



# Gender, emotion regulation, and cognitive flexibility as predictors of depression, anxiety, and affect in healthy adults

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## Abstract

Anxiety and depressive disorders are among the most prevalent mental health conditions. Consequently, identifying the factors that contribute to their development and maintenance has been a longstanding focus of interest within the scientific community. Gender differences, cognitive flexibility, and emotion regulation strategies have all been considered influential in the development of these disorders, but few works have analyzed these variables simultaneously. Our study aimed to investigate the influence of gender, cognitive flexibility and emotion regulation strategies on anxiety and depressive symptoms, as well as on positive and negative affect. Results showed that both men and women exhibited similar levels of depression and affect. However, men tended to suppress their emotions more and were more likely to place blame on themselves and others, whereas women showed a greater tendency to ruminate and reported higher perceptions of alternatives. Additionally, women exhibited higher levels of anxiety. When multiple regression analyses were performed, only emotion regulation strategies and cognitive flexibility emerged as predictors of depression, anxiety and affect. These findings suggest that gender differences in these variables may stem not only from the selection of emotion regulation strategies but also from how men and women perceive situations through cognitive flexibility. This raises the question of whether gender differences in emotional processing are primarily related to the selection of emotion regulation strategies.

**Keywords** Emotion regulation · Cognitive flexibility · Gender · Anxiety · Depression

## Introduction

Anxiety and depression are among the most prevalent psychological disorders in today's society and rank among the world's most disabling mental health problems (GBD 2019 Disease and Injuries Collaborators, 2020). Interestingly, prior research has consistently reported gender differences

in the prevalence of anxiety and depression, as well as in the manifestation of positive and negative affect. Specifically, previous works have shown that women exhibit higher rates of these disorders (Zlomke & Hahn, 2010), and tend to experience more negative affect than men (Fujita et al., 1991). These findings suggest that gender, particularly being a woman, may be a risk factor for developing anxiety and/or depression disorders, highlighting its importance as a key variable in clinical and experimental research.

Another important factor that has been shown to influence the development of these disorders is emotion regulation (ER), which has been defined as the deliberate or automatic attempts individuals use to influence the emotions they experience, as well as when and how these emotions are experienced and expressed (Gross, 2015). While *maladaptive regulatory strategies* have been observed to contribute to the development, increase, and maintenance of psychological disorders such as anxiety (Amstadter, 2008; Martin & Dahlen, 2005; Sheppes et al., 2015) and depression (Hilt & Nolen-Hoeksema, 2009; Sheppes et al., 2015; Silk et

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al., 2003; Wang et al., 2024), *adaptive emotion regulation strategies* have been associated with well-being, improved relationships, enhanced academic and work performance (Aldao et al., 2010; Kirschbaum-Lesch et al., 2021), as well as reduced self-reported anxiety and depression (Sullivan et al., 2023). Specifically, among maladaptive strategies, *rumination*—the tendency to think repetitively about one’s negative mood and its causes and consequences—(Aldao et al., 2010; Boemo et al., 2024; D’Avanzato et al., 2013; Nolen-Hoeksema et al., 2008; Thomsen et al., 2005), *self-blaming* (Martin & Dahlen, 2005; Öngen, 2010), *catastrophizing*—an irrationally negative forecast of future events—(Quartana et al., 2009) and *suppression*—either attempts to voluntarily suppress unwanted thoughts or suppression of emotional expression—(Gross, 1998; Wenzlaff & Wegner, 2000) have been observed to have a positive relationship with negative affect, anxiety, depression, and general distress (Amstadter, 2008; Brzozowski & Crossey, 2024; D’Avanzato et al., 2013; Sheppes et al., 2015). On the other hand, among adaptive emotion regulation strategies, *positive reappraisal*—thinking about a problem from a different, positive perspective—has been associated with lower levels of depressive symptoms (Aldao & Nolen-Hoeksema, 2010; Aldao et al., 2010) and reduced negative affect (D’Avanzato et al., 2013). Indeed, decreased use of reappraisal has been reported among patients clinically diagnosed with anxiety and depression (D’Avanzato et al., 2013).

In addition, literature shows that another variable playing a central role in many forms of psychopathology is emotion regulation flexibility (Aldao et al., 2015). Particularly relevant for our research is *cognitive flexibility*, understood as the ability to effortlessly adapt cognitive thoughts according to changes in environmental stimuli (Dennis & Vander Wal, 2010). This ability contributes to the adaptive use of coping strategies to deal with problems and, consequently, reduces negative emotions, which could decrease the likelihood of developing emotional disorders (Demirtaş, 2020; López-Santander, 2024; Wersebe et al., 2018). Conversely, increased cognitive control and decreased flexibility have been observed among individuals with depression (Snyder, 2013).

Considering that gender, emotion regulation strategies and cognitive flexibility have all been widely linked to the development and maintenance of emotional disorders, it is relevant to investigate whether women and men differ in their use of emotion regulation strategies and their cognitive flexibility, which can provide insight into how these variables are interrelated. To this regard, research has consistently found gender differences in the use of certain regulatory strategies. For instance, women tend to use more maladaptive cognitive strategies (Duarte et al., 2015), but also employ other adaptive strategies more frequently than

men (Nolen-Hoeksema & Aldao, 2011). Specific strategies, such as rumination (Boemo et al., 2024; Duarte et al., 2015; Nolen-Hoeksema & Aldao, 2011; Thomsen et al., 2005), putting into perspective (Zlomke & Hahn, 2010), and acceptance (Duarte et al., 2015) are typically reported to be more commonly used by women. On the other hand, strategies such as suppression or blaming others are typically more often reported by men, who also tend to exhibit greater cognitive flexibility (Preston et al., 2022; Wang et al., 2022; Zlomke & Hahn, 2010). Nevertheless, the literature is not conclusive in this regard, as some studies have found no gender differences in the use of adaptive emotion regulation strategies, such as refocusing on planning, putting into perspective, positive reappraisal, or positive refocusing (Duarte et al., 2015).

In sum, the literature review suggests gender, the frequency of use of specific regulatory strategies, and cognitive flexibility, all play a role in the development and maintenance of affect disorders. Additionally, some studies suggest gender differences in the use of specific emotion regulation strategies. However, to our knowledge, few studies examined how these variables together influence anxiety, depression, and negative affect, and the existing findings remain inconclusive. Consequently, our study aims to investigate the influence of gender, emotion regulation strategies, and cognitive flexibility on anxiety and depressive symptoms, as well as on affect, to better understand the origin of the differences reported in previous literature. While these variables have often been considered independently, we strongly believe, based on the mixed findings, that gender differences would not emerge without being mediated by ER strategies and/or cognitive flexibility.

Furthermore, our study intended to explore gender differences in the use of certain ER strategies and in cognitive flexibility. According to previous research (e.g., Duarte et al., 2015; Nolen-Hoeksema & Aldao, 2011), we hypothesized that women would score higher on overall cognitive strategies but lower on suppression and cognitive flexibility scales compared to men. Moreover, when considering gender and ER strategies together, we hypothesized that these variables would influence the reported levels of anxiety and depressive symptoms, as well as negative affect. Maladaptive regulatory strategies such as rumination, which tend to be more prevalent in women, might account for the higher scores on depression, anxiety and negative affect, while greater cognitive flexibility might contribute to the lower scores observed in men.

## Method

### Participants

A total of 92 participants (50 women) from the University Jaume I (Spain), aged between 17 and 43 years ( $M=22.95$ ,  $SD=4.75$ ), took part in this study. The sample size was determined through an a priori statistical power analysis using G\*Power (Faul et al., 2007). Considering an effect size of  $f^2=0.25$ , with an alpha level of 0.05, a power value of 0.95, and 2 groups (women and men), the minimum required sample size was 42 participants per group. However, a larger sample size was planned as a conservative measure. Ethical approval from the Deontological Commission at Universitat Jaume I was obtained, and the study was conducted in accordance with the Declaration of Helsinki. All participants provided written informed consent, and were compensated with either 5 or 10€ for their participation.

### Measures

#### Trait anxiety questionnaire

The Trait Anxiety Questionnaire (STAI-T; Spielberger et al., 1970; Buela-Casal et al., 1995 [Spanish Version]) is a 20-item measure designed to assess trait anxiety, encompassing both cognitive and somatic components of anxiety as a general personality trait. The items were presented using a 4-point Likert scale (1=not at all; 2=somewhat; 3=quite a lot; 4=very much). Internal consistency coefficients for the original version range from 0.65 to 0.75, while the Spanish version demonstrates a higher reliability, with coefficients around 0.90. For the current sample, reliability coefficient is 0.83.

#### Positive and negative affect scale

The Positive and Negative Affect Scale (PANAS; Watson et al., 1988; López-Gómez et al., 2015 [Spanish version]) is a 20-item questionnaire that assesses positive and negative affect. Each item had a 5-point Likert scale (1=very slightly or not at all; 2=a little; 3=moderately; 5=quite a lot; 5=very much). In the original version, internal consistency coefficients range from 0.86 to 0.90 for the positive affect scale, and from 0.84 to 0.87 for the negative affect scale. In the Spanish version, these coefficients range from 0.83 to 0.92 for the positive affect scale, and from 0.81 to 0.88 for the negative affect scale. For the current sample, reliability coefficients are 0.80 for the positive affect scale and 0.84 for the negative affect scale.

#### Beck depression inventory

The Beck Depression Inventory (BDI; Beck et al., 1979; Sanz et al., 2003 [Spanish version]) is a 21-item self-report questionnaire that measures the intensity of depressive symptoms, with scores ranging from 0 to 63. The items were presented using a 4-point Likert Scale. Internal consistency coefficients range around 0.86 for the original version, and around 0.85 for the Spanish version. For the current sample, the reliability coefficient is 0.85.

#### Emotion regulation questionnaire

The Emotion Regulation Questionnaire (ERQ; Gross & John, 2003; Cabello et al., 2013 [Spanish version]) is a questionnaire consisting of 10 items that measures two different dimensions of emotion regulation: *Cognitive Reappraisal* (i.e., the extent to which a person modifies the emotional valence and impact of stimuli) and *Expressive Suppression* (i.e., the extent to which a person inhibits the emotional expressive behavior). These dimensions are independent from each other. The items were presented using a 7-point Likert Scale (1=totally disagree; 2=disagree; 3=slightly disagree; 4=not agree nor disagree; 5=slightly agree; 6=agree; 7=totally agree). Internal consistency coefficients in the original version are 0.79 for Cognitive Reappraisal, and 0.74 for Expressive Suppression, while in the Spanish version, they are 0.79 for Cognitive Reappraisal, and 0.75 for Expressive Suppression. For the current sample, reliability coefficients are 0.60 for the Cognitive Reappraisal scale and 0.83 for the Expressive Suppression scale.

#### Cognitive emotion regulation questionnaire

The Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski & Kraaij., 2007; Domínguez-Sánchez et al., 2013 [Spanish version]) is a 36-item measure that assesses nine cognitive emotion regulation strategies: *Self-blame* (i.e., attributing responsibility to oneself for the events), *Acceptance* (i.e., accepting what happened), *Rumination* (i.e., dwelling on thoughts and feelings related to the event), *Positive refocusing* (i.e., shifting focus to positive events instead of the emotional event), *Refocus on planning* (i.e., focusing on making plans to handle the event), *Positive Reappraisal* (i.e., considering the positive aspects of the situation), *Putting into Perspective* (i.e., downplaying the significance of the event), *Catastrophizing* (i.e., amplifying the negative aspects of what happened), and *Blaming others* (i.e., attributing responsibility to others for the events). Responses were given on a 5-point Likert Scale (1=almost never; 2=sometimes; 3=regularly; 4=often; 5=almost always). Internal consistency coefficients range from 0.75

to 0.87 in the original version, and from 0.61 to 0.89 in the Spanish version. For the current sample, reliability coefficients range from 0.57 to 0.94 ( $M=0.76$ ).

### Cognitive flexibility inventory

The Cognitive Flexibility Inventory (CFI; Dennis & Vander Wal, 2010; Jaén et al., 2024 [Spanish version]) is a 20 item-questionnaire that measures two dimensions of cognitive flexibility: *Alternatives* (i.e., the ability to perceive multiple alternative explanations for life events and generate multiple solutions to emotional situations); and *Control* (i.e., the tendency to perceive situations as somewhat controllable). Responses were provided on a 7-point Likert Scale (1=totally disagree; 2=disagree; 3=slightly disagree; 4=not agree nor disagree; 5=slightly agree; 6=agree; 7=totally agree). Internal consistency coefficients in the original version were 0.86 for the Alternatives scale, and 0.91 for the Control scale. In the Spanish version, reliability coefficients were 0.87 for the Alternatives scale and 0.89 for the Control scale. For the current sample, reliability coefficients are 0.88 for the Alternatives scale and 0.82 for the Control scale.

### Procedure

Participants were recruited through posters displayed across Universitat Jaume I, and were contacted via mail to schedule participation. Upon arrival at the laboratory, they were provided with an overview of the task and asked to complete a written informed consent form. Afterwards, participants filled out a survey to collect socio-demographic information and then they completed the questionnaires (PANAS, STAI-T, ERQ, CERQ, CFI, BDI). Upon concluding the experiment, they were given economic compensation.

### Statistical analysis

Descriptive statistics were calculated for the entire sample as well as separately for men and women. Mean comparison tests were conducted to explore gender differences in positive and negative affect, anxiety, depression, emotion regulation and cognitive flexibility. A t-test was used when the data followed a normal distribution, as determined by the Kolmogorov-Smirnov test. Alternatively, the Mann-Whitney U test was used.<sup>1</sup>

Secondly, multiple regressions were conducted to examine the effect of gender, emotion regulation and cognitive flexibility on emotionality, anxiety, and depressive

symptoms. Specifically, four separate regressions were performed for each dependent variable (positive and negative affect, anxiety, and depression), with gender and the subscales of the ERQ, CERQ, and CFI as independent variables. Based on the varying differences observed in prior literature for each subscale, each variable was included separately in the analyses. Multicollinearity was assessed by calculating the Variance Inflation Factor (VIF), which showed negligible collinearity (all VIFs were under 1.91).<sup>2</sup>

All data analyses were performed using SPSS IBM Statistics version 26 and JMP Pro 17.2.0. Due to a technical fault during the completion of self-reports, some responses from two participants were missing (2% of the data) for the CERQ, ERQ, CFI, and BDI measures.

## Results

### Gender differences in emotionality, emotion regulation and cognitive flexibility

Descriptive statistics are summarized in Table 1. Results show that women scored higher in trait anxiety,  $U=1359.00$ ,  $p=.015$ , in comparison to men. In regards to emotion regulation strategies, women also scored higher in rumination compared to men,  $U=1291.50$ ,  $p=.021$ , who scored higher in suppression,  $U=633.00$ ,  $p=.002$ , as well as self-blame and blaming others,  $U=724.50$  and  $p=.021$ ,  $U=700.50$ ,  $p=.012$ , respectively (see Table 1). Additionally, women obtained higher scores for the alternatives scale of the CFI,  $t(89)=5.24$ ,  $p=.024$ . No significant gender differences were found for any of the other variables.

### Anxiety, depression and affect as a function of gender, emotion regulation and cognitive flexibility

To explore the combined contributions of gender, cognitive flexibility and emotion regulation strategies, multiple regressions were performed (see Table 2). The overall

<sup>2</sup> The regression analyses showed virtually no change when only the five or nine variables with the highest correlations were entered into the multiple regression analysis. We conducted these alternative analyses to address any plausible concerns regarding the ratio of predictors per observations in this study. Specifically, using five variables with 92 observations adheres to the recommendation given by Green (1991) (i.e., 50 observations plus 8 times the number of variables), while nine variables conform to the 10-to-1 rule proposed by Harrell (2015). Additionally, another set of alternative analyses was performed to assess the impact of minor violations of normality among the predictors. For this purpose, the problematic variables were transformed using the Box-Cox transformation, and the same regression analysis was repeated, yielding no significant changes to the models. We also confirmed that the regression residuals were normally distributed ( $p=0.563$ ) and that the error variance was homoscedastic ( $p=0.129$ ).

<sup>1</sup> According to the Kolmogorov-Smirnov test, the variables that followed a normal distribution were Positive affect and Alternatives ( $p>.05$ ).

**Table 1** Means (*M*), standard deviations (*SD*) and confidence intervals (*CI*) for the overall sample, as well as for men and women

	Global ( <i>n</i> = 92)					Men ( <i>n</i> = 42)					Women ( <i>n</i> = 50)				
	95% CI					95% CI					95% CI				
	<i>M</i>	<i>SD</i>	lower	upper		<i>M</i>	<i>SD</i>	lower	upper		<i>M</i>	<i>SD</i>	lower	upper	
Positive Affect	33.85	5.86	32.63	35.06		34.31	5.69	32.54	36.08		33.46	6.06	31.74	35.18	
Negative Affect	22.40	6.59	21.04	23.77		23.24	7.00	21.06	25.42		21.70	6.20	19.94	23.46	
Anxiety	26.94	9.35	25.00	28.87		24.67	9.60	21.67	27.66		28.84	8.78	26.35	31.34	
Depression	9.26	6.32	7.93	10.58		9.60	5.99	7.73	11.46		8.96	6.65	7.03	10.89	
ERQ															
Cognitive Reappraisal	29.40	4.99	28.35	30.45		29.43	5.12	27.83	31.02		29.38	4.93	27.94	30.81	
Expressive Suppression	13.61	5.90	12.36	14.85		15.67	5.45	13.97	17.36		11.81	5.74	10.15	13.48	
CERQ															
Acceptance	14.38	3.07	13.74	15.02		14.81	2.63	13.99	15.63		14.00	3.38	13.02	14.98	
Positive Refocusing	11.04	4.15	10.18	11.91		11.17	4.07	9.90	12.43		10.94	4.26	9.70	12.17	
Positive Reappraisal	15.18	4.38	14.26	16.09		15.50	4.28	14.16	16.84		14.90	4.48	13.59	16.20	
Putting into Perspective	13.93	3.62	13.17	14.69		14.00	3.60	12.89	15.12		13.88	3.68	12.81	14.94	
Self-Blame	10.62	2.69	10.06	11.19		11.29	2.73	10.43	12.14		10.04	2.53	9.31	10.78	
Rumination	14.40	3.15	13.74	15.06		13.48	3.39	12.42	14.53		15.21	2.71	14.42	15.99	
Catastrophizing	7.41	3.21	6.74	8.08		7.76	3.32	6.73	8.80		7.10	3.12	6.20	8.01	
Blaming others	7.41	2.85	6.81	8.00		8.14	2.83	7.26	9.03		6.77	2.74	5.98	7.57	
Refocusing on planning	15.74	2.99	15.12	16.37		15.60	3.16	14.61	16.58		15.88	2.86	15.05	16.70	
CFI															
Control	32.23	7.61	30.64	33.83		33.72	6.54	31.68	35.75		30.94	8.30	28.53	33.35	
Alternatives	75.17	8.83	73.33	77.03		72.95	10.34	69.73	76.17		77.13	6.79	75.15	79.10	

**Table 2** Multiple regression analysis for positive affect, negative affect, anxiety, and depression; adjusted  $R^2$  for the general model and the Beta coefficient ( $\beta$ ) for each independent variable

	Positive Affect	Negative Affect	Anxiety	Depression
General Model (Adjusted $R^2$ )	0.31***	0.37***	0.41***	0.15*
Gender ( $\beta$ )	-0.03	0.07	0.19	0.11
ERQ				
Cognitive Reappraisal ( $\beta$ )	0.16	0.15	-0.01	-0.01
Expressive Suppression ( $\beta$ )	0.008	0.05	0.10	0.25*
CERQ				
Acceptance ( $\beta$ )	0.08	-0.07	-0.02	0.05
Positive Refocusing ( $\beta$ )	0.16	0.03	-0.12	-0.10
Positive Reappraisal ( $\beta$ )	0.31*	-0.15	-0.10	0.02
Putting into Perspective ( $\beta$ )	-0.04	0.09	0.05	0.18
Self-Blame ( $\beta$ )	0.03	0.21*	0.06	0.01
Rumination ( $\beta$ )	-0.04	-0.02	0.11	-0.02
Catastrophizing ( $\beta$ )	0.19	0.07	0.08	0.09
Blaming others ( $\beta$ )	0.03	0.38***	0.08	0.27*
Refocusing on planning ( $\beta$ )	-0.16	-0.14	-0.09	-0.04
CFI				
Control ( $\beta$ )	0.09	-0.16	-0.45***	-0.18
Alternatives ( $\beta$ )	0.37***	-0.20* <sup>1</sup>	-0.09	-0.07

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ ;  
<sup>1</sup> $p = .052$

Note: Gender was code as 0 for women and 1 for men

models were significant for predicting positive affect ( $R^2 = 0.31$ ,  $p < .001$ ), negative affect ( $R^2 = 0.37$ ,  $p < .001$ ), anxiety ( $R^2 = 0.41$ ,  $p < .001$ ), and depression ( $R^2 = 0.15$ ,  $p = .02$ ). Interestingly, the independent variables accounted for a substantial proportion of the variance, ranging between 15% and 42%. The Variance Inflation Factor (VIF) values ranged from 1.61 to 1.91, indicating a small to moderate correlation between the independent variables.

Regarding positive affect, the most important predictors were cognitive alternatives followed by positive reappraisal. Specifically, higher scores on positive reappraisal and cognitive alternatives were associated with greater positive affect ( $\beta = 0.31$ ,  $p = .012$ , and  $\beta = 0.37$ ,  $p < .001$  consecutively). For negative affect, the most important predictors were blaming others ( $\beta = 0.38$ ,  $p < .001$ ), self-blame ( $\beta = 0.21$ ,  $p = .043$ ) and, marginally, cognitive alternatives ( $\beta = -0.20$ ,  $p = .052$ ), with a negative relationship for the latter. Anxiety variability was significantly associated with lower cognitive control ( $\beta = -0.45$ ,  $p < .001$ ) which means that reduced cognitive flexibility is linked to increased anxiety. Finally, suppression and blaming others were the most important predictors of depressive symptoms, with higher scores in emotional suppression and blaming others correlating with greater depression ( $\beta = 0.25$ ,  $p = .038$ , and  $\beta = 0.27$ ,  $p = .03$  consecutively) (see Table 2).

## Discussion

The current research aimed to explore the influence of gender, emotion regulation strategies, and cognitive flexibility on depression and anxiety symptomatology, as well

as on positive and negative affect, in a sample of healthy participants.

According to our hypotheses, our findings revealed gender differences in the use of certain emotion regulation strategies. Specifically, women scored higher in rumination, whereas men scored higher in expressive suppression, self-blame, and blaming others. Differences in rumination are probably the most well-established in the literature, as are higher scores for men in blaming others (Zlomke & Hahn, 2010). Nevertheless, the fact that rumination was the only regulatory strategy in which women scored higher than men was unexpected, as previous works indicated that women also tend to use other strategies, such as acceptance (Duarte et al., 2015) or putting into perspective (Zlomke & Hahn, 2010), among others. We attribute these unexpected results to the variability within the experimental sample, which also shows some deviations from previous literature in depression scores and both negative and positive affect.

It is noteworthy that our results regarding suppression align with existing literature that supports the stereotype that men use suppression more frequently than women (Preston et al., 2022; Yeh et al., 2017). Previous research suggests that men may benefit from using suppression as a strategy for managing stress, possibly as a means of handling stressful situations in a more harmonious way (Yeh et al., 2017). This approach has been linked to a reduction in cortisol levels (Mink et al., 2023). Regarding self-blame, although prior literature does not typically report gender differences in the use of this strategy, some research indicates that self-blame is primarily associated with worry in women (Zlomke & Hahn, 2010). Our findings suggest that while men use self-blame more frequently, it appears to act as a maladaptive strategy predominantly for women, which might explain the

observed gender differences in anxiety. Understanding how emotion regulation strategies are used differently by men and women could be a crucial step toward elucidating gender differences in the prevalence of disorders such as anxiety and depression in the general population.

In line with the expectations, our results revealed a significant gender difference in cognitive flexibility, specifically regarding the perception of alternatives for confronting situations. However, the direction of these differences was unexpected. Previous literature suggests that men typically score higher in cognitive flexibility (Wang et al., 2022), which is related to lower prevalence of anxiety and depressive symptoms (Demirtaş, 2020). In contrast, our study found that women scored higher in cognitive flexibility. This unexpected finding might explain the absence of gender differences in both positive and negative affect, as cognitive flexibility has been linked to affective variables (Demirtaş, 2020; Wersebe et al., 2018).

However, partially in contrast to previous studies (Zlomke & Hahn, 2010), we found differences between women and men only in anxiety, but not in depressive symptoms or negative affect in this sample. This result suggests that gender alone may not fully explain the development of such negative emotionality, as earlier research has reported (Lewinsohn et al., 1998). It is important to note, however, that this study focused on a non-clinical sample, which could potentially influence the absence of gender differences in depressive symptoms due to their low prevalence.

We further analyzed how different emotion regulation strategies (cognitive reappraisal, expressive suppression), cognitive flexibility, and gender together influence depression and anxiety symptoms, as well as affect. The analysis showed that the global model effectively predicted anxiety and depressive symptoms, as well as positive and negative affect. However, contrary to our expectations based on prior literature (Duarte et al., 2015), our findings revealed that gender did not influence any of the variables. This may align with the idea that gender differences in depressive disorders, anxiety or affect are not directly related to gender itself but rather to differences in cognitive flexibility, the selection of ER strategies used by each gender, and the specific effects of these strategies on men and women. In fact, our results suggest that the use of certain ER strategies and the differences in cognitive flexibility were more crucial than gender in explaining depressive and anxiety symptomatology, as well as positive and negative affect, in line with previous literature (Amstadter, 2008; D'Avanzato et al., 2013; Demirtaş, 2020; Wang et al., 2022). However, rumination was not identified as a significant predictor of either anxiety or depression symptoms, contrary to our expectations based on earlier findings (Aldao et al., 2010; D'Avanzato et al., 2013). This may be due to our sample consisting mostly

of young university students who were not diagnosed with any affective disorder. Another possible explanation could be the variability in depression symptomatology profiles. Some literature suggests that even among diagnosed patients, depressive disorder exhibits significant variability, resulting in distinct profiles with varying subsets of symptoms (Fried & Nesse, 2015). This variability could account for the divergent results, as individuals with specific profiles might not score as high on the inventory we utilized.

Our results indicate that depressive symptomatology was associated with the selection of maladaptive strategies, specifically suppression and blaming others. Anxiety, however, showed a stronger sense of control over situations. Negative affect, in contrast, was related to place blame and perceived alternatives, but not to gender. We theorize that the decreased ability to generate multiple alternative solutions to difficult situations, which partially explains negative affect, may be linked to the selection of ER strategies, specifically self-blame and blaming-others, which partially explain negative affect as well. Previous literature consistently shows a relation between the emotion regulation strategy of blaming others and negative feelings (Dodge, 2006; Peterson & Park, 2007), as well as a correlation between depressive symptomatology and a state-oriented approach to life-situations (Kuehner & Huffziger, 2013). No such robust findings were observed for self-blame, but we hypothesize that it could represent the opposite strategy on the spectrum, selected as a response to a state-oriented approach. Future research should explore the relationship between blame placement and perceived alternatives/control to shed light on this issue. Another possibility is that our subjects may not have fully understood the differences between the items regarding blame placing, and consequently answered every question in a similar way. If we assume this, it could also explain why our results appear slightly contradictory and are not supported by previous research regarding self-blame ratings.

Finally, our study has several limitations. Firstly, current data were derived from self-reported questionnaires, which may be subject to cognitive biases and might not always provide ecologically valid assessments. Employing methods like experience sampling could better capture the dynamic nature of ER processes and their adaptiveness across various situations in individuals' daily life (Boemo et al., 2024). In addition, future investigation should incorporate objective measures such as peripheral physiology or neuroimaging correlates, in situations that require facing negative events (Whittle et al., 2011), which would certainly provide further empirical support to our findings. Moreover, our sample comprised university students and was not clinically representative, with an imbalanced number of men and women, which may limit the generalizability

of gender-based analysis. Finally, we did not account for other potentially influential factors, such as age or cumulative experience with negative life events.

In summary, our results suggest that the use of certain emotion regulation strategies, rather than gender itself, is primarily associated with the development and maintenance of depressive and anxiety symptoms and negative affect. Gender appears to influence these outcomes indirectly, through the selection and implementation of emotion regulation strategies. Clarifying which aspects of being a woman are influencing both the ER strategy selection and the cognitive flexibility development could help future research better understand the influence of gender on the analyzed disorders and affect. A solid body of literature supports the idea that gender stereotypes, such as the belief that women experience emotion more intensely and are more emotionally expressive, lead to the development of emotional distress, particularly for women in the emotion regulation process (Brody & Hall, 2010). This is often accompanied by environmental factors such as increased control over young girls by caregivers, a lower sense of self-efficacy, and a diminished problem-solving orientation in difficult situations (McLean & Anderson, 2009). Some studies have also considered social power imbalance as a possible contributor to gender differences in emotional expressiveness (Brody & Hall, 2010). If environment and socialization play such significant roles in the emotional experience, focusing on these variables rather than treating gender as a categorical factor, could help future research pinpoint the sources of these differences. This approach could facilitate the development of more individualized prevention and intervention tools for emotion-related disorders in women.

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## Declarations

**Conflict of interests** The authors declare that they have no competing interests.

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## References

- Aldao, A., & Nolen-Hoeksema, S. (2010). Specificity of cognitive emotion regulation strategies: A transdiagnostic examination. *Behaviour Research and Therapy*, 48(10), 974–983. <https://doi.org/10.1016/j.brat.2010.06.002>
- Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review*, 30(2), 217–237. <https://doi.org/10.1016/j.cpr.2009.11.004>
- Aldao, A., Sheppes, G., & Gross, J. (2015). Emotion regulation flexibility. *Cognitive Therapy and Research*, 39, 263–278. <https://doi.org/10.1007/s10608-014-9662-4>
- Amstadter, A. (2008). Emotion regulation and anxiety disorders. *Journal of Anxiety Disorders*, 22(2), 211–221. <https://doi.org/10.1016/j.janxdis.2007.02.004>
- Beck, A., Rush, J., Shaw, B., & Emery, G. (1979). *Cognitive therapy of depression*. Guilford.
- Boemo, T., Martín-García, O., Pacheco-Romero, A. M., Blanco, I., Lafit, G., Myin-Germeys, I., & Sánchez-Lopez, A. (2024). Not just emotion regulation but cognition: An experience sampling study testing the relations of ecological interpretation biases and use of emotion regulation strategies with momentary affective states during daily life functioning. *Behaviour Research and Therapy*, 177, 104550. <https://doi.org/10.1016/j.brat.2024.104550>
- Brody, L. R., & Hall, J. A. (2010). Gender, emotion, and socialization. In: Chrisler, J., McCreary, D. (Eds.) *Handbook of gender research in psychology* (pp. 429–454). Springer. [https://doi.org/10.1007/978-1-4419-1465-1\\_21](https://doi.org/10.1007/978-1-4419-1465-1_21)
- Brzozowski, A., & Crossey, B. P. (2024). Maladaptive emotion regulation strategies mediate the relationship between biased cognitions and depression. *Journal of Behavioural and Cognitive Therapy*, 34(1), 100485. <https://doi.org/10.1016/j.jbct.2024.100485>
- Buela-Casal, G., Sierra, J. C., & Carrobes, J. A. (1995). Psicología clínica y de la salud en España: Su estado actual. *Revista Latinoamericana de Psicología*, 27(1), 25–40.
- Cabello, R., Salguero, J. M., Fernández-Berrocal, P., & Gross, J. J. (2013). A Spanish adaptation of the emotion regulation questionnaire. *European Journal of Psychological Assessment*, 29, 234–240. <https://doi.org/10.1027/1015-5759/a000150>
- D'Avanzato, C., Joormann, J., Siemer, M., & Gotlib, I. H. (2013). Emotion regulation in depression and anxiety: Examining diagnostic specificity and stability of strategy use. *Cognitive Therapy and Research*, 37, 968–980. <https://doi.org/10.1007/s10608-013-9537-0>
- Demirtaş, A. S. (2020). Optimism and happiness in undergraduate students: Cognitive flexibility and adjustment to university life as mediators. *Anales de Psicología*, 36(2), 320–329. <https://doi.org/10.6018/analesps.381181>
- Dennis, J. P., & Vander Wal, J. S. (2010). The cognitive flexibility inventory: Instrument development and estimates of reliability and validity. *Cognitive Therapy and Research*, 34(3), 241–253. <https://doi.org/10.1007/s10608-009-9276-4>
- Dodge, K. (2006). Translational science in action: Hostile attributional style and the development of aggressive behavior problems. *Development and Psychopathology*, 18(3), 791–814. <https://doi.org/10.1017/s0954579406060391>
- Domínguez-Sánchez, F. J., Lasa-Aristu, A., Amor, P. J., & Holgado-Tello, F. P. (2013). Psychometric properties of the Spanish version

- of the cognitive emotion regulation. *Questionnaire Assessment*, 20(2), 253–261. <https://doi.org/10.1177/1073191110397274>
- Duarte, A. C., Matos, A. P., & Marques, C. (2015). Cognitive emotion regulation strategies and depressive symptoms: Gender's moderating effect. *Procedia-Social and Behavioral Sciences*, 165, 275–283. <https://doi.org/10.1016/j.sbspro.2014.12.632>
- Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G\*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39, 175–191. <https://doi.org/10.3758/bf03193146>
- Fried, E. I., & Nesse, R. M. (2015). Depression is not a consistent syndrome: An investigation of unique symptom patterns in the STAR\*D study. *Journal of Affective Disorders*, 172(1), 96–102. <https://doi.org/10.1016/j.jad.2014.10.010>
- Fujita, F., Diener, E., & Sandvik, E. (1991). Gender differences in negative affect and well-being: The case for emotional intensity. *Journal of Personality and Social Psychology*, 61(3), 427–434. <https://doi.org/10.1037/0022-3514.61.3.427>
- Garnefski, N., & Kraaij, V. (2007). The cognitive emotion regulation questionnaire: Psychometric features and prospective relationships with depression and anxiety in adults. *European Journal of Psychological Assessment*, 23, 141–149. <https://doi.org/10.1027/1015-5759.23.3.141>
- GBD 2019 Diseases and Injuries Collaborators. (2020). Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: A systematic analysis for the global burden of Disease Study 2019. *The Lancet*, 396, 1204–1222. [https://doi.org/10.1016/S0140-6736\(20\)30925-9](https://doi.org/10.1016/S0140-6736(20)30925-9)
- Green, S. B. (1991). How many subjects does it take to do a regression analysis? *Multivariate Behavioural Research*, 26(3), 499–510. [https://doi.org/10.1207/s15327906mbr2603\\_7](https://doi.org/10.1207/s15327906mbr2603_7)
- Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology*, 2(3), 271–299. <https://doi.org/10.1037/1089-2680.2.3.271>
- Gross, J. J. (2015). Emotion regulation: Current status and future prospects. *Psychological Inquiry*, 26(1), 1–26. <https://doi.org/10.1080/1047840X.2014.940781>
- Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, 85(2), 348–362. <https://doi.org/10.1037/0022-3514.85.2.348>
- Harrell, F. E. (2015). *Regression modeling strategies: With applications to linear models, logistic regression, and survival analysis*. Springer-Verlag. <https://doi.org/10.1007/978-1-4757-3462-1>
- Hilt, L. M., & Nolen-Hoeksema, S. (2009). The emergence of gender differences in depression in adolescence. In S. Nolen-Hoeksema, & L. M. Hilt (Eds.), *Handbook of depression in adolescents* (pp. 111–135). Routledge/Taylor & Francis Group.
- Jaén, I., Vidal-Arenas, V., Suso-Ribera, C., Pastor, M. C., & García-Palacios, A. (2024). Psychometric properties of the Spanish version of the cognitive flexibility inventory. *Clinical and Health. Journal of Empirical Research in Psychology. Ahead of print*, 1–10. <https://doi.org/10.5093/clysa2024a3>
- Kirschbaum-Lesch, I., Holtmann, M., & Legenbauer, T. (2021). Deficits in emotion regulation partly mediated the relation between sleep problems and depressive symptoms in adolescent inpatients with depression. *Frontiers in Psychiatry*, 12, 622833. <https://doi.org/10.3389/fpsy.2021.622833>
- Kuehner, C., & Huffziger, S. (2013). Factors predicting the long-term illness course in a cohort of depressed inpatients. *European Archives of Psychiatry and Clinical Neuroscience*, 263, 413–423. <https://doi.org/10.1007/s00406-012-0379-7>
- Lewinsohn, P. M., Gotlib, I. H., Lewinsohn, M., Seeley, J. R., & Allen, N. B. (1998). Gender differences in anxiety disorders and anxiety symptoms in adolescents. *Journal of Abnormal Psychology*, 107(1), 109–117. <https://doi.org/10.1037/0021-843x.107.1.109>
- Lopez-Gomez, I., Hervás, G., & Vazquez, C. (2015). An adaptation of the positive and negative affect schedules (PANAS) in a Spanish general sample. *Behavioral Psychology*, 23, 529–548.
- López-Santander, R. J. (2024). Cognitive flexibility and socioemotional competences as a modulating factor of psychopathological symptoms in adolescence. *Journal of Affective Disorders Reports*, 16, 100752. <https://doi.org/10.1016/j.jadr.2024.100752>
- Martin, R. C., & Dahlen, E. R. (2005). Cognitive emotion regulation in the prediction of depression, anxiety, stress, and anger. *Personality and Individual Differences*, 39(7), 1249–1260. <https://doi.org/10.1016/j.paid.2005.06.004>
- McLean, C., & Anderson, E. (2009). Brave men and timid women? A review of the gender differences in fear and anxiety. *Clinical Psychology Review*, 29(6), 496–505. <https://doi.org/10.1016/j.cpr.2009.05.003>
- Mink, A. J., MacKenzie, M. M., Pinero, A. J. Z., & Crockett, E. E. (2023). Gender differences in the physiological effects of emotional regulation. *The Journal of Social Psychology*, 163(2), 256–268. <https://doi.org/10.1080/00224545.2022.2064732>
- Nolen-Hoeksema, S., & Aldao, A. (2011). Gender and age differences in emotion regulation strategies and their relationship to depressive symptoms. *Personality and Individual Differences*, 51, 704–708. <https://doi.org/10.1016/j.paid.2011.06.012>
- Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking rumination. *Perspectives on Psychological Science*, 3(5), 400–424. <https://doi.org/10.1111/j.1745-6924.2008.00088.x>
- Öngen, D. E. (2010). Cognitive emotion regulation in the prediction of depression and submissive behavior: Gender and grade level differences in Turkish adolescents. *Procedia-Social and Behavioural Sciences*, 9, 1516–1523. <https://doi.org/10.1016/j.sbspro.2010.12.358>
- Peterson, C., & Park, N. (2007). Explanatory style and emotion regulation. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 159–179). The Guilford Press.
- Preston, T., Carr, D. C., Hajcak, G., Sheffler, J., & Sachs-Ericsson, N. (2022). Cognitive reappraisal, emotional suppression, and depressive and anxiety symptoms in later life: The moderating role of gender. *Aging & Mental Health*, 26(12), 2390–2398. <https://doi.org/10.1080/13607863.2021.1998350>
- Quartana, P. J., Campbell, C. M., & Edwards, R. R. (2009). Pain catastrophizing: A critical review. *Expert Review of Neurotherapeutics*, 9(5), 745–758. <https://doi.org/10.1586/ern.09.34>
- Sanz, J., Perdigón, A. L., & Vázquez, C. (2003). The Spanish adaptation of Beck's Depression Inventory-II (BDI-II): 2. Psychometric properties in the general population. *Clinica Y Salud*, 14(3), 249–280.
- Sheppes, G., Suri, G., & Gross, J. J. (2015). Emotion regulation and psychopathology. *Annual Review of Clinical Psychology*, 11, 379–405. <https://doi.org/10.1146/annurev-clinpsy-032814-112739>
- Silk, J. S., Steinberg, L., & Morris, A. S. (2003). Adolescents' emotion regulation in daily life: Links to depressive symptoms and problem behavior. *Child Development*, 74(6), 1869–1880. <https://doi.org/10.1046/j.1467-8624.2003.00643.x>
- Snyder, H. R. (2013). Major depressive disorder is associated with broad impairments on neuropsychological measures of executive function: A meta-analysis and review. *Psychological Bulletin*, 139(1), 81–132. <https://doi.org/10.1037/a0028727>
- Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). *STAI manual for the state-trait anxiety inventory*. Consulting Psychologists Press.
- Sullivan, E. C., James, E., Henderson, L. M., McCall, C., & Cairney, S. A. (2023). The influence of emotion regulation strategies and sleep quality on depression and anxiety. *Cortex; a Journal Devoted to the Study of the Nervous System and Behavior*, 166, 286–305. <https://doi.org/10.1016/j.cortex.2023.06.001>

- Thomsen, D. K., Mehlsen, M. Y., Viidik, A., Sommerlund, B., & Zachariae, R. (2005). Age and gender differences in negative affect—Is there a role for emotion regulation? *Personality and Individual Differences*, 38(8), 1935–1946. <https://doi.org/10.1016/j.paid.2004.12.001>
- Wang, C., Zhang, Z., Wiley, J. A., Fu, T., & Yan, J. (2022). Gender differences in pleasure: The mediating roles of cognitive flexibility and emotional expressivity. *Bmc Psychiatry*, 22, 320. <https://doi.org/10.1186/s12888-022-03945-9>
- Wang, Z. J., Liu, C. Y., Wang, Y. M., & Wang, Y. (2024). Childhood psychological maltreatment and adolescent depressive symptoms: Exploring the role of social anxiety and maladaptive emotion regulation strategies. *Journal of Affective Disorders*, 344(1), 365–372. <https://doi.org/10.1016/j.jad.2023.10.046>
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063–1070. <https://doi.org/10.1037/0022-3514.54.6.1063>
- Wenzlaff, R. M., & Wegner, D. M. (2000). Thought suppression. *Annual Review of Psychology*, 51, 59–91. <https://doi.org/10.1146/annurev.psych.51.1.59>
- Wersebe, H., Lieb, R., Meyer, A., Hofer, P., & Gloster, A. (2018). The link between stress, well-being, and psychological flexibility during an acceptance and commitment therapy self-help intervention. *International Journal of Clinical and Health Psychology*, 18(1), 60–68. <https://doi.org/10.1016/j.ijchp.2017.09.002>
- Whittle, S., Yücel, M., Yap, M. B. H., & Allen, N. B. (2011). Sex differences in the neural correlates of emotion: Evidence from neuroimaging. *Biological Psychology*, 87, 319–333. <https://doi.org/10.1016/j.biopsycho.2011.05.003>
- Yeh, K. H., Bedford, O., Wu, C. W., Wang, S. Y., & Yen, N. S. (2017). Suppression benefits boys in Taiwan: The relation between gender, emotional regulation strategy, and mental health. *Frontiers in Psychology*, 8, 135. <https://doi.org/10.3389/fpsyg.2017.00135>
- Zlomke, K. R., & Hahn, K. S. (2010). Cognitive emotion regulation strategies: Gender differences and associations to worry. *Personality and Individual Differences*, 48, 408–413. <https://doi.org/10.1016/j.paid.2009.11.007>

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