

Article

Perseverative Thinking: The Link Between Emotional Regulation and Mental Health

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Abstract

Emotion regulation (ER) is associated with various mental health issues. However, a detailed understanding of the underlying processes is important for developing targeted interventions for common mental health problems, such as anxiety and depression. Limited research has focused on these processes among emerging adults, a group that has shown a marked increase in mental health difficulties. The aim of this study was to examine whether rumination and worry, as forms of perseverative thinking, mediate the relationship between ER and symptoms of depression and anxiety in emerging adulthood. A two-wave longitudinal design was employed. The sample included 286 university students (80.4% female; $M_{\text{age}} = 20.3$, $sd = 1.7$). Mediation and moderation analyses were conducted in PROCESS. The results indicated a full mediation between ER and anxiety, where only worry emerged as a significant mediator. The relationship between ER and depression was both direct and indirect, mediated only by rumination. However, after controlling for all baseline values, all paths became nonsignificant, suggesting that the results may reflect stable between-person differences rather than within-person change. The moderation analysis revealed that the highest levels of depressive symptoms were observed among participants with simultaneously high levels of ER difficulties, rumination, and worry. The results suggest that preventive programs focusing on reducing perseverative thinking could play a key role in promoting better mental health outcomes in emerging adulthood.

Keywords: anxiety; depression; emotion regulation; longitudinal design; perseverative thinking



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1. Introduction

Emotion regulation (ER) refers to how individuals influence which emotions they have, when they have them, and how they experience and express these emotions (Gross, 1998). Over the past three decades, research has consistently linked ER deficits to psychopathology (Aldao et al., 2010; Gratz & Roemer, 2004; Sheppes et al., 2015; Sloan et al., 2017). However, a more detailed understanding of the underlying mechanisms is needed to develop targeted interventions for common mental health problems, particularly for anxiety and depression, which occur at elevated rates among emerging adults (Arnett et al., 2014; Wolitzky-Taylor et al., 2026). According to the DSM-5 classification, many mental disorders are defined by dysfunctional emotional patterns regarding intensity, frequency, or regulation (e.g., affective and anxiety disorders) (American Psychiatric Association, 2013). Moreover, recent

studies view ER as a transdiagnostic core of internalizing psychopathology (Sloan et al., 2017; Klein et al., 2022). Meta-analytic evidence confirms that ER difficulties are common across different mental disorders and predict symptom severity regardless of specific diagnosis (Aldao et al., 2016), emphasizing the need for further research in clarifying the involved mechanisms.

Most anxiety and mood disorders first manifest in young adulthood, frequently in comorbidity, suggesting shared underlying etiology (Schäfer et al., 2016; Klein et al., 2022; Niu et al., 2023). Therefore, emerging adulthood, as the period between 18 and 29 years, represents an important developmental stage for mental health (Arnett et al., 2014). Although theoretically “emerging adulthood” is most suitable for describing the age group of 18–25, people older than 25 also share feelings characteristic to emerging adulthood (Arnett & Mitra, 2018), implying a prolonged transition to adulthood. This shift may be attributed to the delay in moving out of the parental home, as dependence on parents has been identified as a risk factor for the transition to adulthood and overall well-being (Kaniūšonytė et al., 2022). In this paper, the term “emerging adulthood” is used to describe a specific period in the lives of university students who are still pursuing their education and remain, to a greater or lesser extent, dependent on their parents. Emerging adulthood is characterized by identity explorations, instability, self-focus, feelings of being in-between, and possibilities/optimism, while neurobiological maturation, mainly of prefrontal brain regions involved in ER, is still progressing (Arnett, 2000, 2004; Arnett & Mitra, 2018; Caballero et al., 2016). The combination of stress, ongoing brain development, and newly acquired autonomy makes emerging adults particularly vulnerable to emotional difficulties (Wolitzky-Taylor et al., 2026; Davey et al., 2008; Kenwood et al., 2022), which may explain the high incidence rates of anxiety and depressive disorders in this age group (Wolitzky-Taylor et al., 2026).

Two theoretical frameworks are used to explain why perseverative thinking might link ER difficulties to mental health problems. According to the Extended-Process Model of ER (Sheppes et al., 2015), the process of ER consists of four stages: identification, selection, implementation, and monitoring. Each stage involves specific processes (perception, valuation, and action) which determine how emotions are regulated or fail to be regulated, potentially leading to psychopathology. This means that, when ER fails at the identification stage (e.g., not recognizing sadness) or selection stage (e.g., choosing rumination over reappraisal), individuals may become trapped in perseverative thinking patterns (worry or rumination) that maintain, rather than resolve, emotional distress. This model provides a framework for understanding how ER failures occur at different points in the regulatory process stages.

The second framework, the Self-Regulatory Executive Function Model (S-REF; Wells & Matthews, 1996), focuses on what keeps emotional disorders going. According to this model, our beliefs about thinking (metacognitions) can trigger so-called Cognitive Attentional Syndrome (CAS). CAS includes perseverative thinking (like worry and rumination) and constantly scanning for threats, which become an unhelpful coping pattern in the center of CAS. Individuals may use worries and rumination in order to cope, but consequently prolong distress instead (Wells, 2010). The S-REF model views perseverative thinking as a transdiagnostic process which connects everyday emotional struggles to clinical symptoms (Ehring & Behar, 2020; Spinhoven et al., 2018). Bringing these frameworks together clarifies how ER difficulties may lead people to rely on perseverative thinking as a way to manage their emotions, but consequently amplify anxiety and depressive symptoms.

Worry and rumination represent distinct forms of perseverative thinking, often referred to as repetitive negative thinking (RNT; Ehring & Behar, 2020; McEvoy et al., 2013), with differential links to psychopathology. Worry is typically defined as a chain of negative, future-

oriented thoughts about uncertain threats (Borkovec et al., 1983). It represents the dominant cognitive component of anxiety and is the central defining feature of generalized anxiety disorder (Stade & Ruscio, 2023; Wells, 2010). According to Avoidance Theory (Borkovec, 1994), worry functions as a predominantly verbal activity that helps individuals avoid emotionally intense material, thus enabling disconnection from emotional pain in the short term, but preventing fear extinction and adaptive coping over time (Newman & Llera, 2011).

Rumination, in contrast, involves repetitive focus on past negative experiences, feelings, and problems, particularly those with depressive content (Nolen-Hoeksema, 1998). Response Styles Theory (Nolen-Hoeksema, 1991, 2003; Nolen-Hoeksema et al., 2008) proposes that a ruminative response style, characterized by passive and repeated focus on distress and its causes, exacerbates and prolongs depressive symptoms. Longitudinal research confirms that rumination has been shown to predict the onset and maintenance of depressive symptoms (McEvoy et al., 2013; Spinhoven et al., 2018).

Despite their distinct temporal orientations (future vs. past), worry and rumination share core features of RNT and may operate synergistically to maintain psychopathology (McEvoy et al., 2013; Stade & Ruscio, 2023). A recent meta-analysis by Stade and Ruscio (2023) of 139 studies with 172,463 participants showed that worry and rumination are strongly correlated, confirming their conceptual overlap as forms of RNT. Yet they also demonstrated discriminant validity, where worry was predominantly associated with anxiety, while rumination predicted depression.

Beyond the distinction between worry and rumination, research has examined whether specific facets of ER difficulties show differential associations with anxiety versus depression. Some studies report that lack of emotional awareness and nonacceptance of emotions are particularly linked to anxiety symptoms, while impulse control difficulties and limited access to regulation strategies show stronger associations with depression (Anderson et al., 2021; Xu et al., 2024). On the other hand, network analysis in clinically referred adolescents found that lack of emotional awareness was actually closer to depressive symptoms than to anxiety, while limited access to strategies emerged as a core feature connecting to both disorders (Ruan et al., 2023). Large correlational studies further show that most DERS subscales correlate moderately with both anxiety and depression (Parmentier et al., 2019). These inconsistencies may stem from methodological differences, including sample characteristics, analytical approaches, and failure to account for comorbidity between anxiety and depression (Li et al., 2024). Given these mixed findings, further research is needed to clarify whether specific ER facets show differential relationships with anxiety versus depression and through which mechanisms (worry vs. rumination) these associations operate.

In summary, theoretical and empirical work suggests that engaging in maladaptive cognitive strategies (like worry and rumination) in turn exacerbates anxiety and depression (E. Cole & Diaz, 2024; Defayette et al., 2021). However, limited research has examined these processes within the population of emerging adults, despite this group showing a marked increase in mental health difficulties in recent years (Gruber et al., 2021). Furthermore, most existing research relies on cross-sectional designs, which limit the ability to draw conclusions about causal relationships. The present study addresses these gaps by employing a two-wave longitudinal design with assessments approximately three months apart. All constructs (ER difficulties, rumination, worry, and symptoms of anxiety and depression) were assessed at both wave 1 and wave 2. The rumination and worry measured in the second wave were used as mediating variables. This allowed us to examine whether levels of perseverative thinking at wave 2 mediate the relationship between earlier ER difficulties and later symptoms. The longitudinal design provides stronger evidence for directional effects than cross-sectional designs, although it cannot establish definitive causality.

A primary aim was to examine whether perseverative thinking patterns (rumination and worry) mediate the relationship between ER difficulties and symptoms of depression and anxiety in emerging adulthood. A secondary aim was to differentiate between specific ER difficulties and their associations with anxiety versus depressive symptoms. By identifying specific cognitive mechanisms linking ER difficulties to psychopathology, this research aims to inform targeted prevention and intervention efforts for emerging adults, a population at elevated risk for internalizing disorders.

Based on the integrated theoretical framework presented above, the following hypotheses were examined:

H1. *ER difficulties at wave 1 would positively predict anxiety symptoms at wave 2.*

H2. *ER difficulties at wave 1 would positively predict depressive symptoms at wave 2.*

H3. *Worry and rumination would mediate the relationship between ER difficulties and anxiety symptoms, such that greater ER difficulties predict increased worry and rumination, which in turn predicts greater anxiety symptoms.*

H4. *Worry and rumination would mediate the relationship between ER difficulties and depressive symptoms, such that greater ER difficulties predict increased worry and rumination, which in turn predicts greater depressive symptoms.*

H5: *Different facets of ER difficulties would show distinct patterns of association with anxiety versus depressive symptoms.*

2. Materials and Methods

A longitudinal study with two measurement waves was carried out during 2021/2022, with the first wave conducted in autumn and the second in spring, approximately three months apart. The three-month interval allowed the majority of participants to be assessed around the middle of both the first and second semesters of the same academic year. This mid-semester point likely represents a time when the influence of academic stressors is relatively consistent and reduces the risk of participant dropout due to academic scheduling. Ethical approval was obtained from the Ethics Committee of the Faculty of Education and Rehabilitation Science, University of Zagreb, prior to data collection. The sample included only faculties of the University of Zagreb that accepted the invitation to participate, resulting in a convenience sample. Data were gathered using paper-and-pencil questionnaires administered before or after scheduled university classes. Participation was voluntary and anonymous, and all participants provided informed consent. In each wave participants generated a code according to the same instructions, so their data was linked through this code. All variables were measured in both research waves. According to D. A. Cole and Maxwell (2003), mediation can be examined longitudinally using only two waves of data if three waves are not available. As mediation does not occur at a discrete point in time (D. A. Cole & Maxwell, 2003), the second-wave measures of rumination and worry were used as mediators. They are assumed to reflect the levels of perseverative thinking forms present between the two waves of assessment or levels of perseverative thinking present alongside with the anxiety and depressive symptoms measured at the second wave.

In the first wave of the study, 526 students who attended regular university classes participated in the research, whereas 594 students participated in the second wave. None of the students refused to participate. For 302 respondents, it was possible to match codes across both waves. It is assumed that attrition occurred due to variations in student class

attendance on the day of data collection, which ultimately resulted in a reduced number of matched questionnaires. The sample consisted of undergraduate students studying at the University of Zagreb, from five various faculties. The majority of participants were female (80.4%), aged 18 to 33 years ($M = 20.30$, $SD = 1.71$). The majority of participants (98%) were aged 18–25. Only 6 participants were older than 25 (99.7% of all participants were aged up to 29, while one was 33 years old), which may represent an example of the extended path of emerging adulthood (Arnett & Mitra, 2018). Although the upper age limit exceeded the traditional range of emerging adulthood, the sample was predominantly composed of individuals in early emerging adulthood, consistent with prior university-based research. Most students reported an average socioeconomic status (64.7%), while 27.3% indicated an above-average and 7% a below-average socioeconomic status. University-based recruitment allowed for access to young adults during a key developmental transition.

Depressive and anxiety symptoms were assessed using the Depression, Anxiety, and Stress Scales (DASS-21; Lovibond & Lovibond, 1995; Henry & Crawford, 2005). Participants rated each item on a 4-point scale ranging from 0 (does not apply to me at all) to 3 (applies to me completely). In the present study, the scale demonstrated good internal consistency, with a Cronbach's α of 0.843 for the anxiety subscale and 0.871 for the depressive subscale.

Rumination was assessed using the Rehearsal subscale of the Emotional Control Questionnaire (ECQ; Roger & Najarian, 1989). The subscale comprises 14 items. The response format was a 5-point scale ranging from 1 (not at all true for me) to 5 (completely true for me). Higher scores reflect a greater propensity for rumination. The ECQ Rehearsal subscale was selected due to its suitability for non-clinical samples and its focus on repetitive cognitive engagement (Roger & Najarian, 1989). The internal consistency of the scale was acceptable (Cronbach's $\alpha = 0.687$), but previous studies found good internal reliability of the Rumination subscale on youth samples (e.g., $\alpha = 0.80$ in Akbari et al., 2023).

Worry was measured using the Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990), a 16-item instrument assessing the tendency toward excessive and uncontrollable worry. Responses were rated on a 5-point scale from 1 (does not apply to me at all) to 5 (completely applies to me), with higher total scores indicating greater levels of pathological worry. The PSWQ demonstrated excellent reliability (Cronbach's $\alpha = 0.94$).

The measurement of deficits in ER was done with the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). The DERS is a 36-item self-report questionnaire. Participants indicate their level of agreement with each item from 1 (almost never) to 5 (almost always), with higher scores reflecting greater difficulties in ER or difficulties in one or more core components of ER. In addition to a total score, the scale yields scores on six dimensions: nonacceptance of emotional responses, difficulties engaging in goal-directed behavior, impulse control difficulties, limited access to ER strategies, lack of emotional awareness, and lack of emotional clarity. In the present study, the internal consistency (Cronbach's alpha) of the total score was 0.94, while subscales ranged between 0.79 and 0.90.

3. Results

The primary variables for 302 participants exhibited a range of missing data, varying from 1% to 8.9%. Little's MCAR test was performed to assess the missing data mechanism. According to the results ($\chi^2 = 31.280$; $df = 28$; $p = 0.305$), data were considered to be missing completely at random. Missing data were addressed through listwise deletion, as it is the only option available for managing missing data within the PROCESS macro version 4 (Hayes, 2013). Outliers were identified using z-scores (Tabachnick & Fidell, 2013; Mowbray et al., 2019). A z-score greater than the absolute value of 3.29 was considered an outlier (Tabachnick & Fidell, 2013; Mowbray et al., 2019), leading to the exclusion of

four identified cases from further analyses. The Mahalanobis distance p -value was used for testing multivariate outliers (Ghorbani, 2019), resulting in the exclusion of three detected outliers from the final analyses. The final number of participants in the mediation analysis was therefore 261.

The primary hypotheses were examined using two mediation analyses (Model 6) in the PROCESS macro version 4.2 (Hayes, 2013). Two separate chained mediation analyses (Model 6) were employed to investigate the hypothesis that rumination and worry mediate the association between emotion regulation and symptoms of anxiety and depression. The bootstrap confidence interval (CI) was set at 95%, and the analyses were performed with 5000 bootstrap samples. A path was considered significant at the 0.05 level if the lower and upper limits of the 95% CI did not include zero. The effect size was evaluated according to Cohen's (1988) criteria, which categorize a standardized coefficient of 0.10 as indicative of a small effect, 0.30 as a medium effect, and 0.50 as a large effect.

The first mediation analysis was conducted to test the hypothesis that rumination and worry serve as mediators in the relationship between ER from the first research wave and anxiety symptoms from the second wave. The graphical representation shows standardized coefficients, while the text reports both unstandardized (B and CI) and standardized (β and p) coefficients. Second-wave depressive symptoms, sex, and socioeconomic status were included as covariates. The results of the first mediation analysis (Figure 1) did not indicate a direct path between ER and anxiety symptoms ($B = 0.026$; $SE = 0.017$; 95% $CI [-0.008, 0.060]$; $p = 0.136$; $\beta = 0.079$). However, the results revealed a significant full mediation process. Greater difficulties in ER predicted increased worry ($B = 0.168$; $SE = 0.034$; 95% $CI [0.101, 0.235]$; $p = 0.00$; $\beta = 0.278$), and greater worry predicted more anxiety symptoms ($B = 0.145$; $SE = 0.031$; 95% $CI [0.085, 0.206]$; $p = 0.00$; $\beta = 0.265$). Results indicated that the indirect effect of worry was significant ($B = 0.024$; $SE = 0.008$; 95% $CI [0.012, 0.042]$; $\beta = 0.074$), but with a small effect size according to established benchmarks (e.g., Cohen, 1988). The indirect effect of rumination was nonsignificant ($B = 0.004$; $SE = 0.004$; 95% $CI [-0.003, 0.014]$; $\beta = 0.013$); emotional dysregulation predicted greater rumination ($B = 0.063$; $SE = 0.021$; 95% $CI [0.023, 0.104]$; $p = 0.002$; $\beta = 0.203$), but rumination did not predict greater anxiety symptoms ($B = 0.067$; $SE = 0.053$; 95% $CI [-0.038, 0.171]$; $p = 0.208$; $\beta = 0.063$). However, the chained mediation effect was significant ($B = 0.006$; $SE = 0.003$; 95% $CI [0.001, 0.012]$; $\beta = 0.017$), indicating that difficulties in ER predicted rumination, which in turn predicted worry ($B = 0.510$; $SE = 0.099$; 95% $CI [0.316, 0.704]$; $p = 0.000$; $\beta = 0.263$), and greater worry was associated with increased anxiety symptoms. The effect size of chained mediation was also small. There were no significant interactions between mediators and ER ($p > 0.05$). Approximately 55% of the variance in anxiety symptoms was accounted for by the predictors ($R^2 = 0.551$).

When the baseline level of the anxiety symptoms (from wave 1) was controlled for (included as covariate) in the previous model, the results remained stable: direct effects remained nonsignificant ($B = -0.015$; $SE = 0.016$; 95% $CI [-0.046, 0.015]$; $p = 0.324$; $\beta = -0.048$), and the indirect effect of worry ($B = 0.015$; $SE = 0.006$; 95% $CI [0.006, 0.029]$; $\beta = 0.049$) and chained mediation ($B = 0.004$; $SE = 0.002$; 95% $CI [0.000, 0.008]$; $\beta = 0.011$) remained significant, but with smaller effect sizes and sample size ($N = 259$). When baseline levels of mediators were added to baseline anxiety symptoms ($N = 259$), direct effects remained nonsignificant ($B = -0.008$; $SE = 0.016$; 95% $CI [-0.039, 0.024]$; $p = 0.644$; $\beta = -0.024$), but all indirect effects became nonsignificant, including the effect of worry ($B = 0.004$; $SE = 0.004$; 95% $CI [-0.003, 0.014]$; $\beta = 0.011$) and chained mediation ($B = -0.002$; $SE = 0.002$; 95% $CI [-0.006, 0.002]$; $\beta = -0.005$).

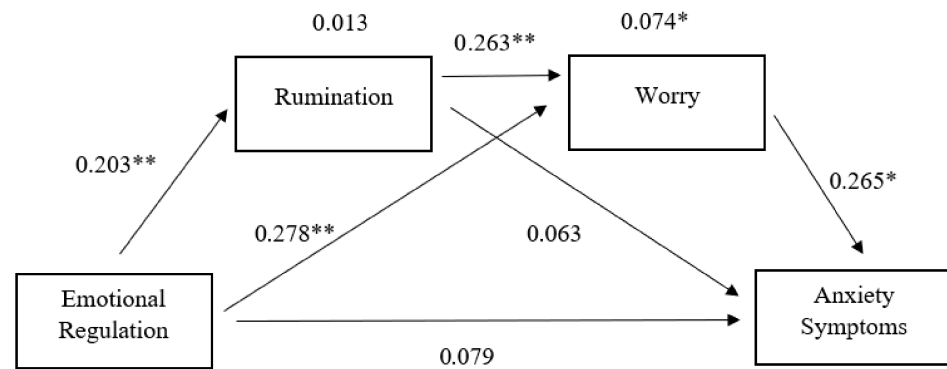


Figure 1. The direct and indirect effects between ER (1st wave) and anxiety symptoms (2nd wave) with rumination (2nd wave) and worry (2nd wave) as mediators in chained mediation (Note: * $p < 0.05$ and ** $p < 0.001$, standardized coefficients); PROCESS Model 6 (N = 261).

The second mediation analysis was performed to examine the hypothesis that rumination and worry mediate the association between ER measured during the initial research wave and depressive symptoms assessed in the subsequent wave. In this analysis, concurrent (second-wave) anxiety symptoms, sex, and socioeconomic status were included as control variables. The results (Figure 2) indicated a significant direct path between ER and depressive symptoms ($B = 0.078$; $SE = 0.019$; 95% CI [0.041, 0.115]; $p = 0.000$; $\beta = 0.225$), with a small to medium effect size. The results also revealed rumination as significant mediator in partial mediation. Greater difficulties in ER predicted increased rumination ($B = 0.063$; $SE = 0.020$; 95% CI [0.024, 0.103]; $\beta = 0.202$; $p = 0.002$), and greater rumination predicted more depressive symptoms ($B = 0.120$; $SE = 0.058$; 95% CI [0.006, 0.234]; $p = 0.039$; $\beta = 0.108$). Results indicated that the indirect effect of rumination was significant ($B = 0.008$; $SE = 0.004$; 95% CI [0.000, 0.017]; $\beta = 0.022$), but with a small effect size (e.g., Cohen, 1988). The indirect path of worry was nonsignificant ($B = -0.000$; $SE = 0.005$; 95% CI [-0.010, 0.009]; $\beta = -0.002$), as was chained mediation ($B = -0.000$; $SE = 0.001$; 95% CI [-0.003, 0.017]; $\beta = -0.002$). Both ER ($B = 0.139$; $SE = 0.032$; 95% CI [0.075, 0.202]; $p = 0.000$; $\beta = 0.229$) and rumination ($B = 0.509$; $SE = 0.099$; 95% CI [0.316, 0.704]; $p = 0.000$; $\beta = 0.263$) predicted worry, but worry did not predict depressive symptoms ($B = -0.004$; $SE = 0.035$; 95% CI [-0.073, 0.065]; $p = 0.913$; $\beta = -0.007$).

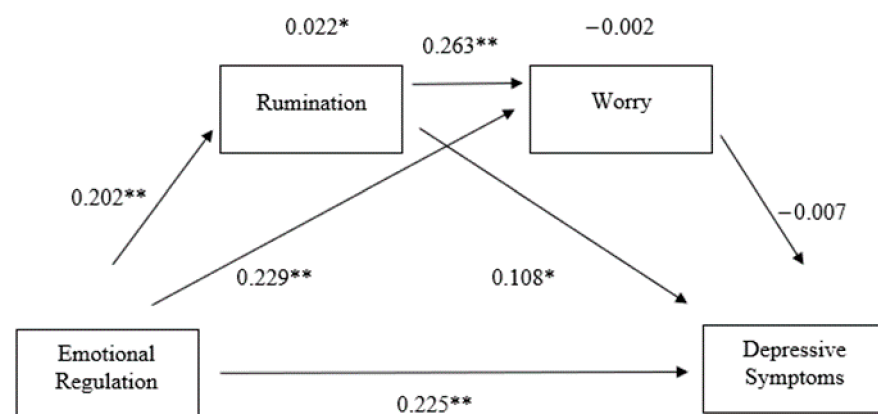


Figure 2. The direct and indirect effects between ER (1st wave) and depressive symptoms (2nd wave) with rumination (2nd wave) and worry (2nd wave) as mediators in chained mediation (Note: * $p < 0.05$ and ** $p < 0.001$, standardized coefficients); PROCESS Model 6 (N = 261).

When the baseline level of the depressive symptoms (from wave 1) was controlled for in the previous model, the direct effect became nonsignificant ($B = 0.011$; $SE = 0.018$; 95% CI [-0.025, 0.046]; $p = 0.560$; $\beta = 0.030$), while the indirect effect of rumination stayed

significant ($B = 0.007$; $SE = 0.005$; 95% CI $[0.000, 0.016]$; $\beta = 0.019$). Indirect effects of worry and chained mediation stayed nonsignificant, as well as sample size ($N = 261$). By adding baseline levels of mediators ($N = 261$), all effects became nonsignificant, including the previously significant effect of rumination ($B = -0.002$; $SE = 0.004$; 95% CI $[-0.011, 0.006]$; $\beta = -0.004$).

Although the inclusion of baseline values provides a more stringent test of longitudinal mediation, it may reduce the available variance and statistical power. All correlations between first- and second-wave measurements of the same variable were high ($r = 0.65$ – 0.83). Therefore, the change in results of both mediation analyses after baseline value control should be interpreted with caution, as it may reflect both the absence of true change or reduced sensitivity to detect smaller effects.

There was also a significant interaction effect (in Model 6) of X on M: ER with rumination ($F(1, 253) = 5.069$, $p = 0.025$) and worry ($F(1, 253) = 5.735$, $p = 0.017$) on depressive symptoms; therefore, a moderation analysis (Model 2 in PROCESS) was conducted to clarify these interaction effects. Moderation analysis (Model 2) revealed that there was no separate interaction effect of a single mediator, rumination ($F(1, 252) = 1.653$, $p = 0.199$) or worry ($F(1, 252) = 2.307$, $p = 0.13$), with depressive symptoms, but the test of the combined contribution of both interaction effects was significant (R^2 change = 0.014 ; $F(2, 252) = 3.701$; $p = 0.026$). The analysis of predicted values revealed that the highest scores for depressive symptoms were observed among participants with simultaneously high levels of emotional dysregulation, rumination, and worry (Figure 3). Although the individual interactions were not statistically significant, their combined effect was significant. The latter suggests a synergistic effect, where elevated levels across all three psychological variables are associated with a substantially greater severity of depressive symptoms compared to cases in which only one or two factors are elevated.

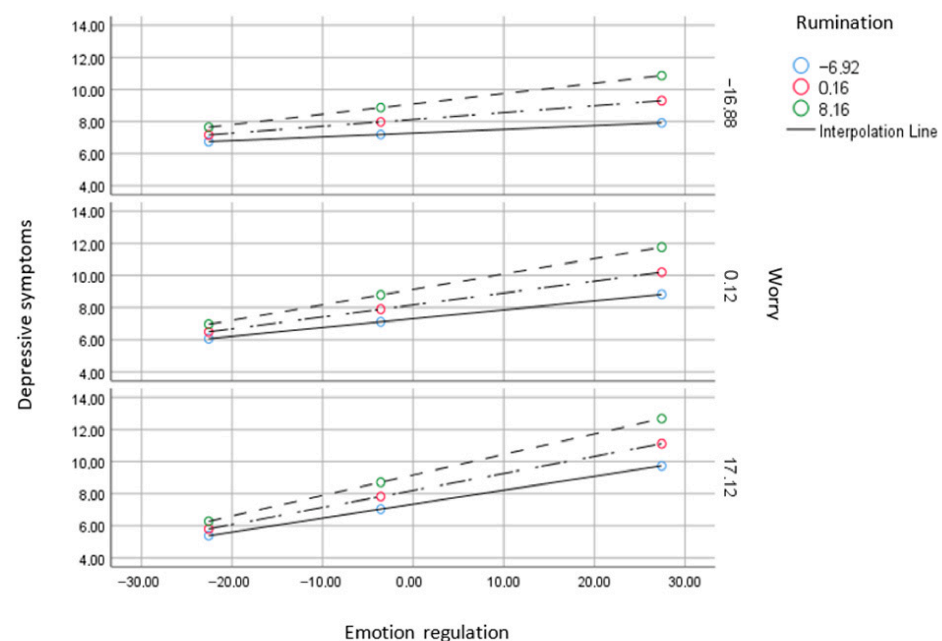


Figure 3. Scatter plot of the relationship between ER (1st wave) and depressive symptoms (2nd wave) with the moderating effects of worry (2nd wave) and rumination (2nd wave).

A more detailed analysis examined which specific ER difficulties contribute to anxiety (Table 1) and depression (Table 2).

Table 1. The direct and indirect effects between DERS subscales (1st wave) and anxiety symptoms (2nd wave) with rumination (2nd wave) and worry (2nd wave) as mediators; N = 283 (descriptive statistics computed before listwise deletion in PROCESS).

Relations	Total Effect (c) [p]	Direct Effect (c') [p]	Indirect/Chained Effect (axb) [BootLLCI, ULCI]
Nonacceptance → Rumination/Worry → Anxiety	0.133 [0.003]	0.093 [0.027]	0.039 [0.002, 0.080]
Rumination			0.001 [−0.009, 0.014]
Worry			0.036 [0.005, 0.071]
Rumination → Worry (chained)			0.002 [−0.011, 0.014]
Goal-directed → Rumination/Worry → Anxiety	0.146 [0.001]	0.096 [0.026]	0.050 [0.015, 0.092]
Rumination			0.009 [−0.006, 0.031]
Worry			0.024 [−0.004, 0.056]
Rumination → Worry (chained)			0.016 [0.003, 0.033]
Impulse → Rumination/Worry → Anxiety	0.103 [0.039]	0.018 [0.711]	0.085 [0.043, 0.131]
Rumination			0.010 [−0.004, 0.033]
Worry			0.061 [0.027, 0.099]
Rumination → Worry (chained)			0.014 [0.000, 0.032]
Awareness → Rumination/Worry → Anxiety	0.203 [0.000]	0.116 [0.012]	0.087 [0.049, 0.132]
Rumination			0.011 [−0.004, 0.034]
Worry			0.062 [0.029, 0.103]
Rumination → Worry (chained)			0.014 [0.003, 0.027]
Strategies → Rumination/Worry → Anxiety	0.147 [0.002]	0.059 [0.208]	0.088 [0.047, 0.132]
Rumination			0.011 [−0.003, 0.034]
Worry			0.062 [0.028, 0.102]
Rumination → Worry (chained)			0.015 [0.003, 0.031]
Clarity → Rumination/Worry → Anxiety	0.034 [0.443]	0.025 [0.555]	0.009 [−0.028, 0.046]
Rumination			−0.002 [−0.017, 0.008]
Worry			0.015 [−0.013, 0.043]
Rumination → Worry (chained)			−0.003 [−0.017, 0.009]

Note: standardized coefficients. DERS subscales: Nonacceptance = Nonacceptance of emotional responses, Goal-directed = Difficulty engaging in goal-directed behavior, Impulse = Impulse control difficulties, Awareness = Lack of emotional awareness, Strategies = Limited access to emotion regulation strategies, Clarity = Lack of emotional clarity; sex, socioeconomic status and depressive symptoms (2nd wave) were controlled.

Table 2. The direct and indirect effects between DERS subscales (1st wave) and depressive symptoms (2nd wave) with rumination (2nd wave) and worry (2nd wave) as mediators; N = 283 (descriptive statistics computed before listwise deletion in PROCESS).

Relations	Total Effect (c) [p]	Direct Effect (c') [p]	Indirect/Chained Effect (axb) [BootLLCI, ULCI]
Nonacceptance → Rumination/Worry → Depression	0.029 [0.539]	0.029 [0.532]	−0.000 [−0.023, 0.246]
Rumination			−0.002 [−0.021, 0.015]
Worry			0.002 [−0.009, 0.018]
Rumination → Worry (chained)			−0.000 [−0.003, 0.003]
Goal-directed → Rumination/Worry → Depression	0.066 [0.164]	0.046 [0.969]	0.020 [0.000, 0.047]
Rumination			0.018 [0.000, 0.044]
Worry			0.001 [−0.006, 0.010]
Rumination → Worry (chained)			0.000 [−0.004, 0.007]
Impulse → Rumination/Worry → Depression	0.250 [0.000]	0.239 [0.000]	0.011 [−0.014, 0.040]
Rumination			0.019 [0.002, 0.041]
Worry			−0.006 [−0.026, 0.013]
Rumination → Worry (chained)			−0.002 [−0.008, 0.004]

Table 2. *Cont.*

Relations	Total Effect (c) [p]	Direct Effect (c') [p]	Indirect/Chained Effect (axb) [BootLLCI, ULCI]
Awareness → Rumination/Worry → Depression	0.116 [0.019]	0.098 [0.054]	0.018 [−0.011, 0.053]
Rumination			0.018 [0.001, 0.045]
Worry			−0.000 [−0.024, 0.024]
Rumination → Worry (chained)			0.000 [−0.005, 0.005]
Strategies → Rumination/Worry → Depression	0.160 [0.001]	0.143 [0.004]	0.017 [−0.011, 0.048]
Rumination			0.019 [0.002, 0.044]
Worry			−0.002 [−0.024, 0.019]
Rumination → Worry (chained)			−0.000 [−0.006, 0.005]
Clarity → Rumination/Worry → Depression	−0.079 [0.079]	−0.072 [0.106]	−0.007 [−0.027, 0.012]
Rumination			−0.008 [−0.025, 0.009]
Worry			0.001 [−0.005, 0.010]
Rumination → Worry (chained)			−0.000 [−0.005, 0.002]

Note: standardized coefficients. DERS subscales: Nonacceptance = Nonacceptance of emotional responses, Goal-directed = Difficulty engaging in goal-directed behavior, Impulse = Impulse control difficulties, Awareness = Lack of emotional awareness, Strategies = Limited access to emotion regulation strategies, Clarity = Lack of emotional clarity; sex, socioeconomic status and anxiety symptoms (2nd wave) were controlled.

The analysis reveals that anxiety is significantly directly predicted by nonacceptance, goal-directed behavior and lack of emotional awareness. Indirect paths are significant via worry and/or through chained mediation (rumination–worry) for all strategies except lack of emotional clarity. As shown in Table 2, depressive symptoms are most consistently associated with impulse control difficulties and limited access to ER strategies, with significant indirect effects primarily via rumination.

4. Discussion

The study aimed to examine whether perseverative thinking patterns mediate the relationship between ER and symptoms of depression and anxiety in emerging adulthood. The aim was also to distinguish between specific ER difficulties and their associations with symptoms of anxiety and depression. The results emphasize the role of worry in the development of anxiety symptoms and rumination in the development of depressive symptoms. An indirect effect was observed between ER and anxiety: greater ER difficulties predicted increased worry, which in turn predicted higher anxiety symptoms. For depressive symptoms, both direct and indirect effects were observed: greater ER difficulties led to higher rumination, which predicted more depressive symptoms. However, after controlling for all baseline values, all paths became nonsignificant, suggesting that the results may reflect stable between-person differences rather than within-person change, although the observed patterns remain theoretically meaningful and consistent with prior research (Ehring & Watkins, 2008; McEvoy et al., 2013; Sloan et al., 2017). This may imply that these processes may operate as relatively stable vulnerability mechanisms. The highest depressive symptom levels were observed among participants with concurrently high emotional dysregulation, rumination, and worry. Regarding specific ER difficulties, effect sizes were generally small. Nevertheless, the strongest direct effects were found for lack of emotional awareness in relation to anxiety symptoms and lack of impulse control in relation to depressive symptoms. These findings highlight emerging adulthood as a developmental period in which habitual cognitive responses to emotional difficulties may play an important role in shaping mental health issues.

4.1. Worry as a Key Mediator of Anxiety

In this study, greater ER difficulties predicted higher levels of worry, which in turn predicted higher anxiety symptoms. The direct path from ER difficulties to anxiety was

nonsignificant, suggesting full mediation. The finding that worry is a significant mediator between ER difficulties and anxiety symptoms is consistent with cognitive theories which consider worry as an important cognitive component of anxiety (Borkovec et al., 2004; Hirsch & Mathews, 2012). Worry can be described as a chain of negative, future-oriented thoughts about potential threats, a sense of uncontrollability and an attempt to mentally prepare for or prevent feared outcomes (Borkovec et al., 2004).

The nonsignificant mediating effect of rumination in the relationship between ER and worry underscores the importance of worry in the development of anxiety symptoms. Although ER difficulties significantly predicted both rumination and worry, only worry was associated with increased anxiety symptoms. This is consistent with prior work indicating that worry is more important for anxiety, whereas rumination is associated with depressive symptomatology (Hong, 2007; Merino et al., 2016). The chained mediation pathway suggests that rumination may indirectly contribute to anxiety through excessive worry, rather than through a direct anxiogenic effect.

These findings align with Avoidance Theory in which worry presents a form of cognitive avoidance of emotional experience (Borkovec et al., 2004; Newman & Llera, 2011). Individuals who struggle with ER may find it hard to tolerate and manage intense feelings, so they turn to worry to think about potential problems in order to not fully face their emotional experience (Borkovec et al., 2004). In this framework, worry may function as an attempted coping strategy, but over time it amplifies anxiety by preventing emotional processing and reinforcing dysfunctional mental habits (Adamis & Olatunji, 2024; Guan et al., 2025; Hirsch & Mathews, 2012; Stapinski et al., 2010). Our findings support this mechanism in emerging adults. Those who report greater ER difficulties seem more likely to rely on worry as a maladaptive strategy, which is linked to higher anxiety symptoms. Although these findings are theoretically expected, they become nonsignificant when baseline anxiety and mediators' values are controlled for. Further research with at least three waves, where the mediators are measured between two time points, could offer more precise findings regarding the mediation process.

4.2. Rumination as Key Mediator of Depression

In contrast to the anxiety model, our study finds both a significant direct effect of ER difficulties on depressive symptoms and a significant indirect effect through rumination. Participants who reported greater ER difficulties were more likely to report higher levels of rumination, and higher rumination predicted increased depressive symptoms. This pattern closely aligns with Response Styles Theory, which proposes that a ruminative response style (repeated and passive focus on one's feelings of distress and their causes and consequences) contributes to the onset and maintenance of depression (Nolen-Hoeksema, 1991; Nolen-Hoeksema et al., 2008).

The combination of direct and indirect effects suggests that ER difficulties relate to depressive symptoms through multiple pathways: by promoting ruminative thinking and directly, via mechanisms such as emotion-driven behaviors, interpersonal problems, and chronic stress that were not explicitly tested (McLaughlin et al., 2011; Sloan et al., 2017). This aligns with longitudinal findings which show that rumination is a strong risk factor for later depressive episodes in both clinical and non-clinical populations but does not fully account for the broader impact of ER difficulties on depression (Just & Alloy, 1997; Nolen-Hoeksema et al., 1994). Individuals who find it hard to soothe themselves or reappraise negative events may become caught in RNT, which deepens and prolongs low mood, while also engaging in behaviors that help maintain or exacerbate depressive symptoms (e.g., withdrawal and self-sabotage).

Finally, once rumination was included, worry did not significantly mediate the ER–depression link. This supports the conceptual distinction that worry is characterized by future-oriented catastrophic thinking and thus is more central to anxiety, while rumination, with its past- and self-focused perseveration, is more specific to depression (Hong, 2007; de Jong-Meyer et al., 2009). Similar findings were reported by Topper et al. (2014) who reported that worry may predict depression, but when rumination is included in the model, this relationship disappears. This has important practical implications, highlighting rumination as a treatment target for depression in emerging adults. Interventions like rumination-focused CBT (RFCBT), designed to reduce passive brooding and promote flexible cognitive habits, are therefore strongly recommended (Daros et al., 2021; Watkins, 2016). Similarly to the case of anxiety, the mediation effect becomes nonsignificant after controlling for baseline values; therefore, more detailed research is needed to confirm these findings and to determine whether the mediation effect is truly present.

4.3. Differential Roles of Specific ER Difficulties

Our study also examined how distinct ER difficulties (measured by the DERS) are connected to anxiety and depressive symptoms through worry and rumination. Regarding anxiety, most ER difficulties (except lack of emotional clarity) showed direct effects and also indirect paths through worry or chained mediation via rumination into worry. Lack of emotional awareness may be the strongest predictor of anxiety symptoms, both directly and indirectly via worry. These findings suggest that the inability to recognize one's own emotions or emotional states may be associated with higher anxiety symptoms. Such lack of awareness can make internal sensations feel unpredictable and hard to interpret, fostering anxious apprehension that something is wrong, thus prompting worry to make sense of vague feelings (Rieffe & De Rooij, 2012; Eichengreen et al., 2023). Earlier longitudinal studies, similarly, show that better emotional awareness helps reduce internalizing symptoms over time (Silk et al., 2003).

For depressive symptoms, a different pattern emerged. Impulse control difficulties and limited access to ER strategies had both direct and indirect effects (via rumination), while goal-directed behavior problems and lack of emotional awareness showed only indirect effects through rumination. Nonacceptance of emotions and lack of emotional clarity had no significant links. Our results found impulse control difficulties to be the strongest predictor of depressive symptoms, suggesting that struggling to inhibit emotion-driven impulses, which was traditionally attributed to passivity or withdrawal, ties closely to depressive symptoms in emerging adults. Longitudinal data support this, linking impulse control trajectories to rising depressive symptoms through chain reactions like outbursts, self-harm, and substance use (Weinberg & Klonsky, 2009).

Overall, these results reveal a subtle link between ER components and internalizing symptoms: emotional awareness matters most for anxiety, while impulse control and behavioral regulation stand out for depression. Interestingly, lack of emotional clarity showed no independent connections to either outcome here, despite its overlap with awareness. One explanation might be that given the three-month interval between measurements in this longitudinal study, basic emotional awareness (noticing and labeling feelings) may play a more immediate role than clarity in shaping short-term symptom changes in emerging adults.

4.4. Combination of Worry, Rumination, and ER Difficulties

This study also showed a synergistic effect where high ER difficulties combined with high rumination and worry predict the most severe depressive symptoms. Moderation analyses found that while individual interactions were not significant on their own, the

combined ER, rumination and worry effects explained a small but significant additional variance in depression. These results should be interpreted cautiously given the modest effect size and nonsignificant single terms, but predicted values clearly showed that participants with elevated levels across all three variables had the highest depressive symptom scores.

For some emerging adults, this suggests risk factors may build on one another, rather than simply add. Multiple ER deficits paired with both rumination and worry may form a strong internalizing pattern (Brewer et al., 2016; McEvoy et al., 2013; Merino et al., 2016). These individuals likely exhaust cognitive resources overthinking past failures and future threats, with little capacity left to direct towards adaptive coping. This fits transdiagnostic models viewing RNT (rumination and worry) as a core feature across anxiety and depressive disorders (Ehring & Watkins, 2008; McEvoy et al., 2013).

From a prevention standpoint, screening for depressive and/or anxiety symptoms, as well as for ER difficulties and both types of perseverative thinking patterns (rumination and worry), could identify emerging adults at risk. Early transdiagnostic interventions, like mindfulness-based approaches, metacognitive therapy, or CBT targeting RNT as a process, rather than diagnoses, might work best for these high-risk groups (Brewer et al., 2016; Daros et al., 2021; Ehring & Watkins, 2008; McEvoy et al., 2013). However, further research is needed that addresses the methodological limitations present in this study in order to draw clearer practical conclusions. The findings primarily reflect short-term maintenance or exacerbation of symptoms rather than longer-term developmental trajectories.

5. Limitations and Directions for Future Research

First, self-report measures introduce potential recall bias and shared method variance. Therefore, more objective measures are needed, such as expert assessment, to detect symptoms of depression and anxiety, or multi-method assessments, including clinical interviews and ecological momentary assessment. Second, the sample was predominantly female (80.4%), which limits generalizability. The findings may not extend to male emerging adults, non-university populations, or young adults from diverse socioeconomic and cultural backgrounds. Research suggests that gender may influence both ER strategies and perseverative thinking patterns (Nolen-Hoeksema & Aldao, 2011); thus, the predominance of female participants in this study may have shaped the observed mediation patterns. Future research should prioritize more diverse and representative samples. Third, although the two-wave longitudinal design with assessments three months apart represents a strength, this timeframe is relatively short. The findings primarily reflect short-term maintenance or exacerbation of symptoms rather than longer-term developmental trajectories. Studies with additional waves and longer follow-up periods are needed to examine these processes over time and to establish stronger causal inference. Fourth, the rumination measure (ECQ Rehearsal subscale) showed modest internal consistency ($\alpha = 0.687$), which may have attenuated observed effects. Future research should use measures with stronger psychometric properties. We acknowledge that listwise deletion reduces the sample size, which may decrease statistical power and effect size.

The main contribution of this study is the use of a longitudinal design to investigate perseverative thinking patterns and their relationship with anxiety and depressive symptoms. The research expands the existing literature. The findings also suggest targeted approaches for prevention and intervention: focusing on reducing rumination and worry, as well as strengthening emotional awareness and impulse control, may support the mental health of emerging adults.

6. Conclusions

This study shows that perseverative thinking may play an important role in linking ER difficulties with anxiety and depressive symptoms during emerging adulthood. However, it should be noted that this study included only two waves, with small effect sizes and results that partially changed when baseline variables were controlled for. After controlling for all baseline values, all paths became nonsignificant, suggesting that the results may reflect stable between-person differences rather than within-person change. The findings may reflect short-term maintenance or exacerbation of symptoms rather than longer-term developmental trajectories. Difficulties in ER appear to be associated with anxiety symptoms primarily through worry, while depressive symptoms may be linked to ER difficulties both directly and indirectly through rumination. When considering specific facets of ER, lack of emotional awareness appeared to be most strongly related to anxiety symptoms, whereas impulse control difficulties and limited access to effective regulation strategies showed the strongest associations with depressive symptoms. Those who reported high levels of ER difficulties along with elevated rumination and worry also reported the highest levels of depressive symptoms. These findings emphasize that emerging adulthood is a sensitive period for mental health. Appropriately timed and well-aimed preventive intervention could strengthen ER skills and address perseverative thinking processes to reduce vulnerability to anxiety and depressive symptoms. Further research is needed that addresses the methodological limitations present in this study in order to draw clearer practical conclusions.

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