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# Emotion Regulation Strategies and Beliefs About Emotions Predict Psychosocial Outcomes in Response to Multiple Stressors

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## Abstract

Emotion regulation (ER) strategies and beliefs about emotions (implicit theories of emotions; ITE) may shape psychosocial outcomes during turbulent times, including the transition to adulthood and college while encountering stressors. The normative stressors associated with these transitions were compounded by the COVID-19 pandemic, providing a novel opportunity to examine how emerging adults (EAs) cope with sustained stressors. Stress exposures can heighten existing individual differences and serve as “turning points” that predict psychosocial trajectories. This pre-registered study (<https://osf.io/k8mes>) of 101 EAs (18–19 years old) examined whether ITE (believing emotions can change or not; incremental vs. entity beliefs) and ER strategy usage (cognitive reappraisal and expressive suppression usage) predicted changes in anxiety symptomatology and feelings of loneliness across five longitudinal assessments (across a 6-month period) before and during the initial months of the COVID-19 pandemic. On average, EAs’ anxiety decreased after the pandemic outbreak but returned to baseline over time, while loneliness remained relatively unchanged across time. ITE explained variance in anxiety across time over and above reappraisal use. Conversely, reappraisal use explained variance in loneliness over and above ITE. For both anxiety and loneliness, suppression use resulted in maladaptive psychosocial outcomes across time. Thus, interventions that target ER strategies and ITE may ameliorate risk and promote resilience in EAs who experience increased instability.

**Keywords** Anxiety · Loneliness · Emotion regulation strategies · Implicit theories of emotions · Emerging adults · COVID-19 pandemic

How we respond to stressful events can shape adjustment outcomes (Cicchetti, 2010). Emotion regulation (ER) strategies and the beliefs individuals have about emotions may contribute to individual differences (Aldao, 2013;

Tamir et al., 2007)—both in terms of how people respond to stressors and how subsequent adjustment unfolds over time. Although ER and beliefs about emotions have been studied in relation to mental health outcomes, less is known about how they operate during major life transitions when uncertainty is heightened. The present study examines how individual differences in ER strategies and emotion beliefs influence well-being during emerging adulthood.

Emerging adulthood is an important developmental interval for increased independence and the exploration of new academic or vocational opportunities (Hoffman et al., 2018). This transitional period of development is a time of increased vulnerability to stress and feelings of loneliness as it brings uncertainty and changes in social support systems, placing youth at risk for poor mental health, social, and academic outcomes (Kessler, Berglund et al., 2005; Kessler, Chiu et al., 2005; Lin & Huang, 2012; Schulenberg et al., 2004; Taylor et al., 2014). Indeed, emerging adults

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(EAs) have higher rates of anxiety disorders than the general population (22% vs. 19.1%) but seek help less often (Kessler, Berglund et al., 2005; Kessler, Chiu et al., 2005). College students are found to be more stressed than the general population (83.9% versus 29%) (Stallman, 2010), and first-year college students, in particular, report having more anxiety than older EAs (Taylor et al., 2014).

For individuals enrolled in college in fall 2019, the typical stressors associated with the transition to adulthood were compounded by the start of the COVID-19 pandemic, presenting an opportunity to examine how EAs cope with multiple stressors. While some work has found that the COVID-19 pandemic has resulted in elevated rates of anxiety and loneliness (Bu et al., 2020; Killgore et al., 2020; Santomauro et al., 2021; Sher, 2020; Son et al., 2020), other work has highlighted that the main negative mental health effects of the pandemic occurred early on but were not sustained (Aknin et al., 2022). Less is known about the role that coping strategies play in predicting psychosocial trajectories for EAs.

ER strategies are coping mechanisms that modulate emotional responses in accordance with one's goals (Aldao, 2013). Cognitive reappraisal is an ER strategy that involves changing one's interpretation of an emotional event (Cutuli, 2014; Werner & Gross, 2010). Expressive suppression is a strategy that involves inhibiting the outward expression of emotion (Cutuli, 2014; Waizman et al., 2021; Werner & Gross, 2010). Reappraisal and suppression often exhibit differential associations with well-being, with the former associated with adaptive outcomes and the latter with maladaptive outcomes (Guassi Moreira et al., 2021; Preece et al., 2020). ER strategies are likely to be maximally effective when one believes they can change their affective experiences (Tamir et al., 2007). Implicit theories of emotions (ITE) describe the extent to which individuals believe their emotions are malleable (incremental beliefs) or fixed (entity beliefs). Incremental beliefs are beneficial for emotional functioning, whereas entity beliefs result in poor ER abilities and increase susceptibility to psychopathology (Ford et al., 2018; Tamir et al., 2007). As such, ER processes and ITE may influence psychological adjustment during turbulent times.

This study examined how ER strategies and ITE moderated EAs' psychosocial trajectories during their first year in college and their responses to the stressors posed by the COVID-19 pandemic. To our knowledge, this study is the first to use longitudinal methods from before to after the pandemic outbreak to examine the impact of these coping mechanisms on psychosocial trajectories during the transition to adulthood and during a stressful global event. We expected anxiety to increase longitudinally (Hypothesis 1) and that individual differences

would explain EAs' responses to stressors across time (Hypothesis 2). Specifically, we hypothesized that ER strategies (reappraisal and suppression) would each be associated with anxiety symptoms at baseline and moderate anxiety across time. We predicted that reappraisal use would be negatively associated with anxiety at baseline and over time, whereas suppression use would be positively associated with anxiety at baseline and longitudinally. Following our ER hypotheses, we tested whether ITE (incremental and entity beliefs) were associated with ER strategies and anxiety at baseline (Exploratory question 1). We hypothesized that incremental beliefs would be associated with greater use of cognitive reappraisal and less anxiety, whereas entity beliefs would be associated with greater use of expressive suppression and greater anxiety. We further examined whether ITE continued to predict changes in anxiety across time when also accounting for each ER strategy usage (Exploratory question 2). In addition to anxiety, given the prevalence of loneliness during the COVID-19 pandemic and in emerging adulthood more broadly (Bu et al., 2020; Killgore et al., 2020), we also tested whether ITE and ER strategies (reappraisal and suppression) are associated with subjective feelings of loneliness at baseline and whether they moderate feelings of loneliness across time in response to stressors (Exploratory question 3). We predicted that greater reappraisal usage and incremental beliefs would each be associated with fewer feelings of loneliness at baseline and across time, whereas greater suppression usage and entity beliefs would be associated with greater feelings of loneliness at baseline and across time. Finally, we expected anxiety and loneliness to be related but distinct. Pre-registered a priori hypotheses are described here: <https://osf.io/k8mes>. Exploratory aims were not pre-registered.

## Method

### Participants and Design

101 ( $M_{\text{age}} = 18.36$ ,  $SD = 0.48$ , range = 18–19, 80 females) diverse first-year college students from the University of California, Los Angeles (UCLA) participated in this longitudinal study. Their reported demographics were as follows: 9.9% African American, 36.6% Asian, 26.7% Caucasian, 2.0% American Indian or Alaska Native, 7.9% other, 12.9% mixed, and 4% did not report their race. Additionally, 23.8% of our sample reported identifying as Hispanic or Latinx. Furthermore, 37.8% of participants reported being first-generation college students (Table 1).

**Table 1** Group means and standard deviations from demographic and questionnaire data at each time point

	T1		T2		T3		T4		T5	
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
<b>Expressive suppression</b>	101	15.05 (5.57)	-	-	-	-	-	-	-	-
<b>Cognitive reappraisal</b>	101	30.48 (6.13)	-	-	-	-	-	-	-	-
<b>Implicit theories of emotion</b>	101	3.2 (0.78)	-	-	-	-	-	-	-	-
<b>Anxiety</b>	101	33.22 (16.35)	95	31.63 (16.99)	95	31.52 (17.17)	82	32.11 (16.65)	81	31.28 (17.88)
<b>Loneliness</b>	101	2.18 (0.57)	95	2.25 (0.55)	96	2.23 (0.54)	82	2.26 (0.55)	81	2.19 (0.62)
<b>Age (years)</b>	101	18.36 (0.48)	96	18.41 (0.51)	96	18.49 (0.50)	82	18.71 (0.48)	81	18.81 (0.45)
<b>GPA</b>	81	3.54 (0.42)	86	3.51 (0.48)	96	3.51 (0.5)	81	3.58 (0.36)	81	3.62 (0.33)
	N	%	N	%	N	%	N	%	N	%
<b>COVID-19 onset</b>	0	0	13	13.54	65	67.71	82	100	81	100
<b>Sex</b>										
Female	80	79.21	76	79.17	76	79.17	64	78.05	63	77.78
Male	21	20.79	20	20.83	20	20.83	18	21.95	18	22.22
<b>Race</b>										
Black/African American	10	9.90	-	-	-	-	-	-	-	-
Asian	37	36.63	-	-	-	-	-	-	-	-
Native Hawaiian/other Pacific Islander	0	0	-	-	-	-	-	-	-	-
Caucasian/White	27	26.73	-	-	-	-	-	-	-	-
American Indian/Alaska Native	2	1.98	-	-	-	-	-	-	-	-
Mixed	13	12.87	-	-	-	-	-	-	-	-
Other	8	7.92	-	-	-	-	-	-	-	-
Missing/NA	4	3.96	-	-	-	-	-	-	-	-
<b>Ethnicity</b>										
Hispanic/Latino	24	23.76	-	-	-	-	-	-	-	-
<b>First generation college student status</b>	38	37.62	-	-	-	-	-	-	-	-

*Note.* SD, standard deviation; T1, baseline; T2, one month following baseline; T3, two months following baseline; T4, four months following baseline; T5, five months following baseline; COVID-19 onset = number of participants that completed each data point following the COVID-19 pandemic onset

## Procedures

### Recruitment

Participants were recruited via flyers and online recruitment that described the purpose of the study (e.g., investigate the transition to college) and its components (e.g., lab visit, MRI scan, and online surveys for several months thereafter). Interested participants contacted the laboratory, where they completed a screening via email to ascertain study eligibility. Eligibility criteria were: (1) individuals ages 18 to 25 years; (2) first-year freshman college students; (3) no medical or psychiatric conditions contraindicating study participation (e.g., psychosis); (4) no current psychotropic medication; and (5) no current treatment for anxiety or depression. Exclusion criteria were based on concerns related to both imaging and mental health needs. They included: (1) the presence of metal in the body; (2) current report of pregnancy; (3) current use of psychiatric medication; (4) spontaneous report of pressing mental health concern requiring immediate follow-up (e.g., psychosis); and (5) fear of enclosed spaces (claustrophobia). Those who appeared eligible were invited to the lab where they provided informed consent. Participants were recruited as part of a larger longitudinal study examining the effects of the transition to college on brain, social, and emotional development (Calderon Leon et al., 2022; Saragosa-Harris, Guassi Moreira, Waizman, Sedykin, Silvers, & Peris 2022; Saragosa-Harris, Guassi Moreira, Waizman, Sedykin, Peris, & Silvers 2022). For this larger study, participants completed computerized decision-making tasks and many self-report measures; of these participants, 41 also underwent an fMRI scan session. However, the only measures used in the analyses to examine the proposed hypotheses are described in this paper. This study did not include any first-year transfer students and was approved by UCLA's Institutional Review Board. Participants were compensated for their participation.

### Longitudinal Data Points

All participants completed a baseline session (T1; before COVID-19 pandemic onset), and most participants completed up to four follow-up assessments one (T2), two (T3), four (T4), and five (T5) months following baseline (76% retained to the final follow-up time point). Out of the 101 participants, 77 participants completed all five longitudinal time points, seven completed only four time points, 12 completed only three time points, two participants completed only two time points, and three participants only completed the baseline assessment. In other words, 101 participants completed T1; 96 participants completed T2; 96 participants completed T3; 82 participants completed

T4, and 81 participants completed T5. Therefore, this study has a total of 453 data time points for longitudinal analyses. Anxiety symptoms and feelings of loneliness did not predict attrition during the study. Those 77 participants that completed all five time points reported comparable anxiety levels ( $M_{\text{anxietyT1}} = 32.14$ ,  $SD = 15.47$ ) to those 24 participants that did not complete all data points ( $M_{\text{anxietyT1}} = 36.67$ ,  $SD = 18.84$ ),  $t(33.24) = 1.07$ ,  $p = 0.29$ ). Moreover, those 77 participants that completed all five time points also reported comparable feelings of loneliness ( $M_{\text{lonelinessT1}} = 2.13$ ,  $SD = 0.53$ ) to excellent reliability in our sample to complete all data points ( $M_{\text{lonelinessT1}} = 2.33$ ,  $SD = 0.67$ ),  $t(32.57) = 1.36$ ,  $p = 0.18$ ). As such, we can assume data were missing at random. All participants were fluent in English and participated in the baseline (T1) session by completing self-report measures on Qualtrics in a private room in a laboratory at UCLA. All four follow-up assessments were completed online via Qualtrics at the participants' homes. An experimenter instructed participants to read each question carefully and answer the questionnaires to the best of their knowledge before all five data time points were collected.

### Measures Collected at Each Data Point

At T1, participants completed the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003), Screen for Adult Anxiety Related Disorders (SCAARED; Angulo et al., 2017), the UCLA Loneliness Scale (Version 3; Russell, 1996), and the Implicit Beliefs of Emotion Scale (IBES; Tamir et al., 2007) and reported their cumulative GPA to date since enrolling at UCLA (see EQ4 in Online Resource where we explored whether ER strategy usage moderated GPA). SCAARED, UCLA Loneliness Scale, and GPA were collected longitudinally at T2-T5.

### Breakdown of Data Points Collected Before and During the COVID-19 Pandemic

Participants enrolled in the study on a rolling basis over 4 months from November 14, 2019, to March 11, 2020. For this study, the onset of the pandemic was set to March 13, 2020—the day that the World Health Organization declared COVID-19 a national public health emergency in the USA and the day that campus in-person classes were suspended. Thus, all participants completed their T1 session before the onset of the COVID-19 pandemic and completed T4 and T5 assessments during the pandemic. Eighty and 29 participants completed their T2 and T3 measures, respectively, before the onset of the pandemic, whereas 16 and 67 participants completed their T2 and T3 measures, respectively, during the pandemic.

## Materials

### Screen for Adult Anxiety Related Disorders (SCAARED)

This 44-item self-report measure assesses adult anxiety symptoms severity. Example item: “It is hard for me to stop worrying.” Participants rated items on a 3-point Likert scale ranging from 0 (not true or hardly ever true) to 2 (very true or often true). A greater sum of scores notes greater severity of anxiety. Since we calculated the sum of scores, participants with any missing responses to items of the SCAARED were excluded from analyses. See Table 1 for the number of participants that did not have any SCAARED items missing across the different time points and, therefore, were included in analyses. This measure has been demonstrated to have excellent psychometric properties (Angulo et al., 2017). The SCAARED demonstrated excellent reliability in our sample (T1:  $\alpha = .94$ ; T2:  $\alpha = .95$ ; T3:  $\alpha = .95$ ; T4:  $\alpha = .95$ ; T5:  $\alpha = .96$ ).

### UCLA Loneliness Scale (Version 3)

This 20-item self-report questionnaire assesses subjective feelings of loneliness. Example item: “How often do you feel isolated from others?” Participants rated each item on a 4-point Likert scale ranging from 1 (never) to 4 (often). Items that were positively worded were reverse-scored and a higher sum of scores indicated heightened feelings of loneliness. Since we calculated the sum of scores, participants with any missing responses to items of the UCLA Loneliness Scale were excluded from analyses. See Table 1 for the number of participants that did not have any UCLA Loneliness Scale items missing across the different time points and therefore, were included in analyses. This questionnaire has been shown to have acceptable convergent and construct validity (Russell, 1996) and also exhibited excellent reliability in our sample at all data points (T1:  $\alpha = .95$ ; T2:  $\alpha = .95$ ; T3:  $\alpha = .94$ ; T4:  $\alpha = .94$ ; T5:  $\alpha = .95$ ).

### Emotion Regulation Questionnaire (ERQ)

Cognitive reappraisal (4 items) and expressive suppression (6 items) usage were assessed using the ERQ self-report questionnaire (Gross & John, 2003) at baselines (T1). Cognitive reappraisal example item: “I control my emotions by changing the way I think about the situation I’m in.” Expressive suppression example item: “I control my emotions by not expressing them.” Participants rated items on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Following Gross and John (2003), two overall scores were calculated by summing up the items for each subscale (cognitive Reappraisal and expressive suppression)

separately. A higher sum of scores for each subscale indicates greater use of each ER type. There were no missing responses for any of the ERQ items. This questionnaire has been shown to have an acceptable convergent and discriminant validity (Gross & John, 2003), with good reliability in our sample (cognitive reappraisal,  $\alpha = .81$ ; expressive suppression,  $\alpha = .81$ ).

### Implicit Beliefs of Emotion Scale (IBES)

Tamir et al. (2007) adapted the Implicit theories of intelligence Scale (Dweck, 1999) to create the IBES, a 4-item questionnaire that measured how malleable (incremental) or fixed (entity) participants believed their emotions were at baseline (T1). Two of these items assessed incremental theories of emotion “Everyone can learn to control their emotions” and “If they want to, people can change the emotions that they have,” and the remaining two items assessed entity theories of emotion “No matter how hard they try, people can’t really change the emotions that they have” and “The truth is, people have very little control over their emotions.” Participants rated each item on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Following Tamir et al. (2007), an overall score ( $\alpha = .65$ ) was calculated by reverse scoring the two entity belief (fixed) items and then averaging across all four items of the IBES. Lower IBES average scores indicated entity (fixed) theories of emotion, whereas higher scores indicated incremental (malleable) theories of emotion. There were no missing responses for any of the IBES items. This questionnaire has been shown to have acceptable internal consistency (Tamir et al., 2007).

### Analysis Plan

The data were analyzed in two steps. First, we used multiple regression analyses to examine how ER strategy usage and ITE related to anxiety and loneliness at baseline (T1). We also explored the relationship between our study predictor and outcome variables (Table 3). Second, we performed a series of growth curve models in a multilevel modeling framework to test for pandemic-related changes in anxiety and loneliness across time, as well as how individual differences in ER and ITE moderated said changes (Tables 3 and 4). Analyses and plots were done in R (R Core Team, 2020). R’s `lm()` function was used for multiple regression analyses and the `lme()` function in the “lme4” package was used for growth curve modeling. See Figs. 1 and 2 for a depiction of anxiety and loneliness trajectories across time. Sex (male = 0, female = 1) and data points collected during the COVID-19 pandemic (prior to COVID-19 pandemic onset = 0, post-pandemic

Table 2 Correlations for questionnaire data

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. IBES T1	1												
2. Reappraisal T1	.290**	1											
3. Suppression T1	-.306**	-.045	1										
4. Anxiety T1	-.360**	-.202*	.317*	1									
5. Anxiety T2	-.247*	-.236*	.266**	.876**	1								
6. Anxiety T3	-.349**	-.162	.325**	.854**	.881**	1							
7. Anxiety T4	-.301**	-.164	.430**	.839**	.868**	.908**	1						
8. Anxiety T5	-.288**	-.185	.237*	.755**	.799**	.849**	.884**	1					
9. Loneliness T1	-.360**	-.363**	.425**	.518**	.499**	.465**	.433**	.355**	1				
10. Loneliness T2	-.288**	-.302**	.401**	.461**	.562**	.509**	.535**	.470**	.863**	1			
11. Loneliness T3	-.351**	-.338**	.470**	.496**	.571**	.557**	.585**	.475**	.812**	.891**	1		
12. Loneliness T4	-.323**	-.293**	.451**	.465**	.480**	.468**	.541**	.380**	.825**	.877**	.886**	1	
13. Loneliness T5	-.351**	-.292**	.443**	.463**	.543**	.537**	.613**	.575**	.827**	.892**	.879**	.890**	1

Note. T1, baseline; T2, one month following baseline; T3, two months following baseline; T4, four months following baseline; T5, five months following baseline

\* $p < .05$

\*\* $p < .01$

**Table 3** Longitudinal results for models investigating anxiety trajectories

	$\beta$	$t$
<b>(a) COVID-19 onset</b>		
Sex	9.145 [1.437, 16.853]	2.354*
COVID-19 onset	-2.705 [-5.187, -0.223]	-2.143*
Time X COVID-19 onset	0.035 [-0.002, 0.075]	1.848
<b>(b) Cognitive reappraisal</b>		
Reappraisal	-0.584 [-1.087, -0.081]	-2.304*
Sex	9.837 [2.267, 17.407]	2.579*
Time	0.009 [-0.011, 0.030]	0.871
COVID-19 onset	-1.33 [-3.366, 0.703]	-1.287
Reappraisal X Time X COVID-19 onset	-0.003 [-0.009, 0.004]	-0.809
<b>(c) Expressive suppression</b>		
Suppression	1.060 [0.533, 1.586]	3.994***
Sex	10.246 [3.043, 17.450]	2.823**
Time	0.010 [-0.011, 0.031]	0.895
COVID-19 onset	-1.404 [-3.438, 0.629]	-1.358
Suppression X Time X COVID-19 onset	-0.002 [-0.009, 0.004]	-0.736
<b>(d) Implicit theories of emotions</b>		
ITE	-7.566 [-11.322, -3.809]	-3.997***
Sex	9.158 [1.967, 16.350]	2.527*
Time	0.009 [-0.012–0.030]	0.856
COVID-19 onset	-1.306 [-3.341, 0.729]	-1.263
ITE X Time X COVID-19 onset	0.011 [-0.037, 0.059]	0.442
<b>(e) Simultaneous model</b>		
ITE	-4.909 [-8.861, -0.958]	-2.466*
Reappraisal	-0.363 [-0.843, 0.116]	-1.503
Suppression	0.832 [0.302, 1.361]	3.116**
Sex	10.465 [3.546, 17.383]	3.002**
Time	0.009 [-0.012–0.030]	0.880
COVID-19 onset	-1.348 [-3.381–0.684]	-1.305

Note. X, interaction; ITE, implicit theories of emotions; values in square brackets indicate the 95% confidence interval for each point estimate

\* $p < .05$

\*\* $p < .01$

\*\*\* $p < .001$

onset = 1) were dummy coded. To account for variability in outcome variables (anxiety and loneliness) that may be due to participants beginning the study at different points of the academic year in between-person models, we controlled for participant-specific T1 dates. Therefore, for baseline analyses, time was a continuous variable coded as days since the first day of the study (November 14, 2019), with this date equaling zero. For growth curve modeling analyses, time was a continuous variable coded as days since the participant's own baseline date, with each participant's baseline equaling zero (i.e., capture within-person change). Growth curve analyses incorporated random intercepts and slopes to allow for individual differences in baseline anxiety/loneliness and

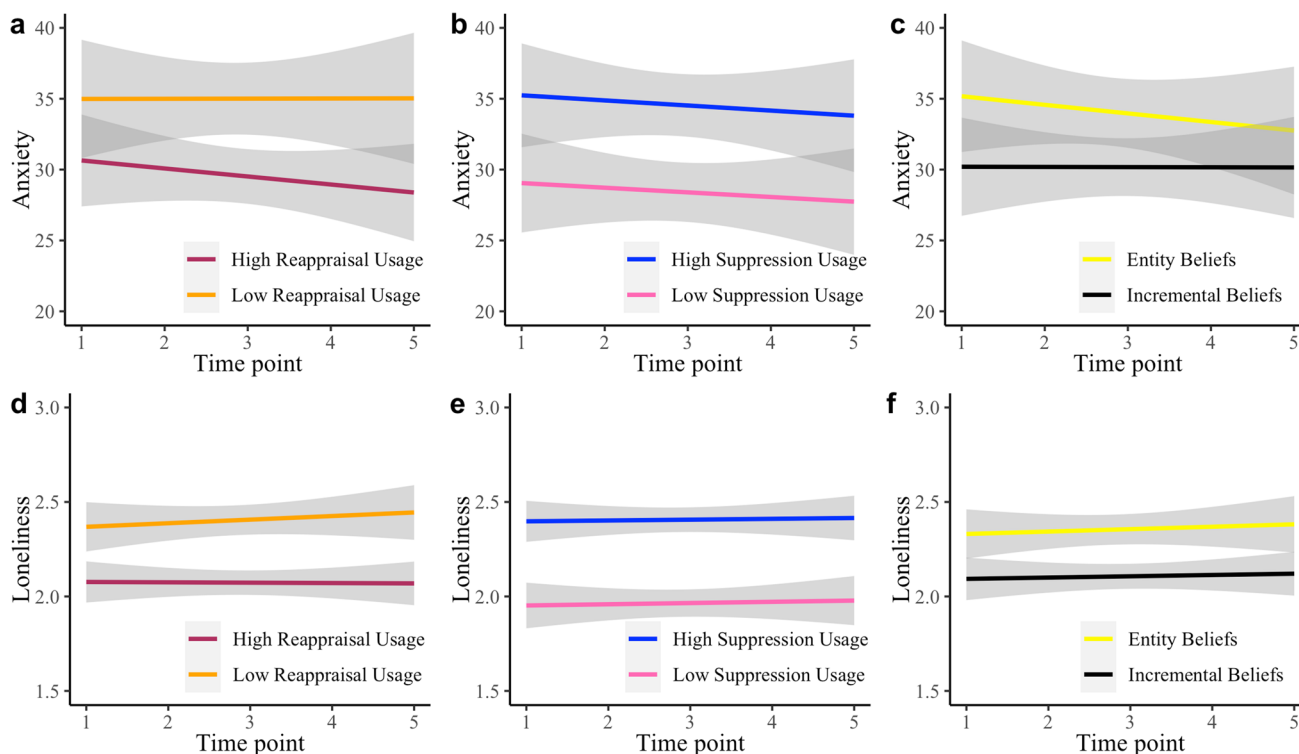
growth trajectories. Cognitive reappraisal total, expressive suppression total, and IBES average scores were all mean-centered for longitudinal analyses. Due to our participants' age range at baseline being between 18 and 19 years, age was not included as a covariate in analyses.

### Hypothesis 1

Participants will exhibit greater anxiety during the COVID-19 pandemic than before the outbreak.

**Longitudinal Analyses** Anxiety trajectories from before to during the COVID-19 pandemic were assessed using linear growth curve modeling. We predicted





**Fig. 1** Levels of emotion regulation usage and beliefs about emotions at baseline predict psychosocial trajectories. High use of cognitive reappraisal at baseline predicted low levels of anxiety (a) and fewer feelings of loneliness (d) across time. Whereas low use of cognitive reappraisal at baseline predicted high levels of anxiety (a) and greater feelings of loneliness (d) across time. High use of expressive suppression at baseline predicted high levels of anxiety (b) and greater feelings of loneliness (e) across time. Whereas low use of expressive suppression at baseline predicted low levels of anxiety (b) and fewer

feelings of loneliness (e) across time. Believing emotions are malleable (incremental beliefs) at baseline predicted low levels of anxiety (c) and fewer feelings of loneliness (f) across time. Whereas believing emotions are fixed (entity beliefs) at baseline predicted high levels of anxiety (c) and greater feelings of loneliness (f) across time. Time is plotted categorically (T1, T2, T3, T4, and T5) for visualization purposes; however, for longitudinal analyses, time was a continuous variable coded as days since the participant's baseline date

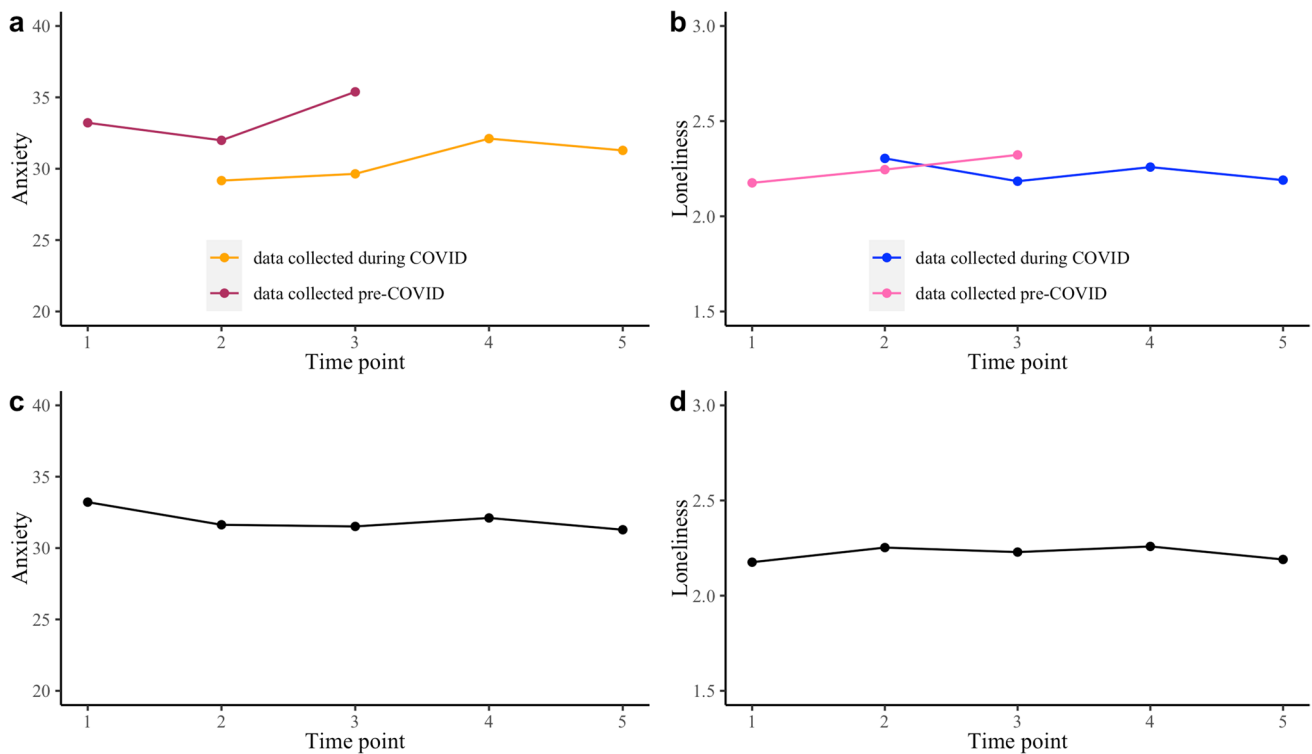
anxiety symptomatology as a function of the interaction term between time and COVID-19 onset variables while controlling for sex and allowing the effects of time and the intercept to vary randomly across participants. Therefore, anxiety scores will be greater after the pandemic onset than before the outbreak.

## Hypothesis 2

cognitive reappraisal and expressive suppression usage will each be associated with anxiety symptoms at baseline and moderate anxiety symptoms across time in response to multiple stressors (i.e., transition to adulthood and college, and the COVID-19 pandemic onset). We hypothesized that reappraisal use would be negatively associated with anxiety at baseline and across time, whereas suppression use would be positively associated with anxiety at baseline and across time.

**Baseline Analyses** Separate multiple regression analyses were conducted with each ER strategy type (cognitive reappraisal and expressive suppression) as predictors of baseline anxiety while controlling for sex and date participants completed T1.

**Longitudinal Analyses** First, we conducted two separate linear growth curve models for each mean-centered ER strategy type total score to predict anxiety trajectories from before to during the COVID-19 pandemic. The functions included a three-way interaction term between cognitive reappraisal or expressive suppression usage scores, time, and COVID-19 onset to predict changes in anxiety scores across time while controlling for sex and allowing the effects of time and the intercept to vary randomly across participants. The relationship between anxiety and each ER strategy is not necessarily static across time, and COVID represented a particularly unique disruption that was distinct from the effect



**Fig. 2** Anxiety and loneliness trajectories across time. Anxiety (a) and loneliness (b) trajectories across time averaged between participants that completed T1, T2, and T3 before the COVID-19 pandemic outbreak, and participants that completed T2, T3, T4, and T5 following the pandemic outbreak. Anxiety (c) and loneliness (d) trajectories across time averaged across all participants regardless of the pan-

demical outbreak. Time is plotted categorically (T1, T2, T3, T4, and T5) for visualization purposes; however, for longitudinal analyses, time was a continuous variable coded as days since the participant's baseline date. Note that all participants completed T1 before the COVID-19 pandemic onset

of time. Thus, we included time, each ER strategy usage, and COVID-19 pandemic onset as a three-way interaction.

Then, similar linear growth curve models were conducted with the same variables listed above to represent the main effects of the between-person predictors (modeled with no interaction term).

### Exploratory question 1

Are ITE (incremental and entity beliefs) associated with ER strategies and anxiety symptomatology at baseline? We hypothesized that incremental beliefs would be associated with greater use of cognitive reappraisal and fewer anxiety symptoms, whereas entity beliefs would be associated with greater use of expressive suppression and more symptoms of anxiety.

**Baseline Analyses** Separate multiple regression analyses were conducted with the IBES average scores as predictors of baseline ER usage (cognitive reappraisal and expressive

suppression) total scores and anxiety symptoms while controlling for sex and date participants completed T1.

### Exploratory Question 2

Do individuals who believe their emotions are malleable (incremental) exhibit greater changes in anxiety across time in response to stressors than those who believe their emotions are fixed (entity)? Do incremental and entity beliefs continue to predict changes in anxiety across time when also accounting for each ER strategy usage in the model?

**Longitudinal Analyses** First, we tested the interaction between IBES average scores and time to predict changes in anxiety scores over five data time points. This function included a three-way interaction term between mean-centered IBES scores, time, and COVID-19 onset to predict anxiety scores across time while controlling for sex and allowing the effects of time and the intercept to vary randomly across participants. The relationship between anxiety

Table 4 Longitudinal results for models investigating loneliness trajectories

	$\beta$	$t$
<b>(a) Cognitive reappraisal</b>		
Reappraisal	-0.033 [-0.048, -0.017]	-4.107***
Sex	0.279 [0.042, 0.516]	2.340*
Time	0.0003 [-0.0003, 0.001]	0.974
COVID-19 onset	-0.002 [-0.073, 0.070]	-0.046
Reappraisal X time X COVID-19 onset	-0.0001 [-3.768, 0.0001]	-1.188
<b>(b) Expressive suppression</b>		
Suppression	0.044 [0.028, 0.061]	5.293***
Sex	0.263 [0.037, 0.489]	2.307*
Time	0.0004 [-0.0003, 0.001]	1.067
COVID-19 onset	-0.007 [-0.078, 0.065]	-0.180
Suppression X time X COVID-19 onset	-0.00001 [-0.0003, 0.0002]	-0.078
<b>(c) Implicit theories of emotions</b>		
ITE	-0.239 [-0.363, -0.114]	-3.805***
Sex	0.223 [-0.016, 0.461]	1.852
Time	0.0003 [-0.0003, 0.001]	0.979
COVID-19 onset	-0.002 [-0.074, 0.069]	-0.065
ITE X time X COVID-19 onset	-0.002 [-0.003, 0.0002]	-1.718
<b>(d) Simultaneous model</b>		
ITE	-0.091 [-0.209, 0.028]	-1.517
Reappraisal	-0.027 [-0.041, -0.013]	-3.723***
Suppression	0.039 [0.023, 0.039]	4.825***
Sex	0.296 [0.088, 0.504]	2.830**
Time	0.0003 [-0.0003, 0.001]	1.024
COVID-19 onset	-0.004 [-0.075, 0.068]	-0.107

Note. X, interaction; ITE, implicit theories of emotions; values in square brackets indicate the 95% confidence interval for each point estimate

\* $p < .05$

\*\* $p < .01$

\*\*\* $p < .00$

and fundamental beliefs about emotions is not necessarily static across time, and COVID represented a particularly unique disruption that was distinct from the effect of time. Thus, we included time, IBES, and COVID-19 pandemic onset as a three-way interaction.

Then, a growth curve model was used to assess how IBES average scores predicted changes in anxiety scores over five data time points. The function included the mean-centered IBES scores, time, and COVID-19 onset to predict changes in anxiety scores across time while controlling for sex and allowing the effects of time and the intercept to vary randomly across participants. These represent the main effects of the between-person predictors (modeled with no interaction term).

Finally, we assessed how mean-centered IBES scores, and mean-centered ER strategy usage scores jointly predict anxiety symptoms across time. As such, this function included IBES average scores, cognitive reappraisal and expressive suppression total scores, time, and COVID-19 onset variable to predict changes in anxiety scores across time while controlling for sex and allowing the effects of time and the intercept to vary randomly across participants.

### Exploratory Question 3

Are ITE and ER strategies (reappraisal and suppression) each associated with subjective feelings of loneliness at baseline and do they moderate feelings of loneliness across time in response to stressors? Moreover, do ITE and ER strategies continue to predict changes in subjective feelings of loneliness across time when investigating them in the same model? We predicted that greater reappraisal usage and incremental beliefs would each be associated with fewer feelings of loneliness at baseline and across time, whereas greater suppression usage and entity beliefs would be associated with greater feelings of loneliness at baseline and across time.

**Baseline Analyses** Baseline analyses identical to those in hypothesis 2 were conducted with an additional model of IBES average scores and the substitution of anxiety symptomatology with subjective feelings of loneliness as the predictor variable.

**Longitudinal Analyses** Longitudinal analyses identical to those in hypothesis 2 were conducted with an additional model of IBES average scores and the substitution of anxiety symptomatology with subjective feelings of loneliness as the predictor variable. Additionally, we assessed how mean-centered IBES scores, and mean-centered ER strategy usage scores jointly predict loneliness symptoms across time. As such, this function included IBES average scores, cognitive

reappraisal and expressive suppression total scores, time, and COVID-19 onset to predict changes in subjective feelings of loneliness across time while controlling for sex and allowing the effects of time and the intercept to vary randomly across participants.

## Results

### Hypothesis 1

Participants will exhibit greater anxiety during the COVID-19 pandemic than before the outbreak.

**Longitudinal Results** The interaction between time and COVID-19 onset was not statistically significant in predicting anxiety trajectories ( $\beta = 0.036$ ,  $t = 1.848$ ,  $p = .065$ , 95% CI =  $[-0.002, 0.075]$ ). This suggests that the association between subject-specific data points (data collected before and during the COVID-19 pandemic) and anxiety symptomatology remained stable across time (Table 3, part a; Fig. 2c). Individuals were on average more anxious before the COVID-19 pandemic outbreak than immediately afterward ( $\beta = -2.71$ ,  $t = -2.143$ ,  $p < .05$ , CI =  $[-5.187, -0.223]$ ; Table 2, part a). By T5, anxiety symptom severity returned to T1 levels (pre-COVID; Fig. 2a, c). Race, ethnicity, and first-generation college student status did not moderate these effects (see EQ6 in Online Resource for details).

### Hypothesis 2

Reappraisal use will be negatively associated with anxiety at baseline and across time, whereas suppression use would be positively associated with anxiety symptoms at baseline and across time.

**Baseline Results** As predicted, greater cognitive reappraisal usage was associated with lower levels of anxiety ( $\beta = -0.582$ ,  $t = -2.267$ ,  $p = .026$ , 95% CI =  $[-1.092, -0.072]$ ) at baseline. Greater expressive suppression usage was associated with higher levels of anxiety ( $\beta = 0.980$ ,  $t = 3.604$ ,  $p < .001$ , 95% CI =  $[0.440, 1.519]$ ) at baseline. These findings remained when controlling for sex, date participant completed T1, race, ethnicity, and first-generation college student status (see EQ5 in Online Resource for details).

### Longitudinal Results

**Cognitive Reappraisal** The three-way interaction between cognitive reappraisal, time, and COVID-19 onset was

not statistically significant in predicting anxiety trajectories from before to during the pandemic ( $\beta = -0.003$ ,  $t = -0.809$ ,  $p = .419$ , 95% CI =  $[-0.009, 0.004]$ ). When examining the main effects of the between-person predictors, there was a statistically significant main effect of cognitive reappraisal usage ( $\beta = -0.584$ ,  $t = -2.304$ ,  $p = .023$ , 95% CI =  $[-1.087, -0.081]$ ) on anxiety across time. Thus, while greater cognitive reappraisal usage continued to predict lower levels of anxiety at all five longitudinal data points (Fig. 1a), these effects did not interact with time (Table 2, part b).

**Expressive Suppression** The interaction between the use of expressive suppression, time, and COVID-19 onset was not statistically significant in predicting anxiety trajectories from before to during the pandemic ( $\beta = -0.002$ ,  $t = -0.736$ ,  $p = .462$ , 95% CI =  $[-0.009, 0.004]$ ). When examining the main effects of the between-person predictors, there was a statistically significant main effect of expressive suppression usage ( $\beta = 1.060$ ,  $t = 3.994$ ,  $p < .001$ , 95% CI =  $[0.533, 1.586]$ ) on anxiety across time. Thus, greater expressive suppression usage continued to predict higher levels of anxiety at all five longitudinal data points but did not interact with time (Fig. 1b; Table 3, part c).

These results overall suggest that the associations between subject-specific data points (data collected before and during the COVID-19 pandemic), ER strategy (cognitive reappraisal or expressive suppression) usage, and anxiety symptomatology remained stable in the face of a stressful experience. The above results remained when controlling for race, ethnicity, and first-generation college student status (see EQ5 in Online Resource for details).

### Exploratory Question 1

Are incremental beliefs positively associated with reappraisal usage and negatively associated with anxiety symptoms and suppression usage at baseline and across time?

**Baseline Results** As predicted, greater IBES average scores were associated with greater cognitive reappraisal usage ( $\beta = 2.304$ ,  $t = 2.997$ ,  $p = .003$ , 95% CI =  $[0.778, 3.829]$ ) at baseline. Alternatively, higher IBES average scores predicted lower expressive suppression usage ( $\beta = -2.259$ ,  $t = -3.251$ ,  $p = .002$ , 95% CI =  $[-3.639, -0.880]$ ) at baseline while controlling for sex and date participant completed T1. Greater IBES average scores also predicted lower levels of anxiety ( $\beta = -7.248$ ,  $t = -3.712$ ,  $p < .001$ , 95% CI =  $[-11.124, -3.373]$ ) at baseline. All results reported controlled for sex and date participant completed T1.

### Exploratory Question 2

Do ITE (incremental and entity beliefs) predict changes in anxiety symptoms across time in response to stressors and are these results preserved when accounting for each ER strategy?

#### Longitudinal Results

**Implicit Theories of Emotions** The three-way interaction between IBES average scores, time, and COVID-19 onset did not significantly predict anxiety trajectories from before to during the pandemic ( $\beta = 0.011$ ,  $t = 0.442$ ,  $p = .659$ , 95% CI =  $[-0.037, 0.059]$ ). However, there was a statistically significant main effect of IBES scores ( $\beta = -7.566$ ,  $t = -3.997$ ,  $p < .001$ , 95% CI =  $[-11.322, -3.809]$ ) on anxiety overtime. Such findings show that greater IBES average scores continued to predict lower levels of anxiety at all five longitudinal data points (Fig. 1c), though these effects did not interact with time (Table 2, part d).

**Simultaneous Model** We assessed the strength of the relationship between ITE and anxiety over time while also controlling for both ER strategies in the linear growth curve model. Here, IBES average scores ( $\beta = -4.909$ ,  $t = -2.466$ ,  $p = .015$ , 95% CI =  $[-8.861, -0.958]$ ) and expressive suppression usage ( $\beta = 0.832$ ,  $t = 3.116$ ,  $p = .002$ , 95% CI =  $[0.302, 1.361]$ ) continued to predict anxiety at all five longitudinal data points while cognitive reappraisal did not ( $\beta = -0.363$ ,  $t = -1.503$ ,  $p = .136$ , 95% CI =  $[-0.843, 0.116]$ ). This suggests that cognitive reappraisal usage does not predict unique variance in anxiety trajectories across time above and beyond ITE and expressive suppression usage (Table 3, part e).

### Exploratory Question 3

Are ITE and each ER strategy independently associated with feelings of loneliness at baseline and across time and are these results preserved when investigating them all together in the same model?

**Baseline Results** As expected, greater usage of cognitive reappraisal was associated with fewer feelings of loneliness ( $\beta = -0.035$ ,  $t = -4.083$ ,  $p < .001$ , 95% CI =  $[-0.052, -0.018]$ ) at baseline, as did higher IBES scores ( $\beta = -0.263$ ,  $t = -3.784$ ,  $p < .001$ , 95% CI =  $[-0.400, -0.124]$ ). By contrast, greater endorsement of expressive suppression predicted more feelings of loneliness ( $\beta = 0.045$ ,  $t = 4.876$ ,  $p < .001$ , 95% CI =  $[0.027, 0.063]$ ). The aforementioned results controlled for sex and date participants completed T1.

## Longitudinal Results

**Cognitive Reappraisal** The interaction between the use of cognitive reappraisal, time, and COVID-19 onset was not statistically significant in predicting loneliness trajectories from before to during the COVID-19 pandemic ( $\beta = -0.0001$ ,  $t = -1.188$ ,  $p = .236$ , 95% CI =  $[-3.768, 0.0001]$ ). When examining the main effects of the between-person predictors, there was a statistically significant main effect of cognitive reappraisal usage ( $\beta = -0.033$ ,  $t = -4.107$ ,  $p < .001$ , 95% CI =  $[-0.048, -0.017]$ ) on loneliness across time. As such, while greater cognitive reappraisal usage continued to predict lower feelings of loneliness at all five longitudinal data points (Fig. 1d), these effects did not interact with time (Table 3a).

**Expressive Suppression** The three-way interaction between the use of expressive suppression, time, and COVID-19 onset was not statistically significant in predicting loneliness trajectories from before to during the COVID-19 pandemic ( $\beta = -0.00001$ ,  $t = -0.078$ ,  $p = .934$ , 95% CI =  $[-0.0003, 0.0002]$ ). There was however a statistically significant main effect of expressive suppression usage ( $\beta = 0.044$ ,  $t = 5.293$ ,  $p < .001$ , 95% CI =  $[0.028, 0.061]$ ) on loneliness across time. These findings show that greater expressive suppression usage predicted subjective feelings of loneliness at all five data points (Fig. 1e), although these effects did not interact with time (Table 3b).

**Implicit Beliefs About Emotion** The three-way interaction between IBES average scores, time, and COVID-19 onset was not statistically significant in predicting loneliness trajectories from before to during the COVID-19 pandemic ( $\beta = -0.002$ ,  $t = -1.718$ ,  $p = .087$ , 95% CI =  $[-0.003, 0.0002]$ ). We observed a statistically significant main effect of IBES scores ( $\beta = -0.239$ ,  $t = -3.805$ ,  $p < .001$ , 95% CI =  $[-0.363, -0.114]$ ) on loneliness across time. Therefore, while greater IBES average scores predicted lower feelings of loneliness at all five longitudinal data points (Fig. 1f), these effects did not interact with time (Table 3c).

These results suggest that the associations between subject-specific data points (data collected before and during the COVID-19 pandemic), ER strategy (cognitive reappraisal or expressive suppression) usage, individuals' ITE, and feelings of loneliness remained stable across time.

**Simultaneous Model** We assessed the strength of the relationship between ITE and loneliness over time with both ER strategies included in the linear growth curve model. Here, cognitive reappraisal ( $\beta = -0.027$ ,  $t = -3.723$ ,  $p < .001$ , 95% CI =  $[-0.041, -0.013]$ ) and expressive suppression usage ( $\beta = 0.039$ ,  $t = 4.825$ ,  $p < .001$ , 95% CI =  $[0.023,$

$0.039]$ ) continued to predict loneliness at all five longitudinal data points over and above ITE ( $\beta = -0.091$ ,  $t = -1.517$ ,  $p = .133$ , 95% CI =  $[-0.209, 0.028]$ ). This suggests that ITE does not predict unique variance in loneliness trajectories across time that are above and beyond ER strategies (Table 3d).

## Discussion

We examined ER strategies and beliefs about emotion as predictors of adjustment for EAs across a 6-month period spanning before and through the early stages of the COVID-19 pandemic. We found that anxiety decreased initially following the pandemic outbreak and returned to baseline levels over time. Loneliness remained relatively unchanged throughout. Our models that simultaneously examined ER strategy usage and beliefs about emotions revealed three key findings. First, believing emotions can change explained variance in anxiety across time over and above reappraisal usage. Second, using cognitive reappraisal to regulate emotions explained variance in loneliness over and above ITE. Finally, for both anxiety and loneliness, using expressive suppression to regulate emotions resulted in maladaptive outcomes across time. Collectively, these results point to a set of key individual differences that confer risk or resilience during emerging adulthood.

### Individual Differences in Emotion Beliefs and Regulatory Tendencies are Associated with Adjustment in Emerging Adulthood

As predicted, individuals who believed their emotions could change or employed reappraisal more, were less anxious and lonely at baseline than those who believed their emotions were fixed or reappraised less. Individuals who suppressed frequently were more anxious and lonelier at baseline than those who suppressed less. Our findings may also explain why some people are better at regulating their emotions. For instance, those that believed their emotions can change, reappraised more, and suppressed less at baseline. These results align with prior work demonstrating that ER strategy usage and ITE are linked and are predictors of psychosocial outcomes among EAs (Cutuli, 2014; Ford et al., 2018; Tamir et al., 2007; Waizman et al., 2021; Werner & Gross, 2010). Future work should explore trajectories of ER strategies and ITE during stress as they were collected cross-sectionally.



## Evidence for Psychosocial Stability in Emerging Adulthood

Despite increasing concerns regarding the effects of COVID-19 on EAs' adverse psychological outcomes (Huckins et al., 2020; Kecojevic et al., 2020; Wang et al., 2020), we found that anxiety decreased initially following the pandemic onset and returned to baseline levels over time. It might be that academic demands were lifted, or that some of the social pressures/uncertainties of navigating college life were put on hold during the initial months of the pandemic. Indeed, a study found that fewer demands were placed on young adults during the early stages of the pandemic, resulting in a reduction of stress post-lockdown (Rettew et al., 2021). Loneliness remained relatively unchanged during the initial COVID-19 lockdown as compared to before the outbreak. Similar results on well-being remaining stable have been noted in the broader literature (Fried et al., 2021; van Zyl et al., 2021; Zhang & Ma, 2020). A possible explanation is that students may have received more social support from family and friends during this time, and may have spent more time relaxing and exercising (Zhang & Ma, 2020). Future work would benefit from considering contextual and familial factors in influencing psychosocial adjustment to adult transitions. Our findings are also consistent with adaptation level theory (Brickman et al., 1978), which suggests that individual differences in well-being remain stable over time, in the face of good fortune or challenge.

We further investigated whether stressors magnified existing individual differences or served as “turning points” regarding psychosocial trajectories. We found that ITE predicted anxiety levels over time above and beyond reappraisal usage. This might be because a central feature of several anxiety disorders is believing that extreme negative emotions are fixed (Leahy, 2002). In fact, fixed emotional thinking patterns (e.g., entity beliefs) resemble several cognitive distortions, including polarized thinking (all-or-nothing thinking) and catastrophizing. Such cognitive distortions are errors in interpretations that skew versions of reality and characterize anxiety disorders (Tolin, 2016). One reason evidence-based treatments, like cognitive behavioral therapy, may be so successful in alleviating symptoms of anxiety might be because of the approaches that specifically target all-or-nothing thinking and get clients to challenge their distorted thinking patterns leading to more flexible emotional thinking (incremental beliefs). Alternatively, we found that engaging in reappraisal predicted less loneliness across time above and beyond ITE. While the links between anxiety and ITE are clearer in light of existing evidence-based treatments, loneliness has a more situational response to events (Perlman & Peplau, 1981), and therefore might be less susceptible to ITE and

more sensitive to cognitive reappraisal that involves changing the interpretation of an emotional event. However, further work should explore if the associations found may be explained by third variables like extraversion, neuroticism, optimism, and pessimism (Rettew et al., 2021). Findings also emphasize the invariant maladaptive role suppression has on anxiety and loneliness trajectories across time. While suppression has been previously linked to maladaptive outcomes (McWhirter, 1990), here, we replicate and extend this literature to highlight the consistent negative role it plays on EAs' psychosocial trajectories when faced with a profound stressor during a transitional phase of development.

## Strengths and Limitations

Findings should be interpreted in the context of their strengths and limitations. First, we relied on self-report measures at a single college site. The ITE measure also had relatively lower reliability due to the limited number of items in this questionnaire. Studies should aim to replicate our findings using larger, more robust measurements (e.g., ecological momentary assessment). Second, we focused on two specific psychosocial trajectories (anxiety and loneliness across time) that have been identified as particularly relevant for the mental health of EAs but did not assess other critical outcomes. Future work might explore how ER and ITE impact other mental health outcomes such as depression. This is particularly important given the prevalence of increased depression rates among EAs following the pandemic onset (Alzueta et al., 2021). Third, while this study considered the transition to college and the COVID-19 pandemic as stressful experiences, we did not directly assess stress in our sample, though other recent publications have done this (Rettew et al., 2021). Fourth, we had a relatively small sample size of  $N=100$ , and the participants were all college students at an elite institution. Finally, our focus on a college sample excludes individuals who pursue other educational/occupational opportunities during emerging adulthood.

## Conclusion

Overall, we found that ER strategies and ITE held unique influences in predicting anxiety and loneliness trajectories over time. These results underscore the utility of targeting specific ER strategy usage and ITE in ameliorating risk and promoting resilience in response to stressors.

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**Competing Interests** The authors declare no competing interests.

**Data Availability** Data used in the current study are available on the Open Science Framework, <https://osf.io/ufy74/>.

**Code availability** Not applicable.

**Authors' contributions** Not applicable.

**Ethics approval** Not applicable.

**Consent to participate** Not applicable.

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