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The role of interpersonal emotional regulation on maternal mental health

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ABSTRACT

Purpose: Symptoms of depression and anxiety during the perinatal period have a negative impact on mothers and their developing children. A significant body of research has demonstrated an association between mental health and both individual and interpersonal emotion regulation. Yet, this association has not been studied during the perinatal period. The aim of this study was to explore the association between emotion regulation, maternal mental health, and interpersonal emotion regulation during the transition to motherhood in a sample of Chilean women.

Methods: Women in their third trimester of pregnancy ($n = 253$) provided self-reports of emotion regulation and symptoms of depression and anxiety during pregnancy and three months post-partum. Additional self-reports of interpersonal emotion regulation were obtained from individuals who were identified as social support persons by these women. **Results:** Maternal emotion regulation contributed to maternal symptoms of depression and anxiety during pregnancy and after childbirth. The association between emotion regulation and maternal mental health was moderated by specific interpersonal emotion regulation strategies reported by the participant's social support persons. Strategies including modulating the emotional response, situation modification, attentional deployment and cognitive change, modified the association between poor regulation strategies and anxiety symptoms. Also, an infrequent use of these interpersonal emotion regulation strategies strengthened the association between these maternal emotional regulation difficulties and anxiety symptoms.

Conclusion: Our findings suggest that interpersonal emotional regulation strategies impact the association of maternal emotional regulation strategies and maternal emotional wellbeing.

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KEYWORDS

Perinatal mental health; depression; anxiety; emotion regulation; interpersonal emotion regulation

Introduction

Perinatal mental health problems, especially symptoms of depression and anxiety, are one of the most frequent and serious complications during childbearing (Cameron et al., 2016). According to international studies, as many as 16% of women may develop symptoms of depression during pregnancy and 5% meet diagnostic criteria for a major depression disorder (Leight et al., 2010). After childbirth 19.2% of new mothers may present with major or minor depression in the first 3 months after delivery (Gavin et al.,

2005). Anxiety has a broad range of presentations and its prevalence rates vary, ranging from 0.3% to 7.4% during the first three months after childbirth (Fairbrother et al., 2016). As for comorbid depression and anxiety disorders, these affect 13.1% of women during the first eight weeks postpartum (Falah-Hassani et al., 2016). In Chile, 16–20% of women present symptoms of depression during the third trimester of pregnancy until 6 months after childbirth. Symptoms of perinatal anxiety are more prevalent, affecting 41,3% a 44,3% of new mothers in the same period (Coo et al., 2020).

Prenatal anxiety not only exposes mothers to high levels of distress, but it also has been associated with physiological effects in the child, such as higher parasympathetic activity, lower immunity and reduced grey matter in the brain (Field, 2017). Emotional development effects have also been reported, such as greater maternal negative emotionality and children's internalising problems (Field, 2017). Likewise, several studies have associated maternal depression with reduced sensitivity and responsiveness to infant cues and lower caregiving capability, which impact child development and mental health (Field, 2010; Phua et al., 2017; Priel et al., 2018; Tronick & Reck, 2009)

Emotional regulation (ER) is defined as a set of strategies that seek to modify the occurrence, magnitude, duration and expression of an emotional response in a specific context (Gross & John, 2003). These strategies are complex and evolve throughout life (Rutherford et al., 2015). Several studies show an association between mental health and emotional regulation. A meta-analysis review found that strategies such as rumination and avoidance of stimuli perceived as negative were associated with depressive symptoms (Aldao et al., 2010). Likewise, Kashdan and Rottenberg (2010) have suggested that individuals who present with mental health symptoms would access fewer emotional regulation strategies and would be less flexible in their use.

Little research exists on how ER strategies impact perinatal mental health. Haga et al. (2012) explored this phenomenon in 737 new mothers and found that ruminating, blaming oneself, and catastrophizing were significantly related to higher levels of depressive symptoms, but using the strategies of positive reappraisal and concentrating on planning predicted lower postpartum depression symptoms 3 months after childbirth. Marques et al (2018) explored the association between ER, attachment representations and symptoms of depression and anxiety in the postpartum period. Their study showed that women with comorbid symptoms of depression and anxiety report more ER difficulties than women who report symptoms of depression with no comorbidities and healthy women (2018).

ER strategies do not only have an important role on maternal mental health, but also serve a functional purpose. It is crucial for mothers to be able to manage their own emotions when faced with their distressed infant and respond sensitively to soothe and facilitate regulation in their child (Rutherford et al., 2015).

Most studies have focused on individual aspects of ER, but episodes of ER processes often occur during the interaction with others. In social contexts, individual do not only regulate their emotions, but make efforts to regulate the emotions of others. Regulatory processes oriented to influence emotional states that belong to someone other than the regulator are regarded as interpersonal emotional regulation (IER) (Niven, 2017).

Studies addressing IER often focus on how adults influence ER in children (Feldman, 2003; Thompson, 1994). For instance, how parents sooth their distressed child. However, as Rimé (2009) emphasises, the interpersonal dimension of ER starts developing during infancy

and continues during adolescence and adulthood. As individuals grow and develop, interpersonal regulation processes include other social actors such as friends and romantic partners (Butler & Randall, 2013; Reed et al., 2015; Saxbe & Repetti, 2010). Studies show that IER may contribute to developing patterns of co-regulation and co-dysregulation in close relationships, in which partners enhance and diminish each other's worries and anxiety. For example, individuals may try to make their partner feel less worried, or more enthusiastic, about a particular situation (Butler, 2015). This suggests that IER may compensate intrapersonal ER difficulties. In work settings, IER has been shown to promote trust between leaders and team members, thus facilitating the development of new relationships and improving the quality of existing ones (Little et al., 2012; Niven, 2017).

Marroquín (2011) suggests that ER may be the mechanism by which social support is associated with the emergence of depression. In his view, interpersonal processes may contribute to the regulation (or dysregulation) of depressive emotional states. This is consistent with the studies that show the association between perceived level of social support and depression in general populations (Gariépy et al., 2016; Ren et al., 2018) and in perinatal women (Diaz et al., 2007; Hetherington et al., 2018). Taking this into account, IER strategies used by individuals who are emotionally close to the mothers and can be considered as social support persons in their lives, acquire an important role on the emotional wellbeing of the mother. Specifically, the emotional input from these individuals could contribute to maternal attempts to regulate their emotions and compensate possible difficulties that mother may experience in this realm. Alternatively, unsuccessful IER attempts from close individuals could contribute to greater increased maternal emotion dysregulation.

For example, affect improving, which refers to the use of strategies to maximise positive emotions and increase feelings of happiness and joy (Gross, 2015), may be particularly relevant during pregnancy, where anticipating future positive events associated with the baby's birth may buffer unpleasant feelings during the pregnancy. Experiencing positive affect is characteristic of positive close relationships and contributes to the development of social bonds and intimacy (Ramsey & Gentzler, 2015).

Studies addressing the role of IER have not explored this phenomenon in the context of maternal wellbeing during the perinatal period. In this study, we assess the contribution of maternal ER strategies to maternal mental health and explore the potential role of the IER strategies used by the women's social support persons as a moderator of the association between maternal ER and mental health. We hypothesise that maternal ER difficulties will be related to maternal mental health problems during the third trimester of pregnancy and at three months postpartum. We also hypothesise that IER used by the women's support people will lessen the strength of the association between maternal ER difficulties and symptoms of maternal depression and anxiety.

Materials and methods

Participants

Adult (>18 years old) pregnant women, who were fluent in Spanish and who reported at least one significant person in their life (>17 years old), were invited to participate in the study. The participants were recruited from two public health services in two cities in Chile (i.e. Santiago and Concepción). Between May 2018 and May 2019, two hundred and fifty-

three pregnant women in their third trimester of pregnancy and 246 persons who were identified by the mothers as support people in their lives participated. One hundred and twenty-two mothers were assessed again 10–14 weeks after childbirth. Three mothers who gave birth to very preterm children (<36 weeks gestation) or presented severe health complications after birth were excluded from the study. Sixty-two mothers could not be contacted or expressed their desire to withdraw from the study at the time of the second assessment, and 66 mothers had babies who were still younger than 10 weeks and could not be included in the follow-up assessments.

The women in the study ($N = 253$) were on average 28.6 years old ($SD = 5.55$, Range 18–44). Most of them were Chilean (81.6%) and were either married (26.1%) or living with a partner (39.5%). In terms of education, 36% had a university degree, 23.7% had technical education qualifications, and 23.3% had not pursued any studies after completing high school. Fifty-five percent of the women were working, 67.1% of them full time. The social support persons identified by the participants in the study reported a mean age of 37.58 ($SD = 13.75$, range 18–81). Most of them were the women's partners and fathers to their babies (60.6%) and the participants' own mothers (21.1%).

Instruments

Difficulties in Emotion Regulation Scale (DERS: Gratz & Roemer, 2004; Hervás & Jódar, 2008). Is a self-report questionnaire that assess self-regulatory difficulties. This instrument has been validated for Spanish-speaking populations (Hervás & Jódar, 2008). The adapted version includes 28 items organised in 5 subscales, in contrast to the 6 subscales described in the original, English version of the DERS. The 5 subscales include nonacceptance of emotional responses (Accept), difficulties engaging in goal-directed behaviour when upset (Goals), lack of emotional awareness (Aware), lack of emotional clarity (Clarity) and lack of emotional control (Control), which combines 2 of the original, English subscales of the instrument, namely limited access to effective emotion regulation strategies (Strategies), and impulse control difficulties when upset (Impulse). Individuals are asked to rate how often they experience these difficulties in a 4-point scale, with higher scores indicating more emotion regulation difficulties. This instrument was completed by the mothers involved in this study. In our study, Cronbach's alpha for the subscales ranged from .6 to .92 (Accept = .92, Goals = .84, Aware = .78, Clarity = .60, Control = .86).

Emotion Regulation of Others and Self (EROS: Da Costa et al., 2014; Niven et al., 2011). This self-report questionnaire assesses how often participants use strategies to regulate their own and other individuals' emotions during the past week. The 4 subscales address intrinsic affect-improving, intrinsic affect-worsening, extrinsic affect-improving and extrinsic affect-worsening. Each item is rated with a 5-point scale, with higher scores indicating a more frequent use of the specific strategies. Da Costa et al. (2014) have reported adequate psychometric properties of the Spanish version of the scale. In this study we asked the mothers' support person to complete the 9 items corresponding to the two subscales addressing extrinsic affect. The extrinsic affect-improving subscale refers to deliberate attempts to improve another person's feeling and include items such as 'I listened to someone's problems' and 'I gave someone positive advice'. The extrinsic affect-worsening subscale addresses the deliberate worsening of another person's feelings and include items such as 'I acted annoyed towards someone' and 'I told someone

about their shortcomings'. Cronbach's alphas were .61 for extrinsic affect-improving and .44 for extrinsic affect-worsening.

Interpersonal Emotion Management Scale (IEMS; Da Costa et al., 2014; Little et al., 2012). This 26-item self-report questionnaire assesses how frequently individuals engage in four specific strategies to regulate other individuals' emotions, namely situation modification (i.e., removing emotion-provoking elements from a situation), attentional deployment (i.e., focusing on a specific aspect of the situation to distract the attention from emotion-provoking elements), cognitive change (i.e., selecting a specific meaning to for the situation, making it less emotion eliciting), and modulating the emotional response (i.e., attempts to modify the intensity of the emotional expression and its associated behaviours). The Spanish version of the scale has adequate psychometric properties (Cronbach's alpha: .7) (Da Costa et al., 2014). This measure was completed by the mothers' social support persons. Cronbach's alphas for the subscales in our study ranged from .60 to .81 (situation modification = .60, attentional deployment = .50, cognitive change = .68 and modulating the emotional response = .81)

Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987; Jadresic et al., 1995). This 10-item, self-report questionnaire is used for screening current (i.e., over the past week) maternal symptoms of depression using a 4-point scale. This scale has been validated in Chile, with high reliability (Cronbach's alpha:.77), sensitivity (100%), and specificity (80%) reported (Jadresic et al., 1995). Cronbach's alpha was .86 in our sample.

Perinatal Anxiety Screening Scale (PASS; Somerville et al., 2015). This 31-item, self-report questionnaire assesses maternal perinatal anxiety over the past month. A total score is calculated by adding all items that indicates level of severity: minimal (0–20 points), mild to moderate (21–41 points) and severe (42–93). The PASS includes four subscales, namely general worry and specific fears; perfectionism, control and trauma; social anxiety; and acute anxiety and adjustment. The authors (Somerville et al., 2015) have reported high reliabilities for the subscales and the total scale (Cronbach's alphas ranged from 0.86 to 0.96). Cronbach's alpha in our study was .94 for the global score.

Demographic and obstetric information. A questionnaire was developed to assess socio-demographic characteristics, history of psychopathology, and perceived social support during pregnancy. This form included the following item to identify support individuals for the mothers: 'Please identify people who are significant in your life in terms of providing practical and emotional support. For instance, in domestic chores and childrearing and/or someone you can share with intimate thoughts and feelings and/or who provides help, advice and/or who helps you to calm down when you need it.' An additional item asked women 'How satisfied are you with the support you receive?'. This item had a 7-point Likert scale, being 1 very unsatisfied and 7 extremely satisfied. In the follow-up assessment the questionnaire included questions about delivery and child's health.

Procedure

We invited expecting mothers in their third trimester of pregnancy who received primary health care from two public health services in two cities in Chile (i.e., Santiago and Concepción) to participate in this study. Members of the research team approached potential participants at the health centres while they waited for their antenatal consultation. The

women who agreed to participate completed the questionnaires at the health service or over the phone. We contacted the mothers by phone after their due dates to congratulate them on the birth of their infants, record the exact birth date, and promote their commitment to the study. During the third month postpartum, (i.e. 10–14 weeks postpartum) we contacted the mothers again to apply the questionnaires for the second assessment.

Upon recruitment, the women identified an individual who was significant for them and could be considered a social support person. When the social support person was accompanying the woman at the health centre, the team member explained him or her the study and the IER questionnaires were completed after signing the Participant Information and Consent Form (PICF). In cases where the support person was not at the health centre, a member of the research team contacted him or her by phone to explain them the study. The social support persons who agreed to participate completed the single assessment over the phone and returned the signed PICF via email.

We referred all cases of mothers who reported high levels of depression or anxiety to the corresponding health services for assessment and treatment. Ethics approval was obtained from the Ethics Committees of the Universidad del Desarrollo and the Health Service at Concepción. All participants provided informed consent before joining the study.

Analysis

We conducted preliminary analyses to evaluate descriptive information and univariate distributions of mental health and emotion regulation variables for normality and outliers. Differences in maternal mood and ER variables between Time-1 (i.e., third trimester of pregnancy) and Time-2 (i.e., 10–14 weeks after childbirth) were assessed with paired-samples t-tests. We compared maternal symptoms of depression and anxiety according to the severity of ER difficulties (i.e., recoded into quartiles) with one-way ANOVA and conducted a factorial ANOVA to assess if greater maternal ER difficulties contributed to differences between antenatal and postpartum maternal symptoms of depression and anxiety.

One-way ANOVA was used to compare IER strategies of social support persons according to their relationship to the participant (i.e., partners, the women's own mothers, and other social support persons such as siblings and friends). Additional series of ANOVA compared women who had identified their partner, their own mother, or another person in terms of ER and mental health at the two assessment times.

We conducted a series of multiple regression analyses to explore the concurrent association between ER variables and maternal mood at Time-1 and Time-2. The prospective contribution of maternal ER at Time-1 and maternal mood at Time-2 was assessed with Hierarchical Regression Analyses controlling for maternal mood at Time-1. These analyses were conducted in IBM SPSS 25, we calculated bootstrap confidence intervals for p values and for estimates of individual predictors in all the regression analyses to minimise the effect of sampling variation.

A series of moderation analyses using the PROCESS macro for IBM SPSS (Hayes, 2018) was selected to examine each of the 6 IER variables reported by the women's social support persons as single moderators of the relation between maternal ER and mood during late pregnancy (i.e. Time 1). Due to the large number of tests, we used Bonferroni adjusted alpha levels of .0083 (.05/6). When more than one IER moderator was significant, we used a multiple moderator model to test possible interactions between these

moderators using MPLUS 8 (Muthén & Muthén, 2018). For significant individual moderators, we conducted simple slope analyses at three levels (i.e. 16th, 50th, and 84th percentiles) to follow up possible effects on maternal mental health at low, moderate, and high levels of the moderator (Hayes, 2018). The Johnson-Neyman procedure was used to identify trends in the statistical significance of the hypothesised moderation effect.

Results

x, the women reported low symptoms of depression and anxiety, and positive ER (see Table 1). Symptoms of maternal depression and anxiety decreased from late pregnancy to the postpartum. The new mothers also reported lower levels of emotional lack of control (Control), difficulty engaging in goal directed behaviours when upset (Goals), and non-acceptance of emotional responses (Accept) after childbirth compared to the antenatal assessment (see Table 1).

One-way ANOVA revealed no significant differences in IER between the three groups of social support persons (i.e. partners, the women’s own mothers and other individuals), all the social support persons reported overall positive IER skills (see Table 2).

Maternal mood and emotional regulation

Women who reported more maternal ER difficulties (i.e. the highest quartile) during pregnancy presented higher symptoms of depression and anxiety than women who reported the fewest ER difficulties (i.e. the lowest quartile) (see Table 3). However, results

Table 1. Means, standard deviations and range of maternal mental health and emotional regulation.

Variables	Pregnancy			Postpartum			t
	Mean	SD	Range	Mean	SD	Range	
Depression	6.23	5.13	0–28	4.91	4.85	0–23	1.20
Anxiety	22.87	14.73	0–93	19.98	14.07	0–69	3.25**
Emotional Regulation							
Control	9.47	4.50	6–30	8.55	4.16	6–29	2.12*
Accept	12.27	6.57	7–35	11.28	6.57	7–35	2.26*
Goals	7.61	3.64	4–20	6.85	3.59	4–20	1.66
Aware	21.21	3.92	8–25	21.03	4.80	7–25	.79
Clarity	4.75	2.34	3–15	4.61	2.35	3–15	–.16

* $p < .05$, ** $p < .01$.

Table 2. Means, standard deviations, and one-way analyses of variance in interpersonal emotional regulation according to their relationship to their support person.

	Partner		Own mother		Other		$F_{(2,184)}$	p
	M	SD	M	SD	M	SD		
Interpersonal emotional regulation								
Extrinsic affect-improving	26.18	3.41	26.77	2.76	27.48	3.74	1.96	.14
Extrinsic affect-worsening	9.56	3.09	9.56	3.31	9.93	3.06	.20	.82
Situation modification	26.95	4.55	27.64	5.15	27.91	4.94	.64	.53
Attentional deployment	27.75	4.87	27.24	6.49	27.61	5.27	.15	.86
Cognitive change	27.96	4.77	29.85	4.34	27.97	5.22	2.24	.11
Modulation of emotional response	16.45	8.03	16.21	7.50	18.28	8.10	.74	.48
N	123		39		33			

Table 3. Means, standard deviations, and one-way analyses of variance in maternal depression and anxiety at postpartum by ER during pregnancy.

	Depression postpartum										Anxiety postpartum									
	Q1		Q2		Q3		Q4		$F_{(4,109)}$	p	Q1		Q2		Q3		Q4		$F_{(4,107)}$	p
	M	SD	M	SD	M	SD	M	SD			M	SD	M	SD	M	SD	M	SD		
ER pregnancy	3.14	3.27	4.24	5.22	5.65	5.68	7.32 ^{##}	4.39	3.45	.01	13.86	9.82	18.24	14.3	23.38	14.12	27.54 ^{##}	14.75	4.65	.00
Control	1.63	2.43	5.00 [#]	4.90	4.76	5.31	7.69 ^{##}	4.27	7.05	.00	10.25	9.22	19.67	11.51	21.88 [#]	14.65	27.00 ^{##}	15.15	6.20	.00
Accept	3.32	4.96	4.15	4.11	5.75	4.47	7.48 ^{##}	4.84	3.56	.01	14.74	14.20	18.38	10.86	22.43	13.17	28.04 [#]	14.83	3.94	.01
Aware	7.80	5.33	5.42	4.64	5.00	5.35	2.65 ^{##}	3.17	5.57	.00	26.25	16.58	21.75	13.58	17.48	12.99	16.52	12.74	2.55	.06
Clarity	3.43	3.99	4.13	5.84	7.50 ^{##}	4.93	6.71	4.94	3.93	.01	16.64	12.28	17.50	17.52	25.85	12.37	24.33	15.40	2.40	.06

ER = Emotional Regulation; [#] = Bonferroni post-hoc analysis shows significant difference with Q1 at $p < .05$; ^{##} = Bonferroni post-hoc analysis shows significant difference with Q1 at $p < .01$

from the factorial ANOVA revealed no significant interactions between the severity of maternal ER difficulties and changes in maternal mental health from pregnancy to the postpartum.

During pregnancy, there were no significant differences in ER and mental health between women who had identified their partner, their own mother, or a different individual as a support person. However, at 10–12 weeks postpartum women who had identified a significant person who was not their partner or their own mother reported more ER difficulties and higher symptoms of depression than women who had signalled their partner as a support person (see Table 4).

Multiple regression analysis showed that low Accept, Goals, Aware, and Clarity contributed to symptoms of depression during the third trimester of pregnancy (see Table 5). Similarly, low Control, Goals and Clarity were associated with symptoms of maternal anxiety during the same assessment time (see Table 6). After childbirth, low Acceptance, Goals and Awareness contributed to both EPDS and PASS scores assessed at Time-2 (see Table 7). Hierarchical regression analyses exploring the prospective contribution of emotional regulation at Time-1 to maternal mood at Time-2 showed that ER variables did not make a significant contribution to either EPDS-2 or PASS-2, after controlling for EPDS-1 and PASS-1 scores (see Tables 4 and 5, respectively).

Moderating role of IER

Due to the lack of significant differences in ER and mental health during pregnancy between women who had identified their partner, their own mother, or another individual as their support person; and considering the similarity in IER between these groups, we combined the social support persons data to conduct the moderation analyses using data from Time 1. This contributed to have a large enough sample size to conduct moderation analyses (Hayes, 2018). Considering that participants who had identified a social support person that was not their partner or their own mother reported higher symptoms of depression at Time 2, data from these women were excluded from the moderation analyses using postpartum data.

Moderation analyses revealed that the relation between low Control and anxiety was significantly moderated by the IER strategies 'situation modification' and 'affect improving' (Table 8). When the possible interaction between these two moderators was tested using a two-moderator model, the results showed no significant results. Statistically significant slopes were observed individually at the 16th, 50th, and 84th percentile for the two IER strategies (affect improving = 16th: 1.62(.23), $t = 7.1$, $p = .00$; 50th: 2.34 (0.22), $t = 10.39$, $p = .00$; 84th: 3.02 (0.38), $t = 7.98$, $p = .00$; situation modification = 16th: 1.53(.24), $t = 6.23$, $p = .00$; 50th: 2.21 (0.21), $t = 10.46$, $p = .00$; 84th: 2.72 (0.3), $t = 9.04$, $p = .00$). Having a support person who frequently attempts to enhance the pregnant woman's positive emotions and to change some aspects of a stressful situation weakens the association between low maternal Control and low maternal Acceptance with maternal anxiety. An infrequent use of these IER strategies would strengthen the association between these maternal ER difficulties and their anxiety symptoms (see Figures 1 and 2).

Situation modification was also a significant moderator of the association between low maternal acceptance and anxiety (Table 8). Statistically significant slopes were observed at the 16th, 50th, and 84th percentile (16th: .86 (.19), $t = 4.58$, $p = .00$; 50th: 1.32 (.15),

Table 4. Means, standard deviations, and one-way analyses of variance in maternal mental health by type of support person.

	Pregnancy						Postpartum							
	Partner		Own Mother		Other		Partner		Own Mother		Other		$F_{(2,104)}$	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Depression	6.17	5.25	6.27	5.15	6.36	4.87	3.83	3.87	5.64	6.08	7.00	4.95	4.92	.01
Anxiety	22.90	15.60	22.42	13.68	23.18	13.52	17.15	13.19	23.57	16.00	23.13	12.67	3.04	.05
<i>N</i>	148		51		52		63		28		23			

Table 5. Hierarchical regression contribution of antenatal maternal emotional regulation (ER) to maternal depression during pregnancy and postpartum.

Model	Predictor	Pregnancy						Postpartum							
		<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>	LL	UL	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>	LL	UL
Control	Intercept								1.89	.77		2.46	.02	.56	3.17
	Depression (pregnancy)								.46	.09	.46	5.11	.00	.30	.65
ER	Intercept	4.73	1.93		2.71	.00	1.15	8.38	6.64	3.41		1.95	.05	-1.69	13.08
	Depression (pregnancy)								.28	.14	.28	1.96	.05	.06	.59
	Control	.13	.07	.12	1.91	.06	-.02	.27	-.01	.14	-.01	-.054	.96	-.23	.33
	Accept	.13	.06	.17	2.71	.00	-.01	.29	.14	.10	.18	1.38	.17	-.13	.35
	Goals	.23	.08	.17	2.70	.00	.07	.39	.00	.17	.00	.00	.99	-.42	.37
	Aware	-.28	.07	-.23	-4.47	.00	-.43	-.14	-.23	.13	-.19	-1.80	.07	-.46	.04
	Clarity	.62	.13	.29	4.88	.00	.37	.85	-.07	.28	-.03	-.25	.80	-.63	.41
<i>R</i> ²									.21						
ΔR^2									.05						

$t = 8.59, p = .00$; 84th: 1.63 (.22), $t = 7.40, p = .00$). Frequent use of this IER by the support person buffers the association between low maternal Acceptance and anxiety, while its infrequent use strengthens it (see [Figure 3](#)). No significant moderation was found for the relation between maternal ER and depression.

Discussion and conclusions

This study explored the association between maternal mental health, maternal ER and IER. Our findings suggest that ER strategies contribute to maternal mood during the perinatal period, which is a time when women face challenges that can impact their wellbeing. Consistent with previous research (Aldao et al., 2010; Joormann & Stanton, 2016) women who report fewer symptoms of depression and anxiety tend to report fewer difficulties with ER. Maternal ER was also stable across the perinatal period, which supports previous findings about the stability of some regulatory processes over time (D’Avanzato et al., 2013).

Supporting the notion that ER is responsive to interpersonal influences, our results suggest that expectant mothers’ ER is not independent of other interpersonal processes, especially those involving strategies to improve the woman’s affect and to modify the situation that causes distress. A frequent use of these IER strategies by social support persons modifies the association between maternal lack of emotional control and anxiety. Situation modification also has a similar role on the association between maternal non-acceptance of emotional responses and anxiety.

Affect improving may include anticipating positive future events, enjoying present positive events or situations, and reminiscing about past positive events (Gross, 2015). This may be relevant during pregnancy, where women may enjoy feeling the baby’s movements and imagining future interactions with her child. In our study we combined IER data from diverse social support persons, including partners, the women’s own mothers and a small number of other individuals such as siblings, friends, and the women’s own fathers. These close relationships are the most important of our social ties and fulfill our need to form attachments to others. Our results suggest that, during the transition to motherhood, the presence of a romantic partner and of the woman’s own

Table 6. Contribution of antenatal maternal emotional regulation (ER) to maternal anxiety during pregnancy and postpartum.

Model	Predictor	Pregnancy						Postpartum							
		B	SE	β	t	p	LL	UL	B	SE	β	t	p	LL	UL
Control	Intercept	10.18	5.65		1.80	.07	-1.09	21.31	6.54	2.27	.61	2.88	.00	2.12	11.76
	Anxiety (pregnancy)								.58	.08		7.46	.00	.38	.73
ER (pregnancy)	Intercept								8.51	9.00	.62	.945	.35	-14.73	30.39
	Anxiety (pregnancy)								.59	.11		5.37	.00	.38	.76
	Control	.81	.24	.25	3.42	.00	.30	1.30	-.52	.38	-.16	-1.37	.17	-1.28	.34
	Accept	.29	.15	.14	1.92	.06	.00	.64	.12	.25	.05	.46	.65	-.34	.61
	Goals	.60	.28	.15	2.15	.03	.02	1.18	.48	.47	.12	1.02	.31	-.49	1.40
	Aware	-.37	.21	-.11	-1.81	.07	-.80	.06	-.07	.33	-.02	-.22	.83	-.80	.64
	Clarity	.97	.42	.16	2.33	.02	.14	1.71	-.16	.70	-.03	-.24	.81	-1.73	1.12
		.38						.39							
								.01							

R²

ΔR^2

Table 7. Contribution of postpartum maternal emotional regulation (ER) to postpartum maternal depression and anxiety.

Model	Predictor	Depression						Anxiety							
		B	SE	β	t	p	LL	UL	B	SE	β	t	p	LL	UL
ER Postpartum	Intercept	4.66	2.38		1.96	.05	-.81	9.28	22.58	8.12		2.78	.01	4.17	37.24
	Control	.10	.12	.09	.88	.38	-.23	.40	-.81	.41	-.24	-1.97	.05	-2.11	.28
	Accept	.22	.07	.30	2.94	.00	.05	.42	.81	.25	.38	3.19	.00	.26	1.52
	Goals	.32	.13	.24	2.42	.02	.03	.67	1.43	.45	.36	3.15	.00	.47	2.58
	Aware	-.28	.08	-.28	-3.34	.00	-.43	-.08	-.73	.29	-.25	-2.54	.01	-1.23	-.09
	Clarity	.12	.18	.06	.69	.49	-.30	.49	.06	.60	.01	.10	.92	-1.04	1.46
R^2		.61						.45							

All betas, errors and confidence intervals are bootstrapped at 1000 repetitions.

Table 8. Conditional effects of maternal emotional regulation to maternal anxiety during pregnancy by interpersonal emotion regulation strategies.

	Maternal Anxiety (Pregnancy)						R^2	$F_{(df)}$	p
	B	SE	t	p	LL	UL			
<i>Model 1</i>							.39	36.77 _(3,174)	.00
Intercept	36.58	11.10	3.29	.00	14.66	58.49			
Control	-1.34	1.04	-1.29	.20	-3.40	.71			
Situation Modification	-1.22	.41	-2.99	.00	-2.03	-.42			
Control x Situation Modification	.12	.04	3.26	.00	.05	.20			
<i>Model 2</i>							.39	37.27 _(3,177)	.00
Intercept	56.13	18.08	3.10	.00	20.45	91.81			
Control	-4.18	1.89	-2.21	.03	-7.92	-.45			
Affect Improving	-2.03	.70	-2.91	.00	-3.41	-.65			
Control x Affect Improving	.24	.07	3.28	.00	.10	.39			
<i>Model 3</i>							.30	24.82 _(3,175)	.00
Intercept	35.56	10.80	3.11	.00	12.23	54.88			
Acceptance	-.84	.76	-1.11	.27	-2.34	.65			
Situation Modification	-.95	.40	-2.40	.02	-1.73	-.17			
Acceptance x Situation Modification	.08	.03	2.71	.01	.02	.13			

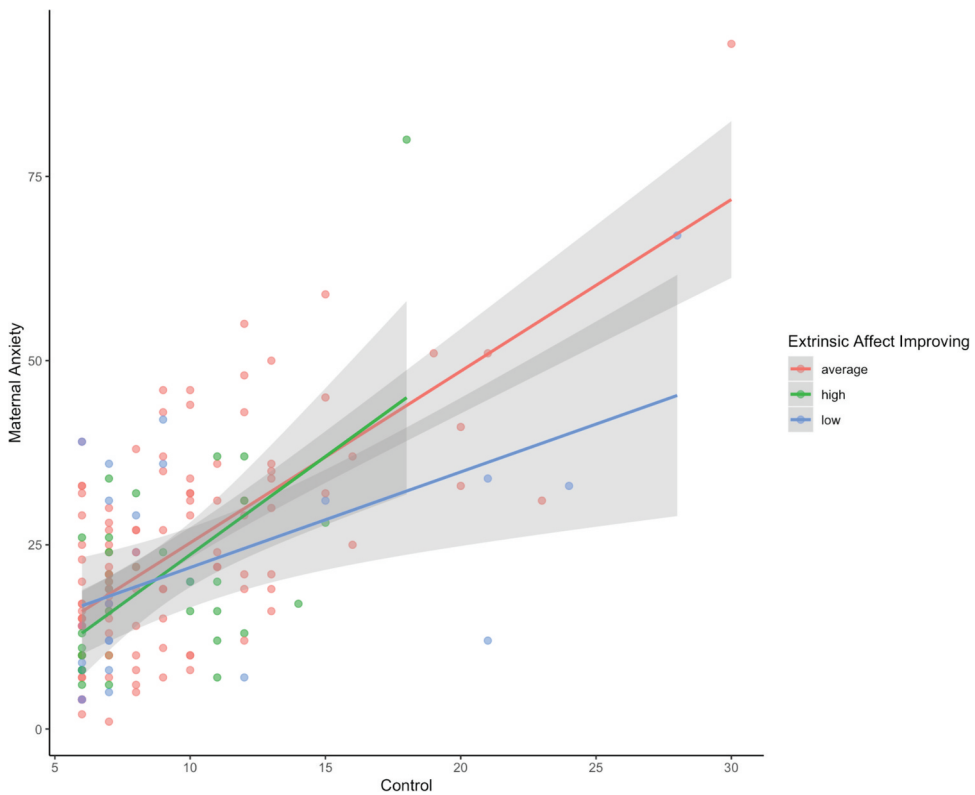


Figure 1. Moderating effect of affect improving on the association between maternal anxiety and control. Shaded areas show confidence intervals at 95%.

mother may be especially relevant to maternal wellbeing. In contrast, women who do not have a close relationship with these individuals may be at higher risk for experiencing symptoms of depression and anxiety. Yet, partner and parental relationships may contribute differently to our emotional wellbeing. Parental relationships are usually the most

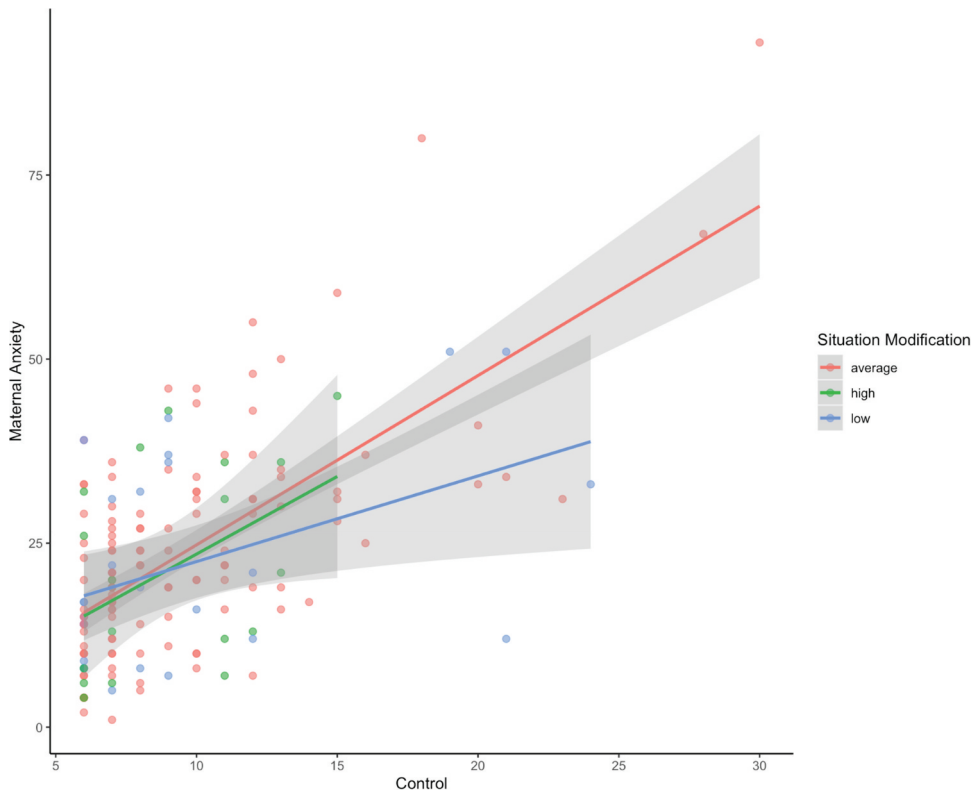


Figure 2. Moderating effect of situation modification on the association between maternal anxiety and control. Shaded areas show confidence intervals at 95%.

relevant during infancy and childhood, however, romantic relationships tend to exert a larger influence on our emotional wellbeing during adulthood, especially in cohabiting couples where co-regulatory processes may develop (Ramsey & Gentzler, 2015). This suggests that different patterns of interactions between IER and maternal ER and mental health may be observed if social support persons were studied separately according to their relationship to pregnant women. This may be particularly relevant in Chile, where most children are born from unmarried couples, which romantic involvement is not always stable in time. In this context, maternal figures may play a significant role in the lives of new mothers who face the challenge of embracing motherhood within an unstable couple relationship. Future studies with larger samples could compare the role of partners and women's own mothers in ER and mental health during the transition to motherhood.

Contrary to our expectations, we did not find a prospective contribution of maternal ER during pregnancy to symptoms of depression and anxiety in the postpartum. Also, the severity of maternal ER difficulties did not have a significant role on changes in mental health symptoms between the two assessments. This may be related to the overall healthy profile of the mothers involved in this study. Although ER difficulties were associated with higher symptoms of maternal anxiety and depression, the participants

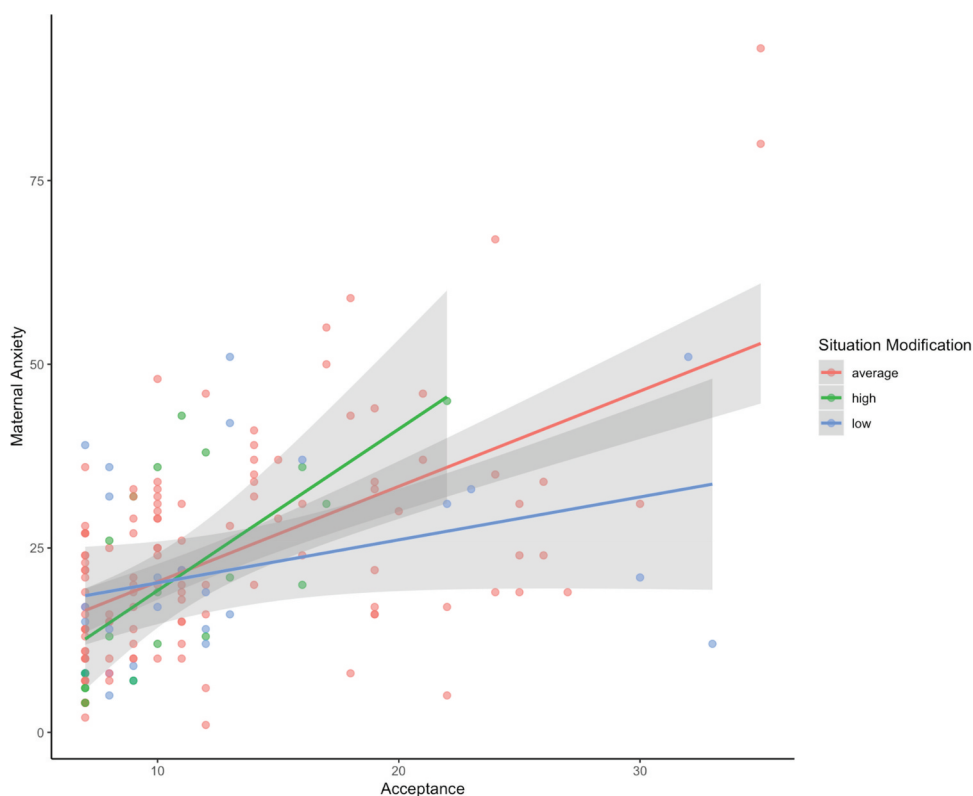


Figure 3. Moderating effect of situation modification on the association between maternal anxiety and acceptance. Shaded areas show confidence intervals at 95%.

did not report severe ER or mental health problems. Different results may be obtained if working with clinical, or more diverse, samples.

Our findings need to be considered in the light of some limitations. In addition to the sample characteristics, namely overall low levels of depression and anxiety and positive ER skills discussed earlier, our measurement of maternal ER and support persons' IER relied on self-report measures that address trait ER. Using research protocols that measure how emotional experiences of individuals in close relationships vary as a function of IER attempts over a certain period of time or during a particular task could provide a deeper understanding of bi-directional processes between pregnant women and their significant others. These assessments could also shed light over the mechanisms and individual characteristics that contribute to the positive and/or negative impact of IER attempts on the partners' emotional states. In our study we measured IER strategies only during the third trimester of pregnancy, studies using repeated measures could assess the stability of IER over the perinatal period and explore the moderating role of IER on maternal emotion regulation and mental health after childbirth. Also, the EROS subscales had low internal consistency in our sample. The validation of the Spanish version of this instrument was conducted in Spain. It may be possible that a different factor structure would be more appropriate for Latin American samples. Unfortunately, no other measures of IER are available for Spanish-speaking populations. Future studies could be conducted

to adapt or develop alternative instruments. Despite these limitations, our study extends the literature on IER by addressing this phenomenon in the perinatal period. During the transition to motherhood, women face the challenge of adjusting to a new situation and may be at risk of experiencing mental health difficulties. IER attempts from close individuals can positively contribute to maternal ER skills and mental health. Our results highlight the need to develop and provide environments that are sensitive and attuned to women's emotional needs.

Declarations

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Soledad Coo, María Ignacia García, Fernanda Prieto and Franco Medina. The first draft of the manuscript was written by Soledad Coo and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Disclosure statement

The authors report no conflict of interest.

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Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the research committee Public Health Ethic Committee (N°17-11-79) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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