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Depressive symptoms in individuals experiencing maternal overcontrol: The specific mediating role of brooding rumination

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ABSTRACT

Parental overcontrol is associated with depressive symptoms and affective vulnerability. A ruminative response style may develop as a coping mechanism for a highly controlling and critical parenting style. The main aim of the current cross-sectional study was to examine the mediating role of brooding and reflective rumination in the association between maternal/paternal overcontrol and depressive symptoms, controlling for potential confounding variables, including adverse childhood experiences (ACEs) and clinically relevant anxiety levels. Five-hundred-sixty participants (121 males and 439 females; mean age = 23.65 ± 8.74 years) completed an online survey assessing maternal/paternal overcontrol, rumination, ACEs, depressive and anxiety symptoms. Only the model including maternal overcontrol fit the data and the association with depressive symptoms was mediated only by brooding rumination. This association remained significant even when controlling for relevant confounding factors. Our sensitivity analyses also showed that the association between parental overcontrol and anxiety symptoms was not mediated by either brooding or reflective rumination when clinically relevant depressive levels were included as covariates. Our data support a specific pathway through which maternal overcontrol may promote the development of brooding rumination which, in turn, affects depressive symptoms severity.

1. Introduction

Depression is recognized as a worldwide public health crisis due to its increasing prevalence (COVID-19 Mental Disorders Collaborators, 2021; Moreno-Agostino et al., 2021), early onset (i.e., the peak and median age at onset are 19.5 years and 30 years, respectively; Solmi et al., 2022) and associated impact on psychosocial, physical, and emotional functioning (Penninx et al., 2013; Winer et al., 2014). An estimated 5 % of the adult population in the world suffers from major depressive disorder (MDD) (World Health Organization, 2023) and, globally, around 35 % of individuals experience elevated depressive symptoms (Cai et al., 2023; Li et al., 2022; Shorey et al., 2022).

MDD is a complex clinical disorder arising from a combination of genetic, environmental, psychological, and biological factors (Marx et al., 2023). Among environmental factors, exposure to adverse childhood experiences (ACEs), including maltreatment, abuse, neglect, and household dysfunctions, has been recognized as a significant risk factor for the development of depression (Tan & Mao, 2023). Although not formally included in the ACEs, several studies have also shown that parental overcontrol (i.e., repeated and prolonged behavioral pattern of overprotection and intrusion by the maternal and/or paternal figure) could be considered a specific form of child maltreatment (Carbone et al., 2024; Farina et al., 2021; Massullo et al., 2023; Sar et al., 2021).

Critically, higher levels of parental overcontrol are considered an important factor associated with depressive symptoms and affective vulnerability (Farina et al., 2021; Kidd et al., 2022). Indeed, parental overcontrol can lead to increased negative perception of the Self (i.e., weak, fragile and vulnerable) and the world (i.e., perceived as always

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threatening) (Bruysters & Pilkington, 2023; Farina et al., 2021). Moreover, overcontrol is considered a key predictor in the development of certain recurrent, dysfunctional, and rigid perseverative negative thoughts that characterize depression (Castro et al., 2023; Manfredi et al., 2011), namely rumination (Kovacs et al., 2020; Yang et al., 2023).

Among these rigid perseverative negative thoughts, rumination is considered an important transdiagnostic risk factor contributing to the development of both depression and anxiety (McLaughlin & Nolen-Hoeksema, 2011). Indeed, according to Nolen-Hoeksema's Response Style theory of depression (1991), rumination – defined as a way of coping with sad and negative feelings by passively and repeatedly focusing on one's negative emotions and beliefs – might contribute to individual differences in vulnerability to depression (Treynor et al., 2003). Particularly, rumination involves a response pattern to distress where individuals passively and persistently focus on their disturbing symptoms, their potential causes, and consequences, rather than proactively addressing the problems contributing to their suffering (Nolen-Hoeksema, 1991).

Studies that have investigated the relationship between ruminative tendency and depression have focused on two forms of rumination: brooding and reflection (Satyshur et al., 2018; Treynor et al., 2003). Brooding rumination is defined as a passive and self-critical comparison of one's current state with an unachieved standard. Instead, reflective rumination is a purposeful and contemplative turning inward to engage in cognitive problem-solving to alleviate one's depressive symptoms (Treynor et al., 2003). Brooding and reflective rumination are considered distinct constructs, where brooding represents a more maladaptive form of rumination than reflection, with a stronger and more consistent association to depression (Junkins & Haeffel, 2017; Rogers & Joiner, 2017; Whitmer & Gotlib, 2011). Indeed, the relationship between reflective rumination and depressive symptoms is more controversial (Junkins & Haeffel, 2017). Some studies suggest that reflection does not increase the risk of future depression and may even have a protective effect (Burwell & Shirk, 2007; Grossmann & Kross, 2010; Treynor et al., 2003). On the other hand, other reports have demonstrated its potential depressogenic effects (Joormann et al., 2006; Xavier et al., 2016), especially when they are associated with high levels of brooding ruminations (Junkins & Haeffel, 2017).

Interestingly, brooding rumination has a role in the development and maintenance of depression not only in adults but also in adolescents and children (Stroud & Fitts, 2017; Tsypes & Gibb, 2016). In contrast, the existing studies on reflective rumination showed neither an association with depressive symptoms nor a predictive role in their development in both adolescents and children (Mezulis et al., 2011; Verstraeten et al., 2011). Furthermore, in adolescence, brooding has been shown to be associated with maladaptive disengagement coping strategies (e.g., avoidance, denial, wishful thinking, etc.), whereas reflection seem to be associated with adaptive strategies (e.g., emotion expression, positive thinking, acceptance, etc.) (Burwell & Shirk, 2007).

It has been hypothesized that a ruminative response style may develop as a coping mechanism for a highly controlling and critical parenting style (Castro et al., 2023; Watkins, 2016). More specially, some authors have suggested that parents play a significant role in the development of brooding tendency in their children by failing to teach them both implicit and explicit adaptive emotion regulation strategies such as distraction and problem solving in early childhood and adolescence (Stroud & Fitts, 2017). Nolen-Hoeksema (1991) also hypothesized that children are more likely to develop a brooding style when parents are overcontrolling and intrusive, thereby interfering with the child's ability to cope autonomously.

Despite this assumption, the potential mediating role of rumination in the association between parental overcontrol and depressive symptoms has been relatively understudied, with mixed results. For example, while Williams et al. (2015) reported nonsignificant results, Bahari et al. (2019) showed that maternal overprotection mediated the relationship between brooding rumination and depressive symptoms in a sample of university students. Similarly, the mediating role of depressive rumination in the association between paternal and maternal overcontrol was recently shown in a sample of non-clinical adults by Akiyama et al. (2024).

These mixed results could be explained by differences in study designs and/or failure to assess potential confounding variables, including other forms of ACEs and anxiety. For example, the mediating role of rumination in the association between childhood maltreatment and depression in adulthood is well documented (Deguchi et al., 2021; Raes & Hermans, 2008). Similarly, parental overcontrol is known to be strongly associated with high levels of anxiety (Shimasaki et al., 2023; Spada et al., 2012). Overall, these studies supported the association between parental overcontrol and rumination, but they did not clarify how their association contributes to depression severity.

Against this background, in the present study we aimed to further elucidate the complex relationship between parental overcontrol, rumination, and depressive symptoms in a non-clinical sample of adults. The study of psychopathological dimensions (such as brooding and other depressive symptoms) in non-clinical populations (i.e. in subjects not already suffering from diagnosed psychiatric disorders) can be useful because it allows us to characterize the relationship between these variables in a perspective that is unrelated to existing diagnostic categories (Lawn et al., 2022; Maj, 2016; Marques et al., 2021).

Specifically, compared to previous reports on this topic (Akiyama et al., 2024; Bahari et al., 2019) we aimed to: i) examine the specific role of both maternal and parental overcontrol on depressive symptoms, considering reflective and brooding rumination as mediators separately; ii) control for potential confounding variables, including forms of maltreatment other than overcontrol and clinically relevant anxiety levels; iii) test alternative models examining the severity of anxiety as a dependent variable to better understand the specific association between parental overcontrol, rumination, and depressive symptoms. We hypothesized that higher levels of parental overcontrol would be positively associated with higher depressive symptoms and that this association would be significantly mediated by brooding rumination after controlling for potential confounding variables.

2. Methods

2.1. Participants

An a priori power analysis was carried out according to Fritz and Mackinnon (2007). It showed that a mediational model conducted with the percentile bootstrap procedure requires at least 558 participants to achieve a statistical power of 0.80, assuming small effect sizes for both paths "*a*" and "*b*".

The current study included a convenience sample of 560 participants (121 males and 439 females; mean age ± standard deviation = 23.65 ± 8.74 years; min/max: 18–74) who responded to an online survey shared via web-based devices, including social media (e.g., Facebook, WhatsApp, Instagram, LinkedIn), mailing lists, and personal contacts. The enrollment lasted from November 2023 to May 2024. Subjects responded by opening the QR code of the questionnaire or the web link to the survey on their smartphone, tablet or PC. All participants took part in the study voluntarily (i.e., they received no payment or other compensation including academic credits) and anonymously.

The inclusion criteria for participation in the present study were: (i) age over 18 years, (ii) good Italian language skills, (iii) written informed consent to participate in the study, (iv) correct answering of an attentional check item (i.e., "*please select response #2*"). Data were collected in the context of a multicentric study (Roma, Padova, and Torino) looking at the endophenotypes and risk factors of depression (PRIN Project 20228P4H2K supported by MUR of Italy). The Ethics Review Committee of the European University of Rome has evaluated and approved the study procedure (Prot. n. 12/2023) according to the principles of the Helsinki Declaration.

2.2. Measures

The following self-report questionnaires were used in the present study: the overcontrol subscale of the Measure of Parental Style (MOPS; Parker et al., 1997), the 10-item version of the Adverse Childhood Experiences International Questionnaire (ACE-IQ-10; Felitti et al., 1998; Wingenfeld et al., 2011), the Beck Depression Inventory-II (BDI-II; Beck et al., 1996), the 10-item version of the Ruminative Responses Scale (RRS-10; Treynor et al., 2003) and the Anxiety subscale of the Brief Symptom Inventory (ANX-BSI; Derogatis & Melisaratos, 1983). Participants were also asked to provide the following sociodemographic and clinical data: age, biological sex, educational level, occupation, marital status, tobacco use, use of psychiatric medications and illicit substances (i.e., cannabis, cocaine or amphetamines, heroin or other opiates, and/or other unlisted illicit substances) in the past two weeks. Frequency of alcohol use was also assessed with the first item (i.e., "*How often do you have a drink containing alcohol*?") of the Alcohol Use Disorders Identification Test (AUDIT#1; Babor et al., 2001).

The overcontrol subscale of the MOPS (Parker et al., 1997) consists of eight items that examine the level of maternal (four items) and paternal (four items) overcontrol. Participants are asked to provide separate responses for both parents according to their memories of maternal/paternal behaviors before the age of 16 years (e.g., her/his *"over controlling of me"*). The items are rated on a 4-point Likert scale (from 0 = *"not true at all"* to 3 = *"extremely true"*), with higher scores indicating a higher level of parental overcontrol. A cut-off score of ≥6 and ≥2 has been proposed (Imperatori, Adenzato, et al., 2022) to identify individuals with significant levels of maternal and parental overcontrol, respectively. These cut-off scores have been empirically determined using the Receiver Operating Characteristic (ROC) test procedures (Ruopp et al., 2008) to assess the performance of the MOPS (i.e., total score and subscales) in categorizing organized and disorganized individuals according to the Adult Attachment Interview (George et al., 1996). In the present report, the Italian adaptation of the scale (Picardi et al., 2013) was used, and internal consistency was appropriate for both subscales (i.e., Cronbach's alpha of 0.70 and 0.77 for the paternal and maternal subscales, respectively).

The ACE-IQ-10 is a dichotomous (i.e., 0 = "no"; 1 = "yes") 10-item retrospective questionnaire that examines five categories of maltreatment (i.e., physical/emotional/sexual abuse, and physical/emotional neglect) and five types of family dysfunction (e.g., parental separation/divorce, household mental disorders/suicide attempt). The total score ranges from 0 to 10, with higher scores indicating a higher number of ACEs. A cut-off score of ≥4 is considered clinically significant (Hughes et al., 2017). Several studies have shown that the scale is characterized by appropriate psychometric properties (e.g., Kovacs-Toth et al., 2023; Van der Feltz-Cornelis & de Beurs, 2023). In the present study, the Italian translation (Save the Children Italia, 2022) of the scale was used and the Cronbach's alpha was 0.65.

The BDI-II is a 21-item well-validated self-report instrument that assesses depressive symptoms in the past two weeks. Respondents were asked to rate each item on a 4-point Likert-type scale (from 0 to 3), with higher scores indicating more severe depressive symptoms. The total score ranges from 0 to 63. A large body of literature has supported the psychometric properties of the scale in both clinical and non-clinical samples (for a review see Manian et al., 2013; Wang & Gorenstein, 2013). In the present study, according to a recent diagnostic meta-analysis (von Glischinski et al., 2019), a cut-off score of ≥19 was used to identify individuals with clinically relevant levels of depressive symptoms. In the present study, the Italian version of the BDI-II (Sica & Ghisi, 2007) was used and the Cronbach's alpha was 0.91.

The RRS-10 is a 10-item self-report scale that measures two types of rumination: brooding (RRS-10-B; five items) and reflection (RRS-10-R; five items). Whereas reflective rumination (e.g., *"Go away by yourself and think about why you feel this way"*) is characterized by the an attempt to understand the reasons for one's distress, brooding rumination (e.g., *"Think "Why do I have problems other people don't have?"*) refers to the tendency to "*dwell on the negative consequences of one's distress"* (Rogers & Joiner, 2017, p. 132). Respondents were asked to rate each item on a 4-point Likert-type scale (from 1 = *"never"* to 4 = *"always"*), with higher scores indicating greater ruminative symptoms. Several studies have shown that the RRS-10 is characterized by good psychometric properties (e.g., Lucena-Santos et al., 2018; Thanoi & Klainin-Yobas, 2015). In the present study the Italian adaptation of the scale was used (Macchia et al., 2012) and the Cronbach's alpha was 0.72 and 0.74 for brooding and reflection subscales, respectively.

The ANX-BSI subscale consists of six items and is considered a reliable measure of anxiety symptoms (Derogatis, 2017). Respondents were asked to rate each item on a 5-point Likert scale (0–4), with higher scores indicating more severe anxiety symptoms. We used a validated Italian version of the subscale (De Leo et al., 1993). Subjects with clinically relevant levels of anxiety were assessed with a cut-off score of 63 T, as suggested by the test authors (Derogatis & Melisaratos, 1983) and in line with previous reports (e.g., Carbone et al., 2023; De Rossi et al., 2024; Grassi et al., 2000; Grassi et al., 2018; Imperatori, Panno, et al., 2022). In our sample, the Cronbach's alpha for the ANX-BSI subscale was 0.82.

2.3. Statistical analysis

All analyses were performed using the SPSS (20.0) statistical package (IBM, Armonk, NY, USA). Normality of data was assessed using skewness and kurtosis according to Kim (2013). The relationships between the main variables of the study were assessed using Pearson's *r* correlation coefficient.

To determine whether the relationship between paternal/maternal overcontrol and depressive symptoms was mediated by brooding and reflection rumination, a single mediation analysis with two mediators was conducted using the "Model 4" option of SPSS Macro Process v3.5 (Hayes, 2012) with 5000 bootstrap samples. Specifically, maternal (Model#1) and paternal (Model#2) total score for overcontrol were set as independent variables, BDI-II total score was considered as the dependent variable, and the two total scores for RRS-10-B and RRS-10-R were set as mediators. In these models, in order to investigate the specific effect of parental overcontrol on depressive symptoms, sociodemographic (i.e. sex, age, education level, occupation, marital status), substance-related variables (i.e., frequency of alcohol use, tobacco use, illicit drugs use, and psychotropic medication use), and clinically relevant levels of anxiety were included as covariates to adjust for potential confounding factors. Given the strong association between ACEs and depressive symptoms (Tan & Mao, 2023), the ACE-IQ-10 total score (i.e., forms of maltreatment other than overcontrol) was also included as a covariate. Lastly, in Model#1, the paternal overcontrol total score was included as a covariate. The opposite was done for Model#2 (i.e., inclusion of maternal overcontrol total score as a covariate).

To better investigate the specific effect of rumination on the association between overcontrol and depressive symptoms, the following additional alternative models were tested as a sensitivity analysis: maternal (Model#3) and paternal (Model#4) overcontrol total score as independent variables, brooding and reflection rumination as mediators, ANX-BSI total score as dependent variable. The same covariates of Model# 1 and Model#2 were considered, also including the clinically relevant levels of depressive symptoms (instead of the clinically relevant levels of anxiety).

For each model, we reported three separate pathways (Baron & Kenny, 1986): i) pathway *a* (i.e., the direct effect of maternal/paternal overcontrol on brooding and reflection rumination), ii) pathway *c'* (i.e., the direct effect of maternal/paternal overcontrol on the BDI-II total score), iii) pathway *c* (i.e., the total effect of maternal/paternal overcontrol on the BDI-II total score, summing direct and indirect effect). Pathway *b* (i.e., the association of brooding and reflection rumination with the BDI-II total score) and pathway *ab* (i.e., the indirect effect of maternal/paternal overcontrol on the BDI-II total score through

brooding and reflection rumination) are also shown in the graphical representations.

3. Results

The socio-demographic and clinical data are shown in Table 1. In the present sample, according to the cut-off scores described above, 24.64 % of the sample (n = 138) met the criteria for possible clinically relevant depression, and 11.43 % (n = 64) of the sample met the criteria for possible clinically relevant anxiety. In addition, 18.04 % (n = 101), 36.79 % (n = 206) and 61.25 % (n = 343) of the sample reported clinically significant ACEs, maternal and paternal overcontrol, respectively.

Correlational analyses revealed that both maternal (r = 0.368, p < .001) and paternal overcontrol (r = 0.382, p < .001) were positively related to the ACE-IQ-10 total score. Both MOPS subscales were also positively related (p < .001) to the RRS-10-B, RRS-10-R, BDI-II, and ANX-BSI total scores. The full correlation matrix is shown in Table 2.

The results of Model #1 (i.e., maternal overcontrol total score as the independent variable, BDI-II total score as the dependent variable, and both RRS-10-R and RRS-10-B total scores as mediators) are shown graphically in Fig. 1 and reported in full in Supplementary Table 1 [see Supplementary Table 2 for the unadjusted (i.e., without covariates) pathway c']. The total effect was positive and significant [B = 0.577, SE = 0.119 (95 % CI: 0.344; 0.811)], indicating that higher maternal overcontrol was associated with higher depressive symptoms. Furthermore, the effect of maternal overcontrol was positive and significant on both reflective [B = 0.101, SE = 0.044 (95 % CI: 0.015; 0.188)] and brooding rumination [B = 0.120, SE = 0.040 (95 % CI: 0.042; 0.199)]. In turn, brooding rumination [B = 1.637, SE = 0.117 (95 % CI: 1.408; 1.867)], but not reflective rumination [B = −0.103, SE = 0.106 (95 % CI: −0.312; 0.105)], was positively associated with depressive symptoms. The direct effect of maternal overcontrol on depressive symptoms was also positive and significant [B = 0.391, SE = 0.101 (95 % CI: 0.192; 0.589)]. Finally, the indirect effect was significant for the RRS-10-B total score [B = 0.197, SE = 0.070 (95 % CI: 0.065; 0.335)], but not for RRS-10-R total score [B = −0.010, SE = 0.012 (95 % CI: −0.039; 0.011)], suggesting that the association between maternal overcontrol and depressive symptoms was significantly mediated only by brooding

Table 1
Socio-demographic and clinical data of the sample (N = 560).

Variables	Statistics
Age – M ± SD	23.65 ± 8.74
Females – N (%)	439 (78.39)
Occupation	
Students – N (%)	485 (86.61)
Employed – N (%)	52 (9.29)
Unemployed – N (%)	23 (4.11)
Married or living with partner – N (%)	59 (10.54)
Educational Level	
Middle school diploma or high school diploma – N (%)	366 (65.36)
Bachelor's degree – N (%)	147 (26.25)
Master's degree – N (%)	37 (6.61)
PhD degree – N (%)	10 (1.79)
Alcohol use	
Never – N (%)	56 (10.00)
Monthly or less – N (%)	132 (23.57)
2–4 times a month – N (%)	272 (48.57)
2–3 times a week – N (%)	95 (16.96)
4 or more times a week – N (%)	5 (0.89)
Tobacco use – N (%)	192 (34.29)
Substance use[a] – N (%)	67 (11.96)
Current psychiatric medication use – N (%)	50 (8.93)
Maternal overcontrol – M ± SD	4.70 ± 3.14
Maternal overcontrol ≥6 – N (%)	206 (36.79)
Paternal overcontrol – M ± SD	2.88 ± 2.68
Paternal overcontrol ≥2 – N (%)	343 (61.25)
ACE-IQ-10 – M ± SD	1.80 ± 1.77
ACE-IQ-10 ≥ 4 – N (%)	101 (18.04)
RRS-10-Brooding – M ± SD	10.76 ± 3.03
RRS-10-Reflection – M ± SD	9.80 ± 3.21
BDI-II total score – M ± SD	13.30 ± 9.89
BDI-II ≥ 19 – N (%)	138 (24.64)
ANX-BSI – M ± SD	1.12 ± 0.81
ANX-BSI ≥ 63 T – N (%)	64 (11.43)

Abbreviations: ACE-IQ-10 = 10-item version of the Adverse Childhood Experiences International Questionnaire; RRS-10 = 10-item version of the Ruminative Responses Scale; BDI-II = Beck Depression Inventory-II; ANX-BSI = Anxiety subscale of the Brief Symptom Inventory.

[a] Number of individuals who reported the use of one or more of the following substances in the last two weeks: cannabis, cocaine or amphetamines, heroin or other opiates, other unlisted illegal substances.

Table 2
Values of Pearson's r correlation coefficient among study variables in all sample (N = 560).

	1	2	3	4	5	6	7
1. Maternal overcontrol	–						
2. Paternal overcontrol	0.358*	–					
3. ACE-IQ-10 total score	0.368*	0.382*	–				
4. RRS-10-Reflection	0.219*	0.190*	0.321*	–			
5. RRS-10-Brooding	0.238*	0.233*	0.316*	0.510*	–		
6. BDI-II total score	0.325*	0.287*	0.409*	0.381*	0.666*	–	
7. ANX-BSI total score	0.277*	0.319*	0.345*	0.392*	0.523*	0.664*	–

Note: Abbreviations: ACE-IQ-10 = 10-item version of the Adverse Childhood Experiences International Questionnaire; RRS-10 = 10-item version of the Ruminative Responses Scale; BDI-II = Beck Depression Inventory-II; ANX-BSI = Anxiety subscale of the Brief Symptom Inventory.

* p < .001.

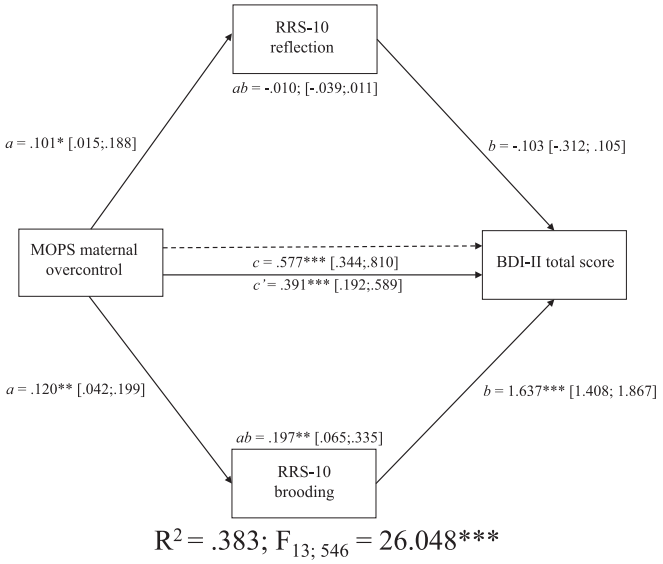

Fig. 1. Graphical representation of Model #1 (i.e., maternal overcontrol total score as the independent variable, BDI-II total score as the dependent variable, and both RRS-10-R and RRS-10-B total scores as mediators).
Abbreviation: MOPS = Measure of Parental Style; RRS-10 = The 10-item ruminative response scale; Beck Depression Inventory–II.
Note: The reported estimates were obtained controlling for potentially competing factors (i.e., sex; age; educational level; occupation; marital status; frequency of alcohol use; tobacco use; drug use, use of psychotropic drugs; clinically-relevant anxiety, paternal overcontrol and ACE-IQ-10 total score.
* = p < .05; ** = p < .01; *** = p < .001.

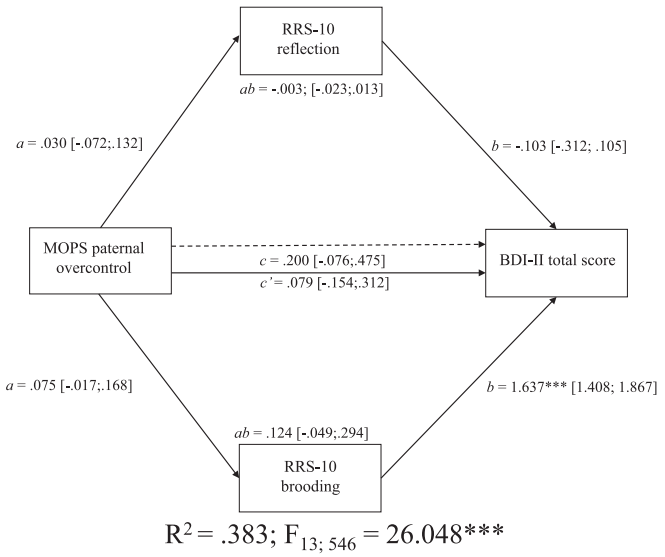

Fig. 2. Graphical representation of Model #2 (i.e., paternal overcontrol total score as the independent variable, BDI-II total score as the dependent variable, and both RRS-10-R and RRS-10-B total scores as mediators).
Abbreviation: MOPS = Measure of Parental Style; RRS-10 = The 10-item ruminative response scale; Beck Depression Inventory–II.
Note: The reported estimates were obtained controlling for potentially competing factors (i.e., sex; age; educational level; occupation; marital status; frequency of alcohol use; tobacco use; drug use, use of psychotropic drugs; clinically-relevant anxiety, paternal overcontrol and ACE-IQ-10 total score.
* = $p < .05$; ** = $p < .01$; *** = $p < .001$.

rumination.

The results of Model #2 (i.e., paternal overcontrol total score as independent variable, BDI-II total score as dependent variable, both RRS-10-R and RRS-10-B total scores as mediators) are shown graphically in Fig. 2 and reported in full in Supplementary Table 3. This model was not supported, as indicated by the non-significant results for both the total effect [B = 0.200, SE = 0.140 (95 % CI: −0.076; 0.475)] and the direct effect [B = 0.079, SE = 0.119 (95 % CI: −0.154; 0.312)].

For sensitivity analyses, alternative models were conducted in which anxiety symptoms were considered as dependent variables while controlling for clinically relevant levels of depressive symptoms. Although the total effect of both models was positive and significant, suggesting that higher maternal and paternal overcontrol were associated with higher anxiety symptoms, our results showed that this association was mediated neither by brooding nor by reflective rumination. These models are graphically reported in supplementary Fig. S1 and Fig. S2.

4. Discussion

The main aim of the current study was to investigate the association between maternal and paternal overcontrol and depressive symptoms and to test the potential mediating role of reflective and brooding rumination. Our results showed that only the model including maternal overcontrol fit the data and that the association with depressive symptoms was mediated only by brooding rumination. This association remained significant even when controlling for relevant confounding factors (e.g., ACEs and clinically relevant levels of anxiety). Of note, our sensitivity analyses showed that the association between parental overcontrol and anxiety symptoms was not mediated by either brooding or reflection rumination, when clinically relevant levels of depressive symptoms were included as covariate.

Thus, the current results suggest that brooding rumination could be considered a specific mediating factor for the association between maternal overcontrol and depressive symptoms. These findings are not only consistent with previously published data in the literature (Akiyama et al., 2024; Bahari et al., 2019), but also provide new insights into the relationship between overcontrol, rumination, and depression (e.g., examining the specific role of both maternal and parental overcontrol, separately reflective and brooding rumination as mediators, and controlling for important confounding variables, including ACE-IQ-10 total score and clinically relevant anxiety levels).

As mentioned in the introduction, and in line with previous studies (Junkins & Haeffel, 2017; Rogers & Joiner, 2017; Whitmer & Gotlib, 2011), of the two subtypes of ruminative thinking studied, namely brooding and reflective rumination, only brooding showed the most consistent and robust association with depression. For instance, people who engage in brooding exhibit higher levels of depressive symptoms, experience longer depressive episodes, and have an increased risk of future depression (Junkins & Haeffel, 2017; Rogers & Joiner, 2017; Whitmer & Gotlib, 2011). In addiction, this form of rumination seems to be involved also in the maintenance of depression (Treynor et al., 2003).

From a developmental and evolutionary biology perspective, it is possible to hypothesize that rumination in general, but brooding in particular, is a form of adaptation to developmental conditions (e.g., intrusive and critical behaviors) typical of maternal overcontrol (Castro et al., 2023; Watkins, 2016), which in turn influences the severity of depression. As mentioned in the introduction, several researchers (Nolen-Hoeksema, 1991; Stroud & Fitts, 2017) have hypothesized that intrusive, demanding, and overcontrolling parents prevent children from autonomously and effectively developing coping strategies for negative emotions such as distraction and problem solving, and that this can lead to the development of brooding, which in turn generates and maintains depressive symptoms. This is consistent with the findings that brooding rumination in adolescence is associated with an increased use of maladaptive disengagement coping strategies (Burwell & Shirk, 2007). Furthermore, Nolen-Hoeksema and Watkins have suggested that rumination should be considered as one of the transdiagnostic risk factors "*that vary along continua in the general population*" (Nolen-Hoeksema & Watkins, 2011, p. 590), as it represents a pathogenetic process common to several psychiatric disorders in a dimensional way.

This perspective links very well with new research approaches in psychopathology, such as the Research Domain Criteria (RDoC) of the US National Institute of Mental Health (Cuthbert & Insel, 2013). The RDoC considered rumination as a "*dynamic process that is likely a major driving force in the neurodevelopmental progression of depression*", particularly for its Negative Valence System dimension (Woody & Gibb, 2015, p. 5). This approach also suggests a necessary shift in the way we study the factors that influence mental disorders, moving from a categorical, disease-centered model to a dimensional approach based more on pathogenetic and maintaining processes than just psychopathological manifestations (Luyten & Fonagy, 2018). Accordingly, in the current study we have investigated the association between specific psychopathological dimensions in a non-clinical sample (Lawn et al., 2022; Maj, 2016; Marques et al., 2021).

This perspective may also have useful clinical implications. Indeed, the results of our study could have significant implications for the assessment, treatment decisions and strategies for depression. If confirmed by further research, they suggest that treatments for individual with depressive symptoms and a history of maternal overcontrol should focus on specifically reducing brooding rumination. Consistent with this dimensional approach, for several years, both psychotherapies and neuromodulatory therapies have focused on different therapeutic targets related to the various pathogenetic processes that characterize the different clinical pictures of affective disorders. One of these targets is precisely the reduction of brooding (Taylor et al., 2022; Vancappel et al., 2023). For example, several forms of third-wave cognitive-behavioral therapies (such as Rumination-focused Cognitive Behavior Therapy or Acceptance and Commitment Therapy) and mindfulness-based psychotherapies focus specifically on reducing brooding to treat depression and prevent relapse, with positive results (e.g., Vancappel et al., 2023). On the other hand, Taylor and colleagues (Taylor et al.,

2022) achieved a significant reduction in brooding and consequently depressive symptoms by treating patients using functional magnetic imaging (fMRI) connectivity neurofeedback, which targets the neurophysiological alterations thought to be typical of brooding. More recently, Tsuchiyagaito et al. (2023) obtained the same results, finding that real-time fMRI functional connectivity neurofeedback selectively reduces brooding and improves depressive symptoms.

Several limitations of the current report should be noted. First, although relationships between study variables in mediational models are inferred to be causal, in cross-sectional studies such models should be considered "*as a type of variance partitioning*" which can be useful to clarified whether the relationship between two variables is reduced or increased when a mediation variable is considered (Salthouse, 2011, p. 2). Therefore, it should be highlighted that the statistical design of the current report is correlational and accordingly does not allow for unequivocal interpretations of causal effects that should be investigated in future longitudinal studies. Second, although we used well-validated self-report measures, these may be subject to certain biases, such as recall bias and social desirability (Althubaiti, 2016). Furthermore, it should be noted that the overcontrol subscale of the MOPS examines maternal/paternal behaviors before the age of 16. Thus, the exact time frame of parental overcontrol, age, and developmental stage of the participants when they were exposed to this type of behaviors were not examined. Consequently, it was not possible to estimate how long the participants had practiced brooding rumination. In addition, as the sample was non-clinical, further studies are needed to investigate the relationship between overcontrol, rumination and depressive symptoms in patients with MDD. Finally, the data were collected via an online survey from certain groups of individuals who are more represented in the current sample (e.g., students and females), which affects the generalizability of the results. Therefore, future studies could ensure generalizability by including a clinical sample integrating self-report measures and structured interviews. Despite these limitations, the following strengths should also be considered: i) the sample size was adequate, as determined by an a priori power analysis; ii) we used widely validated assessment instruments that showed satisfactory reliability in the current sample; iii) we statistically adjusted for relevant sociodemographic and clinical confounding variables; iv) we tested alternative models to better understand the association between parental overcontrol, rumination, and depressive symptoms.

In conclusion, this study suggests a specific mediating role of brooding in the relationship between maternal overcontrol and depressive symptoms. Although our findings need to be confirmed in selected clinical populations, they also suggest the use of specific therapeutic protocols and techniques that focus on reducing brooding in individuals (including children and adolescents) with high levels of depressive symptoms and a history of maternal overcontrol.

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CRediT authorship contribution statement

Benedetto Farina: Writing – original draft, Supervision, Methodology, Conceptualization. **Simone Messerotti Benvenuti:** Methodology, Funding acquisition, Data curation, Conceptualization. **Rita B. Ardito:** Writing – original draft, Supervision, Methodology, Funding acquisition, Conceptualization. **Federica Genova:** Formal analysis. **Carola Dell'Acqua:** Methodology, Data curation, Conceptualization. **Aurelia Lo Presti:** Writing – original draft, Methodology, Data curation, Conceptualization. **Elena De Rossi:** Writing – original draft, Methodology, Formal analysis. **Giuseppe A. Carbone:** Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Mauro Adenzato:** Writing – original draft, Supervision, Methodology, Conceptualization. **Claudio Imperatori:** Writing – original draft, Supervision, Methodology, Funding acquisition, Formal analysis, Data curation, Conceptualization.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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