regulation is not simply determined by the specific use of adaptive strategies over maladaptive strategies, but rather the ability to flexibly adapt and choose strategies that best address the demands of the situation at hand (Sheppes, 2014). A strategy that is considered adaptive in one context may very well be maladaptive in another context, and vice versa. For example, the use of expressive suppression, often considered maladaptive, may actually be beneficial in extremely emotional situations, such as during grief (Bonanno & Keltner, 1997). Future research is needed to replicate and extend these results. It should also be noted that this study only assessed reported stress reactions during the ongoing pandemic. If possible, future research should reexamine the relationships between use of cognitive reappraisal or expressive suppression with reported stress reactions after the COVID-19 pandemic, to see if these relationships remain stable or change over time.

The present results support our hypotheses and prior cross-sectional research regarding a positive association between global emotion regulation difficulties and stress symptoms (e.g., Badour & Feldner, 2013; Barlow et al., 2017). We also replicate and support the prospective findings of Bardeen, Kumpula et al. (2013), such that global emotion regulation difficulties were positively predictive of later stress symptoms following a traumatic event. This study adds to the premise that emotion regulation difficulties may offer insight into who may be at risk for regulation difficulties were positively predictive of later stress symptoms (e.g., Badour & Feldner, 2013; Barlow et al., 2017). In the current study, only two of the six measured dimensions of emotion regulation difficulties were found to be predictive of later acute stress; emotional nonacceptance and lack of access to emotion regulation strategies. Indeed, it is unsurprising that these two dimensions underlie the relationship between emotion regulation difficulties and acute stress. Emotional nonacceptance refers to an unwillingness to experience or accept negative emotions from a secondary emotional response, such as shame or guilt, on top of one’s initial response (Gratz & Roemer, 2004). This difficulty can compound the experience of emotional distress (Gratz & Tull, 2010) and may even result in situation avoidance or disen engagement, thus preventing fear extinction (Foa & Kozak, 1986) and increasing the risk of developing sustained stress reactions in the form of posttraumatic stress symptoms (e.g., Viana et al., 2017; Woodward et al., 2020). The finding that perceived lack of access to effective emotion regulation strategies was also predictive of reported acute stress provides additional evidence for our results showing that a combination of greater cognitive reappraisal and greater expressive suppression was most protective in the development of future acute stress. This finding underscores the importance of having a flexible and wide repertoire of emotion regulation strategies to draw upon during times of distress (Aldao, Sheppes, & Gross, 2015).

While this study is strengthened by a prospective within-subjects design, some limitations offer directions for future research. First, this study consisted of only one wave, and the analyses are still correlational, such that the outcomes could have been influenced by another variable (Christenfeld, Sloan, Carroll, & Greenland, 2004). However, a number of potential confounding variables were identified and controlled (i.e., perceived severity of COVID-19 infection, sex, race, ethnicity, SES, adverse childhood experiences, anxiety, depression, and neuroticism). Second, participation for Phase 2 consisted of only 27% of the original study sample that had participated in Phase 1, resulting in a relatively small subsample. While participants provided consent at Phase 1 to be contacted in the future about other potential study opportunities, we did not originally plan this follow-up study, and as such, no effort was made to maintain contact between Phase 1 and Phase 2. Additionally, a lack of participation may be the result of a lack of monetary or course credit incentive. However, there were no observed differences between those who participated in the follow-up and those who did not, in terms of age, race, ethnicity, SES, neuroticism, adverse childhood experiences, anxiety, depression, DERS total/subscale scores, or ERQ subscale scores. Females were more likely to participate than males, χ²(1, 455) = 7.4, p = .006. Third, while this study utilized a relatively homogenous sample (undergraduate students at the same university), racial and ethnic diversity was still observed (31.1% non-Caucasian and 22.7% Hispanic/Latino). Future research may benefit from observing these relationships in other samples (e.g., older adults, diverse occupational status). Fourth, this study relied entirely upon self-report measurements, which may have been influenced by a participant’s willingness and ability to accurately report emotional experiences. That being said, the self-report measures of emotion regulation utilized in this study are strongly associated with behavioral measures as well as experimental manipulations of emotion regulation (Gratz & Tull, 2010; Gratz, Rosenthal, Tull, Lejuez, & Gunderson, 2006; Jentsch & Wolf, 2020). Still, future research may benefit from examining emotion regulation using other types of assessment (e.g., behavioral or physiological measurements, interviews, or experimental manipulation). Fifth, it is common for the IES-R to be utilized to quantify posttraumatic stress symptoms. However, the IES-R is not considered an official diagnostic instrument for PTSD, and as such, no clinical diagnoses can be made. In the present manuscript, we utilized the IES-R to quantify “acute stress,” given that the pandemic is still ongoing and not “post” the traumatic event (Aasumdon & Taylor, 2021). Additionally, our sample likely did not have a consistent level of exposure to the distressing aspects of the COVID-19 pandemic (e.g., possible individual differences in loss of jobs, loved ones, state/city wide regulations), and as such, some exposures may not have met the DSM-5 definition of Criterion A regarding the experiencing, witnessing, or learning of the traumatic experience (American Psychiatric Association, 2013; Aasumdon & Taylor, 2021).

Furthermore, it is worth noting that the IES-R was measured during the initial stages of the pandemic (~30 days) rather than after the pandemic; thus, the current findings are more representative of acute stress reactions than actual PTSD symptoms (Aasumdon & Taylor, 2021). However, the findings of this study still have important clinical implications. Given the pandemic is ongoing, it is critical to determine if individuals are currently experiencing distress-like symptoms related to the pandemic, and whether individual differences may make some more susceptible than others. Acute stress reactions occurring within the first month of potential trauma exposure are a nascent area of research; those reactions have been found to be indicative of individuals who are at risk for subsequent, more serious psychological disorders (Bryant et al., 2014). As such, it is useful to understand what factors (e.g., emotion dysregulation) contribute to greater acute stress severity to identify individuals who may benefit from early intervention or monitoring (Bryant et al., 2014). In particular, interventions focused on improving regulation of emotions may be beneficial (e.g., Dialectical Behavior Therapy, Linehan et al., 1999; Skills Training in Affect and
Interpersonal Regulation, Cloitre, Koenen, Cohen, & Han, 2002). Based on these findings, a more narrowed intervention approach that specifically targets improved flexibility of strategy use as well as greater acceptance of one’s emotional experience may be worth exploring.

In conclusion, the combined habitual use of high cognitive reappraisal with low expressive suppression, along with greater reported global difficulties in emotion regulation were predictive of later acute stress surrounding the initial onset of a stressful event (i.e., global pandemic). We offer further evidence of the temporal relationship between emotion regulation and future stress responses while controlling for factors known to influence the likelihood of developing such symptoms. This prospective investigation makes a significant contribution to a literature that is heavily reliant upon cross-sectional designs. Additionally, these findings highlight a need to further examine the context surrounding different stress experiences, as the expected protective or harmful effects of certain emotion regulation strategies or abilities may differ from one experience to another. This may be informative for the development of interventions that take context into account when addressing emotion regulation.

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Declaration of Competing Interest
The authors report no declarations of interest.

Appendix A. Supplementary data
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