

# Incremental Theories of Emotion Across Time: Temporal Dynamics and Correlates of Change

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Accumulating research points to the importance of incremental theories of emotion. Yet, little is known about whether these beliefs change in adulthood across long time spans, and if so, whether such changes are prospectively linked to emotion regulation outcomes. In the present investigation, we tested how incremental theories of emotion change during college, and whether such changes are linked to emotion regulation practices. We followed 394 undergraduates as they entered and ultimately graduated from college. Focusing on the temporal dynamics of incremental theories of emotion, we found that they were somewhat stable, and their mean-level increased over time. Focusing on the correlates of such changes, we found that students who during college came to believe that emotions (but not intelligence) are more controllable, ended up using more cognitive reappraisal (but not expressive suppression) at the end of college. Similarly, students who during college came to use cognitive reappraisal (but not expressive suppression) more frequently, ended up believing that emotion (but not intelligence) is more controllable at the end of college. This pattern could not be explained by differences in initial levels or by differences in underlying affective experiences. We discuss potential implications of these findings for understanding the interplay between beliefs and emotion regulation.

**Keywords:** controllability, emotion, emotion regulation, implicit theories, reappraisal

**Supplemental materials:** <https://doi.org/10.1037/emo0000945.supp>

Holding an incremental theory of emotion refers to the belief that emotions are not fixed but can be controlled (Tamir et al., 2007). This belief is related to emotion regulation (e.g., Romero et al., 2014; Tamir et al., 2007) and can causally affect it (e.g., Kneeland et al., 2016a, 2016b; Rovenpor & Isbell, 2018) in healthy and in clinical populations (e.g., De Castella et al., 2014).

However, we know little about whether and how incremental theories of emotion change over time and what such changes predict. In the present investigation, we examined these questions by assessing incremental theories of emotion at the beginning and end of a 4-year period that poses emotional and academic challenges—namely, college. College students in industrialized societies are individuals on the verge of young adulthood (Arnett, 2014). During college, these emerging adults explore possibilities in love, work, and worldviews, with many of the responsibilities of

adult life “kept at bay” (Arnett, 2016). Such a period should offer a unique opportunity to learn, test, and cultivate beliefs about the controllability of emotions that can inform how people practice emotion regulation.

## Stability and Change of Incremental Theories of Emotion

Because incremental theories of emotion can shape the way individuals regulate their emotions, it is important to understand whether and to what extent incremental theories of emotion are stable over time. Stability can be assessed by using rank-order stability and mean-level change (Roberts et al., 2008): Rank-order stability refers to the stability of the relative positions of individuals on the target variable over time, whereas mean-level change refers to how the level of the variable averaged across a sample of individuals might change over time.

With respect to rank-order stability, some initial evidence suggests that incremental theories of emotion are somewhat stable over shorter periods. In a small sample of early adolescents (ages 11–14), incremental theories of feelings, which are likely related to incremental theories of emotion, were relatively stable over the course of a year (Schleider & Weisz, 2016;  $r[59] = .57-.60^1$ ). In adulthood, incremental theories of emotion were fairly stable dur-

This article was published Online First December 28, 2020.

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This research was funded by National Institutes of Health Grant MH58147 to James J. Gross.

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<sup>1</sup> This range combines incremental theories of feelings, thoughts, and behaviors.

ing one semester (Kneeland & Dovidio, 2020;  $r[104] = .53$ ). Another study examined incremental theories of anxiety, which may overlap with incremental theories of emotion. Incremental theories of anxiety among students (ages 17–19) were fairly stable across a 5-week period (Schroder et al., 2019;  $r[293] = .52-.72$ ). These data suggest that incremental theories of emotion may be relatively stable over several months up to a year.

With respect to mean-level change, existing findings suggest that incremental theories of emotion tend to decrease from childhood to late adolescence. In a cross-sectional design, participants aged 18 and 19 endorsed less incremental theories of emotion than did children aged 8 to 10 (Brandone & Klimek, 2018). In an 18-month cross-sectional design with participants aged 10–18 years, incremental theories of emotion were lower in childhood than in adolescence but were relatively similar after puberty and into adulthood (Ford et al., 2018). Taken together, these findings are consistent with the hypothesis that incremental theories of emotion decrease from early adolescence to adulthood and then show little change during adulthood.

Existing longitudinal studies of within-person stability in incremental theories of emotion examined time spans up to 1.5 years (e.g., Ford et al., 2018). We know less about whether and how incremental theories of emotion change over longer periods of time, especially during periods of transition. We sought to address these issues in the current investigation.

### Correlates of Change in Incremental Theories of Emotion

Incremental theories of emotion have been linked to more desirable emotional outcomes, such as greater emotion regulation self-efficacy (Tamir et al., 2007), and more positive emotional patterns and mental health (e.g., Aldao et al., 2010). Incremental theories of emotion have also been linked to the implementation of emotion regulation. In particular, it has been studied with reference to the use of cognitive reappraisal. Cognitive reappraisal is an emotion regulation strategy that involves modifying how one thinks about an emotion-eliciting event to alter its emotional impact (Gross, 1998). Cognitive reappraisal is commonly attempted in daily life (Ford et al., 2017). It has been shown to effectively lead to desired changes in emotional experience (Webb et al., 2012). It is also one of the most widely studied emotion regulation strategies (McRae & Gross, 2020). Incremental theories of emotion have been linked to more frequent use of cognitive reappraisal (e.g., Schroder et al., 2015; Tamir et al., 2007).

If incremental theories of emotion are linked to cognitive reappraisal, it is important to understand the mechanism underlying such links. One possibility, therefore, is that cultivating more incremental theories of emotion increases the propensity to engage in emotion regulation. This is because the belief that emotions can be controlled should increase active attempts to regulate emotional experiences. Consistent with these ideas, more incremental theories of emotion at the beginning of the semester were linked to more frequent use of cognitive reappraisal at the end of the semester, which was in turn linked to less depression at the end of the semester (Kneeland & Dovidio, 2020). Similarly, more incremental theories of emotion in youth were linked to more frequent use of cognitive reappraisal 18 months later, which was in turn linked to less depression 18 months later (Ford et al., 2018).

A second possibility is that increasing the use of cognitive reappraisal over time should lead to the belief that emotions are more controllable. This is because practicing emotion regulation is likely to teach people that emotions are amenable to control. Repeated failure to control emotions could lead to the conclusion that emotions are less controllable. Consistent with these ideas, when assessing incremental theories about feelings, people with higher rates of psychopathology at the beginning of the school year, who likely experienced repeated failure in emotion regulation, showed throughout the year a decrease in incremental theories (Schleider & Weisz, 2016).

A third possibility is that the link between incremental theories of emotion and cognitive reappraisal is bidirectional. As people come to believe that emotions are more controllable, they use more cognitive reappraisal, and as they use more cognitive reappraisal, their belief that emotions can be controlled is further strengthened. Evidence for a bidirectional relationship between incremental theories and self-regulation in the target domain was already established in the intelligence domain. Incremental theories of intelligence in ninth grade pupils were both a cause and a consequence of higher academic achievement (Jones et al., 2012).

Empirical research on emotion regulation has often compared cognitive reappraisal to other strategies, particularly expressive suppression (e.g., Gross, 2014; Gross & John, 2003). Expressive suppression involves inhibiting the outward expression of emotion and typically fails to lead to desirable changes in emotional experience (Gross, 1998). Implicit theories of emotion have been associated with more frequent use of cognitive reappraisal (e.g., Schroder et al., 2015; Tamir et al., 2007) but has been largely unrelated to the use of expressive suppression (e.g., Kneeland et al., 2016b; Tamir et al., 2007). Therefore, we expected that as people cultivate more incremental theories of emotion, they would also use more cognitive reappraisal, but not more expressive suppression.

We assessed incremental theories of emotion, cognitive reappraisal, and expressive suppression over four years of college. According to the first possibility, students who come to believe that emotions are increasingly more controllable during college, would end up using more cognitive reappraisal (but not expressive suppression) at the end of college, even when controlling for cognitive reappraisal and incremental theories of emotion at the beginning of college. According to the second possibility, students who use increasingly more cognitive reappraisal (but not expressive suppression) during college, would end up believing that emotions are more controllable at the end of college, even when controlling for incremental theories of emotion and cognitive reappraisal at the beginning of college. Finally, according to the third possibility, both the first and the second patterns above would occur simultaneously.

### The Present Investigation

We tracked incremental theories of emotion in college students over a 4-year period. We measured incremental theories of emotion just before entering college (as reported in Tamir et al., 2007) and at the end of college. First, we tested whether incremental theories of emotion change over time and, if so, to what extent. We assessed both rank-order stability and mean-level change (Roberts et al., 2008). Because incremental theories of emotion in adulthood

are relatively stable over short time spans (e.g., Brandone & Klimek, 2018; Ford et al., 2018; Kneeland & Dovidio, 2020), we predicted that incremental theories of emotion would be relatively stable during college. However, we predicted that the stability of incremental theories of emotion during the four years of college might be lower than the stability found in other adult samples when examined over shorter time spans. In terms of mean-level change, college may pose increasing demands for emotion control (e.g., Tamir et al., 2007). To the extent that college students need to regulate their emotions often during college, such practice may lead them to cultivate more incremental theories of emotion. Alternatively, to the extent that students have difficulty coping with such demands, they might cultivate less incremental theories of emotion during college. Second, we expected incremental theories of emotion to be positively linked to cognitive reappraisal but not to expressive suppression (Kneeland et al., 2016b; Tamir et al., 2007).

We tested whether and how potential changes in incremental theories of emotion are prospectively linked to cognitive reappraisal at the end of college, controlling for cognitive reappraisal and incremental theories of emotion at the beginning of college. We also tested whether and how potential changes in the use of cognitive reappraisal might be prospectively linked to incremental theories of emotion at the end of college, controlling for incremental theories of emotion and cognitive reappraisal at the beginning of college. We also tested the third possibility, according to which incremental theories of emotion and the use of cognitive reappraisal mutually reinforce each other.

Incremental theories are assumed to be domain-specific (e.g., Hughes, 2015), such that theories regarding one domain (e.g., emotion) should be largely independent of theories regarding another domain (e.g., intelligence; Tamir et al., 2007). Nonetheless, it is possible that effects involving incremental theories of emotion reflect patterns that characterize incremental theories, more generally, rather than theories of emotion, in particular. To test whether findings pertaining to incremental theories of emotion are specific to the emotion domain, we assessed both incremental theories of emotion and intelligence in the current investigation. We expected to find our predicted effects when examining incremental theories of emotion, but not intelligence.

Finally, how frequently a person uses cognitive reappraisal may be a function of the emotions she experiences. People who experience less desirable emotions and related affective states may use more cognitive reappraisal than those who experience more desirable emotions, because they need to regulate their emotions more frequently. We hypothesized that potential links between incremental theories of emotion and cognitive reappraisal would be independent of differences in emotional or affective experiences. To test this hypothesis, we measured and controlled for the intensity of positive and negative emotional experiences, depressive symptoms, and perceived stress.

## Method

### Participants

Data were available for 394 undergraduate students, who completed an assessment right before entering college and an assessment at the end of the fourth and final year of college (59.4%

females, three participants did not specify their sex; mean age at the first college year = 18.19,  $SD = 0.47$ ; 48.4% white/Caucasian, 28.2% Asian/Asian American, 4.4% Mexican, American/Chicano, 2.9% Blacks/African American, 2.9% other cultures, and 13.2% multicultural). Participation before entering college was voluntary, and participants received monetary compensation for subsequent participation. The data were collected as part of a larger longitudinal project on the transition to college, which included multiple measures and assessments.<sup>2</sup> We considered only those measures relevant to the present research questions.

### Attrition

Of the participants who completed the first assessment (i.e., before college,  $N = 532$ ), 74% completed the final assessment (i.e., end of college). Participants who completed the two assessments did not differ significantly from those who did not in terms of demographics or key psychological variables,  $t_s < 1.93$ ,  $p_s > .054$ . As in Robins and Pals' (2002) 2-year follow up among college students, participants who completed the two assessments had a higher cumulative grade at the end of college ( $M = 3.56$ ,  $SD = 0.31$ ), compared to those who did not ( $M = 3.41$ ,  $SD = 0.42$ ),  $t(516) = -4.65$ ,  $p < .001$ . This may be because only students who graduated completed the final assessment, and those students tended to have higher academic achievements early on.

### Power

We collected data on a cohort of undergraduate students. The sample size, therefore, was determined by pragmatic considerations based on a longitudinal sample of college students with some attrition in the final fourth year of the study, where the goal was to get as close to  $N = 400$  as possible. Using G\*Power 3 (Faul et al., 2007), the obtained sample size of 394 allowed us to detect an effect size of  $f = .14$  ( $r = .14$ ,  $d = .28$ ,  $\eta^2 = .02$ ) or higher, at a significance level ( $\alpha$ ) of .05, with .80 power ( $\beta$ ).

### Procedure

This investigation was approved by the Stanford University Institutional Review Board, Protocol 14,156, "Transition to Stanford Study." It included two assessments (i.e., before college and at the end of college), as shown in Figure 1. The first assessment took place just before participants entered college. In this assessment, participants provided demographic information, rated how intensely they experienced positive and negative emotions in general, and rated the frequency with which they used cognitive reappraisal and expressive suppression, their incremental theories

<sup>2</sup> This research and Tamir et al. (2007) share a common starting point (i.e., before the beginning of college) but look at different developmental trajectories. Tamir et al. (2007) assessed prospective links between incremental theories of emotions (but not intelligence) as measured at the beginning of college and emotion regulation across the first year of college. In contrast, the current investigation examines potential changes in incremental theories over the four years of college and their correlates. Tamir et al. (2007) included only one assessment of incremental theories of emotion and intelligence, cognitive reappraisal, and expressive suppression. In contrast, the current investigation assessed incremental theories of emotion and intelligence, cognitive reappraisal, and expressive suppression, before the beginning of college and at the end of college.





during the last month (1 = *rarely or none of the time*; 4 = *most or all of the time*). We reverse-scored two items, and summed across all items, so that a higher score represents more perceived stress (alphas were .76 before college and .72 at the end of college).

## Results

### Temporal Dynamics

#### *Are Incremental Theories of Emotion Stable Across the Four Years Of College?*

Table 1 presents the correlations between incremental theories of emotion and intelligence at each time point and across time points. Incremental theories of emotion were moderately stable over the 4-year period, as were incremental theories of intelligence. Incremental theories of emotion were positively and moderately associated with incremental theories of intelligence both before entering college (see Tamir et al., 2007) and this remained consistent the end of college, but to a lesser extent across time points, thus showing domain-specificity.<sup>3</sup>

#### *Do Incremental Theories of Emotion Change Over Time?*

Next, we tested whether incremental theories of emotion change over time, and if they do, whether such change is similar to the changes in incremental theories of intelligence (see Figure 2). To this end, we conducted a 2 (time: before college/end of college)  $\times$  2 (incremental theories: emotion/intelligent) repeated-measures analysis. There was a main effect for time,  $F(1, 388) = 19.77, p < .001$ , Cohen's  $f^2 = .23$ , so that students developed increasingly more incremental theories from the beginning ( $M = 3.19, SD = 0.95$ ) to the end ( $M = 3.42, SD = 0.67$ ) of college. As students went through college, they came to believe that both emotions and intelligence are more controllable. There was also a main effect for incremental theories,  $F(1, 388) = 18.53, p < .001$ , Cohen's  $f^2 = .22$ , such that students generally believed that emotions are more controllable ( $M = 3.40, SD = 0.75$ ) than intelligence ( $M = 3.21, SD = 0.83$ ). Finally, we tested whether the increase in incremental theories that occurs during college varies across domains. The Time  $\times$  Incremental theories interaction was not significant,  $F(1, 388) = 0.69, p = .405$ , indicating that incremental theories of emotion and intelligence increased to the same extent during college.

In addition to these main effects, we also found that people differed in how their incremental theories of emotion changed over time. On average, people developed more incremental theories of emotion during college. Specifically, 54% of our sample came to believe that emotions are more controllable, 12% did not change in their beliefs, and 35% came to believe that emotions are less controllable.<sup>4,5</sup>

#### **Correlates of Incremental Theories and Change in Incremental Theories**

Table 1 presents the correlations between incremental theories of emotion and intelligence and the use of cognitive reappraisal and expressive suppression at each time point and across time points. As expected, incremental theories of emotion were posi-

tively linked to cognitive reappraisal, but not expressive suppression. In addition, incremental theories of emotion were more strongly linked to cognitive reappraisal than incremental theories of intelligence.

#### *Changes in Incremental Theories of Emotion and Emotion Regulation*

We tested whether and how potential changes in incremental theories of emotion are prospectively linked to cognitive reappraisal at the end of college, controlling for cognitive reappraisal and incremental theories of emotion at the beginning of college. To this end, we used a multiple regression analysis. As predicted, change in incremental theories of emotion during college (i.e., the degree of increase in incremental theories of emotion from the beginning of college to the end of college) was a significant positive predictor of the use of cognitive reappraisal at the end of college ( $B = 0.37, SE = 0.07, \beta = 0.32, t = 5.34, p < .001$ ). In addition, incremental theories of emotion at the beginning of college were a significant positive predictor of the use of cognitive reappraisal at the end of college ( $B = 0.28, SE = 0.08, \beta = 0.22, t = 3.57, p < .001$ ), as was use of cognitive reappraisal at the beginning of college ( $B = 0.36, SE = 0.05, \beta = 0.35, t = 7.30, p < .001$ ).

To test whether this pattern was specific to cognitive reappraisal, we repeated this analysis predicting expressive suppression. As expected, changes in incremental theories of emotion during college were not a significant positive predictor of the use of expressive suppression at the end of college, when controlling for incremental theories of emotion and use of expressive suppression at the beginning of college ( $B = 0.10, SE = 0.08, \beta = 0.08, t = 1.38, p = .169$ ).

To test whether the above pattern was specific to incremental theories of emotion, we repeated the analysis using changes in incremental theories of intelligence as the predictor. As expected, changes in incremental theories of intelligence during college were not a significant positive predictor of the use of cognitive reappraisal at the end of college, when controlling for incremental theories of intelligence and use of cognitive reappraisal at the beginning of college ( $B = 0.05, SE = 0.05, \beta = 0.06, t = 1.11, p = .269$ ).

<sup>3</sup> See the [online supplemental materials](#) for the correlations among all key variables (Table S1), means and standard deviations of key variables overall and by gender (Table S2), and correlations among change in incremental theories of emotion and intelligence and in regulation across college, and change in intensity of positive and negative emotions, depressive symptoms and perceived stress (Table S3).

<sup>4</sup> With respect to incremental theories of intelligence, 51% came believe that intelligence is more controllable, 10% did not change in their beliefs, and 39% came to believe that intelligence is less controllable.

<sup>5</sup> We also tested whether and how changes in incremental theories of emotion differed across key social categories. There was a significant link between incremental theories of emotion and ethnicity ( $\chi^2[2,390] = 6.82, p = .033, \text{Cramer's } V = .13$ ). More Caucasians (54%) than non-Caucasians (47%) came to believe that emotions are more controllable during college. More non-Caucasians than Caucasians maintained their beliefs throughout college (16% and 9%, respectively) or came to believe that emotions are less controllable (37% and 33%, respectively). Changes in incremental theories of emotion were not linked to gender or to socio-economic status.

**Table 1***Relationships Among Incremental Theories of Emotion and Intelligence and Regulation Across College*

Theory	<i>M</i>	<i>SD</i>	IT <sub>Emo t1</sub>	IT <sub>Int t1</sub>	IT <sub>Emo t2</sub>	IT <sub>Int t2</sub>	Reapp <sub>t1</sub>	Supp <sub>t1</sub>	Reapp <sub>t2</sub>
Incremental theories of emotion before college	3.31	0.87	1						
Incremental theories of intelligence before college	3.12	1.18	.29**	1					
Incremental theories of emotion at the end of college	3.54	0.77	.35**	.08	1				
Incremental theories of intelligence at the end of college	3.27	1.14	.13*	.35**	.21**	1			
Reappraisal before college	4.77	1.07	.34**	.12*	.13*	.12*	1		
Suppression before college	3.24	1.04	-.02	.01	-.01	-.02	-.05	1	
Reappraisal at the end of college	4.76	1.09	.14*	.12*	.29**	.13*	.37**	.03	1
Suppression at the end of college	3.21	1.21	.06	.04	.08	-.07	.08	.45**	.07

Note. IT = incremental theories; Supp. = suppression; Reapp. = reappraisal.

\*  $p < .05$ . \*\*  $p < .001$ .

Next, we tested whether changes in incremental theories of emotion during college were a significant positive predictor of cognitive reappraisal at the end of college, as a function of differences in emotional experiences. To this end, we entered changes in incremental theories of emotion during college as predictors of cognitive reappraisal at the end of college, controlling for incremental theories of emotion at the beginning of college, cognitive reappraisal at the beginning of college, and emotional experiences (i.e., positive emotions, negative emotions, depressive symptoms, and perceived stress, at the beginning or end of college). The prospective association between changes in incremental theories of emotion during college and use of cognitive reappraisal at the end of college remained significant when all predictors were entered simultaneously ( $B = 0.35$ ,  $SE = 0.07$ ,  $\beta = 0.30$ ,  $t = 5.11$ ,  $p < .001$ ) as well as individually.<sup>6,7</sup>

In summary, people who cultivated more incremental theories of emotion (but not intelligence) during college used cognitive reappraisal (but not expressive suppression) more frequently at the end

of college. This pattern could not be explained by differences in underlying affective experiences.

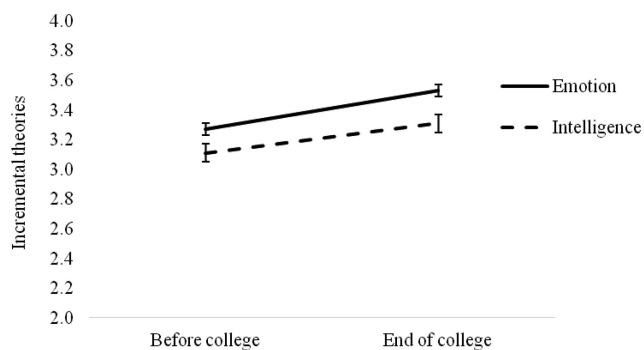
### Changes in Emotion Regulation and Incremental Theories of Emotion

Next, we tested whether and how potential changes in the use of cognitive reappraisal might be prospectively linked to incremental theories of emotion at the end of college, controlling for incremental theories of emotion and cognitive reappraisal at the beginning of college. To this end, we used a multiple regression analysis. As predicted, the changes in the use of cognitive reappraisal during college were a significant positive predictor of incremental theories of emotion at the end of college ( $B = 0.19$ ,  $SE = 0.04$ ,  $\beta = 0.29$ ,  $t = 5.34$ ,  $p < .001$ ). In addition, the use of cognitive reappraisal at the beginning of college was a significant positive predictor of incremental theories of emotion at the end of college ( $B = 0.14$ ,  $SE = 0.04$ ,  $\beta = 0.19$ ,  $t = 3.30$ ,  $p = .001$ ), as was incremental theories of emotion at the beginning of college ( $B = 0.29$ ,  $SE = 0.04$ ,  $\beta = 0.33$ ,  $t = 6.75$ ,  $p < .001$ ).

To test whether this pattern was specific to the changes in the use of cognitive reappraisal, we repeated the analysis using the changes in the use of expressive suppression as the predictor. As expected, changes in the use of expressive suppression during

**Figure 2**

*Incremental Theories of Emotion and of Intelligence Increased Significantly During College*



<sup>6</sup> Controlling for positive emotions at the beginning of college,  $B = 0.38$ ,  $SE = 0.07$ ,  $\beta = 0.33$ ,  $t = 5.49$ ,  $p < .001$ ; positive emotions at the end of college,  $B = 0.34$ ,  $SE = 0.07$ ,  $\beta = 0.29$ ,  $t = 5.01$ ,  $p < .001$ ; negative emotions at the beginning of college,  $B = 0.37$ ,  $SE = 0.07$ ,  $\beta = 0.32$ ,  $t = 5.32$ ,  $p < .001$ ; negative emotions at the end of college,  $B = 0.35$ ,  $SE = 0.07$ ,  $\beta = 0.30$ ,  $t = 5.09$ ,  $p < .001$ ; depressive symptoms at the beginning of college,  $B = 0.38$ ,  $SE = 0.07$ ,  $\beta = 0.33$ ,  $t = 5.50$ ,  $p < .001$ ; depressive symptoms at the end of college,  $B = 0.34$ ,  $SE = 0.07$ ,  $\beta = 0.29$ ,  $t = 5.03$ ,  $p < .001$ ; perceived stress at the beginning of college,  $B = 0.38$ ,  $SE = 0.07$ ,  $\beta = 0.33$ ,  $t = 5.44$ ,  $p < .001$ ; perceived stress at the end of college,  $B = 0.32$ ,  $SE = 0.07$ ,  $\beta = 0.28$ ,  $t = 4.70$ ,  $p < .001$ .

<sup>7</sup> Because emotion ratings at the beginning and at the end of college were not identical with respect to the format, the timeframe, and the exact items, any direct comparisons between them should be interpreted cautiously.

college were not a significant positive predictor of incremental theories of emotion at the end of college, when controlling for the use of expressive suppression and incremental theories of emotion at the beginning of college ( $B = 0.05$ ,  $SE = 0.03$ ,  $\beta = 0.07$ ,  $t = 1.38$ ,  $p = .169$ ).

To test whether the above pattern was specific to incremental theories of emotion, we repeated the analysis predicting incremental theories of intelligence. As expected, changes in the use of cognitive reappraisal during college were not a significant positive predictor of incremental theories of intelligence at the end of college, when controlling for the use of cognitive reappraisal and incremental theories of intelligence at the beginning of college ( $B = 0.06$ ,  $SE = 0.05$ ,  $\beta = 0.06$ ,  $t = 1.11$ ,  $p = .269$ ).

Next, we tested whether changes in cognitive reappraisal during college were a significant positive predictor of incremental theories of emotion at the end of college, as a function of differences in emotional experiences. The prospective association between changes in cognitive reappraisal during college and incremental theories of emotion at the end of college remained significant, even when controlling for affective experiences simultaneously ( $B = 0.19$ ,  $SE = 0.04$ ,  $\beta = 0.30$ ,  $t = 5.11$ ,  $p < .001$ ) as well as individually<sup>8</sup> (see also footnote 7).

In summary, people who increased the use of cognitive reappraisal (but not expressive suppression) during college ended up believing that emotion (but not intelligence) is more controllable at the end of college. This pattern could not be explained by differences in underlying affective experiences.

## Discussion

In this investigation, we tested whether and how incremental theories of emotion change over an extended period of time, and what is associated with such potential changes. First, we found moderate rank-order stability, and an increase in mean-levels across the four years of college. Second, we found that positive changes in incremental theories of emotion during college prospectively predicted more frequent use of cognitive reappraisal at the end of college. Similarly, however, increases in the use of cognitive reappraisal during college prospectively predicted more incremental theories of emotion at the end of college. These patterns were found when we controlled for initial levels, or when we controlled for differences in underlying affective experiences. This suggests that incremental theories of emotion and the use of cognitive reappraisal might mutually reinforce each other. This pattern of findings was specific to incremental theories of emotion but not to incremental theories of intelligence, and to cognitive reappraisal but not to expressive suppression.

## Stability and Change of Incremental Theories of Emotion

There is little research on the stability of incremental theories of emotion. Existing evidence suggests that incremental theories of emotion and related constructs (feelings and anxiety) show rank-order stability in adulthood when looking at time spans shorter than a year (Kneeland & Dovidio, 2020; Schleider & Weisz, 2016; Schroder et al., 2019;  $r = .52-.72$  across studies for incremental theories of emotion, feelings, and anxiety). We found that incremental theories of emotion were somewhat stable during the 4

years of college. Not surprisingly, rank-order stability was lower compared with the stability found in previous studies studying shorter time frames. The lower stability might also be unique to the time period studied, as college is a time of change and transition (e.g., Arnett, 2014; Tamir et al., 2007). College might offer unique challenges and opportunities for emotion regulation (e.g., Tamir et al., 2007). Such challenges and how well people cope with them are likely to inform their incremental theories of emotion.

With respect to mean-level changes, existing findings suggest that incremental theories of emotion decrease in mean-level from childhood to adulthood, but remain relatively stable after puberty and into adulthood (Brandone & Klimek, 2018; Ford et al., 2018). However, we found that, on average, students cultivated more incremental theories of emotion from the beginning to the end of college. These findings demonstrate that incremental theories can change even in adulthood. This is important for two reasons. First, the fact that incremental theories of emotion can change in adulthood implies that such theories are malleable and are informed by experience. Second, given that more incremental theories of emotion have been linked to more desirable emotional outcomes (e.g., Schroder et al., 2015; Tamir et al., 2007), the fact that they can change in a desirable direction is encouraging. Most people come to view emotions as more controllable, yet some people come to view emotions as less controllable. Given that decreases in incremental theories of emotions have been linked to psychopathology (e.g., Schleider & Weisz, 2016), it may be important to examine in the future what underlies such negative changes.

With respect to incremental theories of intelligence, we found that they were as stable as incremental theories of emotion and also showed a similar mean-level increase during college, although their levels at the beginning and end of college were lower compared to that of incremental theories of emotion. The resemblance in the temporal dynamics of incremental theories of emotion and intelligence during college might be attributable to the unique challenges experienced at that time in the emotional and academic domains (e.g., Arnett, 2014; Tamir et al., 2007). It is also a time of self-discovery, when people test and consolidate their belief system (e.g., Gutierrez & Park, 2015). It might be that incremental theories in other domains, that are not challenged to the same extent during college, might show less of an increase over time.

## Correlates of Change in Incremental Theories of Emotion

We tested whether and how change in incremental theories of emotion relates to patterns of emotion regulation. We found that increases in the belief that emotions can be controlled were prospectively linked to more frequent cognitive reappraisal, even

<sup>8</sup>Controlling for positive emotions at the beginning of college,  $B = 0.19$ ,  $SE = 0.03$ ,  $\beta = 0.30$ ,  $t = 5.49$ ,  $p < .001$ ; positive emotions at the end of college,  $B = 0.18$ ,  $SE = 0.04$ ,  $\beta = 0.28$ ,  $t = 5.01$ ,  $p < .001$ ; negative emotions at the beginning of college,  $B = 0.19$ ,  $SE = 0.03$ ,  $\beta = 0.29$ ,  $t = 5.32$ ,  $p < .001$ ; negative emotions at the end of college,  $B = 0.18$ ,  $SE = 0.03$ ,  $\beta = 0.28$ ,  $t = 5.09$ ,  $p < .001$ ; depressive symptoms at the beginning of college,  $B = 0.19$ ,  $SE = 0.03$ ,  $\beta = 0.30$ ,  $t = 5.50$ ,  $p < .001$ ; depressive symptoms at the end of college,  $B = 0.18$ ,  $SE = 0.04$ ,  $\beta = 0.28$ ,  $t = 5.03$ ,  $p < .001$ ; perceived stress at the beginning of college,  $B = 0.19$ ,  $SE = 0.03$ ,  $\beta = 0.30$ ,  $t = 5.44$ ,  $p < .001$ ; perceived stress at the end of college,  $B = 0.17$ ,  $SE = 0.04$ ,  $\beta = 0.27$ ,  $t = 4.70$ ,  $p < .001$ .

when controlling for initial levels of cognitive reappraisal and incremental theories of emotion. In doing so, our findings demonstrate that regardless of their initial levels, the more people cultivated incremental theories of emotion during college, the more they used cognitive reappraisal at the end of college. This finding is consistent with the idea that incremental theories of emotion might lead people to use more cognitive reappraisal (e.g., Ford et al., 2018; Kneeland & Dovidio, 2020). We also found that increases in the use of cognitive reappraisal during college was subsequently linked to beliefs that emotions are more controllable, even when controlling for initial levels. Regardless of what people believed as they entered college or their initial level of use of cognitive reappraisal, the more reappraisal they used during college, the stronger was their belief that emotions can be controlled at the end of college. This finding is consistent with the idea that effective attempts to control emotions might lead people to believe that feelings are more controllable (see Schleider & Weisz, 2016).

Taken together, our findings indicate that incremental theories of emotion and cognitive reappraisal mutually reinforce each other. This may be expected, given that beliefs are constructed from our experiences in the world, but also help us understand and navigate the world (Boden & Gross, 2013). The possibility that incremental theories of emotion and self-regulation mutually reinforce each other has rarely been tested. Some evidence suggests that a bidirectional relationship between incremental theories and self-regulation in the target domain might also characterize incremental theories of intelligence (e.g., Jones et al., 2012). The present investigation suggests that incremental theories of emotion and self-regulation in the emotion domain might similarly reinforce each other.

This bidirectional relationship between incremental theories of emotion and cognitive reappraisal did not apply to expressive suppression. Replicating existing findings (e.g., Kneeland et al., 2016b), incremental theories of emotion were tied to strategies such as cognitive reappraisal, which can effectively modify our experiences of emotion, rather than strategies that target its outward expression. The effect was also domain-specific (e.g., Hughes, 2015; Tamir et al., 2007). Incremental theories of emotion were linked to emotion regulation strategies, whereas incremental theories of intelligence were not. Finally, the links between cognitive reappraisal and incremental theories of emotion were not driven by differences in underlying affective experiences, ruling out the possibility that people who have more intense negative emotions, for instance, believe that emotions are less controllable and use less cognitive reappraisal.

To the extent that incremental theories of emotion and emotion regulation are mutually reinforcing, this might carry important implications for emotion regulation. First, most of the research on incremental theories of emotion focused on the outcomes of incremental theories of emotion (for a review, see Ford & Gross, 2019), but only limited attention has been devoted to their antecedents. Schleider and Weisz (2016) suggested that psychopathology might lead to less incremental theories of feelings. Our findings suggest that using cognitive reappraisal might lead to more incremental theories of emotion. Second, our findings may carry implications for emotion regulation interventions. The bidirectional relationship between incremental theories of emotion and cognitive reappraisal suggests that interventions designed to affect either one could be effective.

## Limitations and Future Directions

This study has several limitations. First, the correlational design of the study does not allow us to infer causality. Future research can design experiments to systemically test the causal role of incremental theories of emotion in shaping the use of cognitive reappraisal, or the causal role of cognitive reappraisal in shaping incremental theories of emotion.

Second, on average, during college students came to believe that emotions are more controllable. However, we studied a specific sample of students in one American college, which may or may not be representative. In addition, we do not know whether the increases in incremental theories of emotion and intelligence evident in the present investigation are a result of natural developmental processes—namely college. Lüdtke et al. (2011) found that some changes in personality traits in young adults in Germany over four years were more or less pronounced in college students than in noncollege students of the same age. For example, participants on a more vocationally oriented path showed higher increases in conscientiousness and lower increases in agreeableness than their peers at university (Lüdtke et al., 2011). It might be that the changes in incremental theories observed in the present investigation apply to our sample of college students, to college students more generally, or to young adults. Future research should compare these three populations directly.

Third, in the present investigation, we assessed our key variables at the beginning and at the end of college. To track change over time, future research should assess incremental theories of emotion and cognitive reappraisal at multiple time points over extended periods of time. We join the call (Ford & Gross, 2019) for longitudinal developmental studies, examining—among other things—the stability and change of incremental theories of emotion from childhood to adulthood, and from adulthood to old age.

Fourth, in the present investigation we found two patterns in the data that reinforce one another. First, believing emotions are more controllable may have led people to actively try and change their emotions using cognitive reappraisal. Second, using cognitive reappraisal may have led people to believe that emotions are more controllable. Both patterns could potentially be explained by the same mechanism, increased agency (e.g., Bandura, 2006). During college, emerging adults tend to explore new possibilities (Arnett, 2016). This exploration might offer a unique opportunity to gain a sense of agency in various life domains (e.g., Laird, 2005), including in the emotion domain. Therefore, believing that emotions are controllable might contribute to a sense of agency, leading people to try to change their emotions more frequently, and use more cognitive reappraisal. In turn, using cognitive reappraisal may contribute to a sense of agency, leading to the belief that emotions are more controllable, through direct experience. The finding that cognitive reappraisal and incremental theories of emotions are mutually reinforcing may therefore stem from the fact that both may relate to a growing sense of agency during college. To test this proposed mechanism, future research could track perceived agency over time, and how it is informed by incremental theories of emotion and by emotion regulation strategies during college.

Fifth, whereas our investigation focuses on people's theories about the general controllability of emotion, people also differ in their theories about their own efficacy in controlling emotions (De Castella et al., 2013). Such theories are related but distinct from



incremental theories of emotion ( $r = .75$ ; De Castella et al., 2018). For instance, people may believe that emotions can be controlled, although they personally do not have the ability to control their own emotions. Future research could test whether theories about one's efficacy in controlling emotions change during college to the same extent and in the same direction as theories about emotions do, and the links of both concepts with agency.

Sixth, in the present investigation we focused on two emotion regulation strategies—namely, cognitive reappraisal and expressive suppression. The data used in this investigation were collected between 2000 and 2004 as part of a larger longitudinal project on the transition to college. The project was focused on cognitive reappraisal and expressive suppression, which received considerable research attention at the time (e.g., Gross, 1998; Gross & John, 2003). We found a bidirectional link between incremental theories of emotion and cognitive reappraisal, but not expressive suppression. Although it is important to test links between incremental theories of emotion and a range of emotion regulation strategies, information on other emotion regulation strategies at both the beginning and the end of college is not available in the dataset. Nonetheless, given the differences between cognitive reappraisal and expressive suppression, our findings could potentially guide future research that examines potential links between incremental theories of emotion and other emotion regulation strategies. First, whereas cognitive reappraisal targets the experience of emotions, expressive suppression targets the expression of emotion (e.g., Gross, 1998). One possibility, therefore, is that any strategy that targets emotional experience would be positively linked to incremental theories of emotion. According to this account, we expect that as people come to believe that emotions are more controllable, they engage more in strategies that target emotional experience, such as situation selection and rumination, but not in those targeting emotional expression, such as venting. This might be the case, to the extent that incremental theories of emotion capture beliefs about how people feel rather than what they express. Second, cognitive reappraisal focuses on intrapersonal aspects of emotion, whereas expressive suppression focuses on more interpersonal aspects of emotions (e.g., Butler et al., 2003). Another possibility, therefore, is that any strategy that focuses on intrapersonal aspects of emotion would be positively linked to incremental theories of emotion. According to this account, we expect that as people come to believe that emotions are more controllable, they engage more in strategies that focus on intrapersonal aspects of emotion (e.g., acceptance, attentional deployment), but not in those that focus on interpersonal aspects (e.g., social sharing, seeking social support). This might be the case, to the extent that incremental theories of emotion target intrapersonal rather than interpersonal aspects of emotional experiences. Third, cognitive reappraisal typically leads to more desirable outcomes, both in the short- and in the long-term, whereas expressive suppression often does not (e.g., Webb et al., 2012). A third possibility, therefore, is that any emotion regulation strategy that leads to desirable outcomes, especially in the long-term, would be linked to more incremental theories of emotion, whereas strategies that lead to less desirable outcomes over time (e.g., rumination or avoidance; Aldao et al., 2010) would be linked to less incremental theories of emotion. Some evidence is consistent with this possibility. For example, Kneeland and Dovidio (2020) found an inverse relationship between students' incremental the-

ories of emotion and rumination. In addition, De Castella et al. (2018) found that when emotions were seen as uncontrollable, people were inclined toward avoidance-based strategies. Therefore, we expect that as people come to believe that emotions are more controllable, they are more likely to engage in strategies that lead to desirable outcomes over time, such as acceptance, but less likely to engage in strategies that lead to undesirable outcomes over time, such as rumination and avoidance. This might be the case if the belief that emotions can be controlled is reinforced by engaging in adaptive emotion regulation. To test these possibilities, future research should examine the associations between incremental theories of emotion and the use of other emotion regulation strategies.

Finally, change in incremental theories of emotion over four years explained less than 2% of the variance in changes in cognitive reappraisal. Nonetheless, our effect sizes are theoretically meaningful (see Funder & Ozer, 2019). Changes in cognitive reappraisal can be explained by multiple factors, including emotional intensity, regulation skills, personality, as well as emotional events, social context, and so forth (see Ford & Troy, 2019). The fact that changes in incremental theories of emotion were linked to changes in cognitive reappraisal over four years, even when controlling for some of the factors mentioned above, suggests that theories of emotion might play a role in emotion regulation, above and beyond other determinants (for similar arguments, see Ford & Gross, 2019). Small effects are common with respect to incremental theories (e.g., Sisk et al., 2018). We were also able to demonstrate the specificity of such links, as these associations were not found with incremental theories of intelligence and expressive suppression.

## Conclusion

The present investigation focused on the temporal dynamics of incremental theories of emotion, and their correlates over four years of college. Incremental theories of emotion were somewhat stable, increasing in mean-level. Students who came to believe that emotions are more controllable during college ended up using more cognitive reappraisal at the end of college. Similarly, students who came to use cognitive reappraisal more frequently during college ended up believing that emotions are more controllable at the end of college. This pattern was unique to incremental theory of emotion (but not intelligence) and to cognitive reappraisal (but not expressive suppression) and could not be explained by differences in affective experiences. It appears that believing that emotion is controllable and using cognitive reappraisal go hand-in-hand.

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Received March 1, 2020

Revision received October 12, 2020

Accepted October 14, 2020 ■