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Effects of negative and positive affect on antenatal maternal attachment: The

mediational role of resilience and self-esteem

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Abstract: Parental antenatal attachment refers to the bond developed from parents to their unborn child. This attachment is established based on parents' emotions, perceptions, and behaviors towards their unborn baby. The present research is exploratory and aims to assess the underlying mechanisms linking positive and negative affect to antenatal attachment in first-time mothers, and whether resilience and self-esteem can mediate these relations. Participants were contacted before their prenatal consultation and invited to answer the survey remotely. We performed one study, considering a sample of 265 women (Mage = 29.49; SDage = 5.95) in different stages of their first pregnancy. Our results showed that all variables were significantly related. We then created a mediational model, considering 5,000 bootstrap simulations. Results indicated that antenatal attachment is predicted by positive and negative affect, with resilience and self-esteem mediating these relations. Such findings might help better understand the underlying mechanisms that enhance the bonding between mother and child. Environments that promote positive affect, resilience and self-esteem in soon-to-be-mothers might help to enhance the antenatal attachment between mother and the unborn child.

Keywords: Antenatal Attachment; Resilience; Self-Esteem; Positive and Negative Affect; Pregnancy.

Introduction

Parenting is a significant event in human life, commonly associated with a range of health-related variables, such as life satisfaction (Angeles, 2010) and happiness (Myrskylä & Margolis, 2014). This significant impact occurs since the pregnancy stages, bringing several (and sometimes, negative) physical, physiological, and psychological changes. For instance, previous research showed that mothers unsatisfied with their postnatal weight presented higher levels of depressive affects (Jenkin & Tiggermann, 1997). Pregnants also present a gradual enhancement in hormone concentrations on the cortisol stress system (Wadhwa et al., 2002), a physiological pattern seen in depression (O'Keane & Marsh, 2007). Moreover, the effects of many psychological variables have been studied during pregnancy. For instance, considering 109 articles, a systematic review showed that between 6.5 and 12.9% of mothers present depression at different trimesters of pregnancy (Gavin et al., 2005). This occurrence was also seen in fathers. A meta-analysis, considering 43 studies, showed that 10% of men present relatively high levels of depression, especially during the first months after birth (Paulson & Bazemore, 2010). Finally, pregnancy anxiety was identified as a syndrome that should be understood as distinct from general anxiety, with characteristics such as fear of giving birth, bearing a disabled child, or concern about the future baby's appearance (Huizink, Mulder, Robles de Medina, Visser, & Buitelaar, 2004).

These findings highlight the need for a more in-depth assessment of these variables that impact the different stages of pregnancy and the postnatal period. One influential variable that can help this understanding is parental antenatal attachment, which refers to the bond developed from parents to their unborn child (Condon, 1993). This bond is developed based on parents' emotions, perceptions, and behaviors towards their unborn baby (Piloni et al., 2014). In the present research, we sought to assess the

vital role of emotions in influencing antenatal attachment. More specifically, we are interested in understanding to what extent positive and negative affects influence the development of a greater antenatal attachment in first-time mothers. Secondarily, we assessed whether resilience and self-esteem could mediate these relations. That is, how much these constructs contribute to the overall relations between affects and antenatal attachment.

Antenatal Attachment and Emotions

Antenatal attachment can be seen as the purest type of bonding, once it is not influenced by characteristics yet to be developed by the child after the birth (e.g., temperament, personality traits, behaviors; Condon, 1993). The antenatal attachment has been significantly associated with several variables. For instance, high parenting efficacy (while raising the first child) positively predicted antenatal attachment on second-time mothers (Chen & Xu, 2018). Also, higher levels of antenatal attachment were associated with fewer depression symptoms during the last term of pregnancy and postpartum (Goecke et al., 2012). Women with lower levels of antenatal attachment presented higher levels of depression and anxiety, besides dysfunctional characteristics within their partner relationship (e.g., high control, domination, criticism; Condon & Corkindale, 1997). Finally, the father's antenatal attachment (and its continuity after birth) was related to good partner relationships and mental well-being (Condon, Corkindale, Boyce, & Gamble, 2013).

Research has highlighted the vital role of emotions in the development of a healthy attachment. For instance, Molero et al. (2017) assessed whether affects could mediate the relations between attachment insecurities and life\relationship satisfaction. Their results showed significant associations between anxious attachment and negative affects, and avoidant attachment and positive affects. In line with these findings,

Schiffrin (2014) found that higher attachment anxiety was linked with less positive and more negative affects. Finally, children who experienced rejection tend to minimize negative affects to avoid the possibility of future rejections (Cassidy, 1994). Despite these significant findings, the direct influence of positive and negative affects, which predominantly comprises the affective structure (Watson et al., 1988), is still unknown in the development of antenatal attachment. As mentioned above, research has focused on mood-related variables (e.g., depression, anxiety; Condon et al., 2013; Condon & Corkindale, 2013).

Watson et al. (1988) describe positive affect in this two-dimensional model as representing individuals' feeling of beneficial mood states. Individuals with a low level of positive affect are characterized by sadness and lethargy, whereas individuals with high levels present more energy, total concentration, and pleasurable engagement. On the other hand, negative affect represents to what degree individuals experience harmful mood states (Watson et al., 1988). Individuals with a low level of negative affect tend to present more serenity and calmness, whereas individuals with high levels present higher subjective distress and aversive emotions. Researchers have assessed the role of affect within pregnancy context, showing significant associations to relevant psychological variables, such as stress and depression (Urizar et al., 2004), and postpartum depression (Bos et al., 2013).

Resilience and Self-esteem

It is also crucial to consider the role of psychological variables that can influence the relations between positive and negative affects and antenatal attachment in mothers. In this study, we focused on two variables frequently associated with attachment and emotions: resilience and self-esteem. Resilience is known as the process of positively adapting when facing adversities (American Psychological Association, 2019). It is

associated with variables such as distress and anxiety in pregnant women (Roos et al., 2013). Resilience is also positively associated with secure attachment, and negatively with fearful and preoccupied attachment styles (Karreman et al., 2012).

On the other hand, self-esteem refers to the individual's evaluation of the self, with this judgment being developed based on self-knowledge (Baumeister, 1998). In the parenting context, self-esteem significantly predicted anxiety and depression in women in early pregnancy stages (Jomeen & Martin, 2005). Also, self-esteem and satisfaction with social support mediated the relation between antepartum stress and depressive symptoms in rural low-income women (Jesse, Kim, & Herndon, 2014). Self-esteem also presents significant associations to attachment styles. For instance, it mediated the associations between parental attachment and psychological health (Wilkinson, 2004). Greater global self-esteem levels were also associated with adult romantic attachment styles (Bylsma et al., 2010).

Researchers have also found that positive and negative affect can influence the development of both resilience and self-esteem. For instance, Murphy et al. (2017) found that the ability to sustain positive affects help to boost resilience in adolescents with cancer. Strang et al. (2006) also showed that positive affect plays an essential role in developing resilience in patients with arthritis. Moreover, Benetti & Kambouropoulos (2006) found that positive and negative affect mediates the role between traits and self-esteem.

Therefore, knowing their significant implications during pregnancy and puerperium periods and their associations to attachment styles and affect, it is relevant to assess whether resilience and self-esteem can help explain the associations between positive and negative affects, and antenatal attachment. A more precise understanding of the relations between these variables can help to promote a higher quality of life for

new mothers. For instance, it can help delineate intervention strategies, understand the factors that help create an environment more prone to developing positive affects, and even identify the negative impact of mood in antenatal attachment.

The Present Research

Many are the changes that can happen during pregnancy, either physical (e.g., a gain of weight), physiological (e.g., enhancement in hormone concentrations), and psychological (e.g., the occurrence of depression symptoms). Consequently, it is crucial to understand better variables that can help deal with these potential problems, such as antenatal attachment. The present research is exploratory, and its main aim is to assess the underlying mechanisms linking positive and negative affect to antenatal attachment, in a sample composed of first-time mothers from Brazil. The country has one of the most extensive public health systems globally (Sistema Único de Saúde; SUS). This health system is universal and accessible for the Brazilian population, covering simple (e.g., blood pressure assessment) to complex (e.g., organ transplantation) procedures. SUS also provides reproductive planning and assistance to women and children during all pregnancy stages and puerperium periods (Viva Mais SUS, 2021). Moreover, Brazil also has essential and modern private hospitals, such as the Albert Einstein, one of the biggest in Latin America.

More specifically, we developed a mediational model considering antenatal attachment, affect, resilience, and self-esteem. As emotions significantly influence the development of healthy attachment styles (e.g. Cassidy, 1994; Molero et al., 2017; Schiffrin, 2014), we considered positive and negative affect to predict antenatal attachment. Moreover, knowing the relevant role of resilience and self-esteem during pregnancy (e.g., Jomeen & Martin, 2005; Roos et al., 2013), we added them as mediators in the model. We expect positive emotions to significantly influence a greater

antenatal attachment, with higher levels of self-esteem and resilience helping to develop this healthier link. Conversely, negative emotions might negatively influence antenatal attachment, with lower levels on the psychological variables helping in this link.

Method

Participants and Procedure

Participants were 265 women (M_{age} = 29.49; SD_{age} = 5.95) in different stages of their first pregnancy (i.e., first, second, and the third trimester). Most of the participants had a family income ranging from 4 to 10 times the Brazilian minimum wage (41.5%). Supplemental Table 1 shows detailed information about participants. Before their prenatal medical consultation, participants were contacted by a research team member and invited to be part of this study. Once accepted, they received an email containing all ethical information and goals of our study, and a link for the Redcap platform, where they could answer the online survey, composed of self-report measures.

Material

Antenatal Attachment Questionnaire (Condon, 1993). Measure composed of 19 items, assessing the subjective emotional attachment between a parent and the unborn baby. The measure can be assessed through two dimensions (quality and strength), or a single factor, as a global attachment score. The measure uses different five-point answer scales, varying according to the content of the items (e.g., *Happy/sad feelings about fetus; Feeling emotionally close to/distant from fetus*), where the last answer category represents very intense feelings. We took the average of the answered items to assess the general antenatal attachment score, with higher scores indicating a higher emotional attachment between the parent and the unborn baby.

Positive and Negative Affect Schedule (PANAS; Watson et al., 1988). The measure was validated in Brazil by Carvalho et al. (2013), and is composed of 20 items,

equally distributed among its positive (e.g., *Interested*, *Enthusiastic*) and negative (e.g., *Ashamed*, *Distressed*) dimensions. Participants answer to what extent the items represent them, using a five-point scale (1 = *Very slightly or not at all*; 5 = *Extremely*). We averaged the total answered items for each factor (positive and negative) to assess their scores, with higher scores indicating their higher prevalence.

The Rosenberg Self-Esteem Scale (Rosenberg, 1989). The scale was validated in Brazil by Hutz and Zanon (2011), and is composed of 10 items disposed among one dimension. Six items represent a positive view of the self (e.g., *I am able to do things as well as most other people*), and four a self-depreciative view of the self (e.g., *I do not have much to be proud of*). Participants are asked to answer to what extent they agree with the items, using a four-point scale (1 = *Strongly disagree*; 4 = *Strongly agree*). To assess the total score, we reversed the negative items, averaged the answered items, with higher scores indicating a greater level of self-esteem.

Resilience Scale (Wagnild & Young, 1993). Validated to Brazil by Damásio et al. (2011), the scale comprises 14 items (e.g., *I have self-discipline; My life has meaning*). Differently from its original structure, the authors proposed its measurement with a single dimension. Participants answer to what extent they agree with the items, using a seven-point scale (1 = *Strongly disagree; 7 = Strongly agree*). We averaged the answered items to assess resilience level, with greater levels indicating a higher score on the latent trait.

Data Analysis

All the analyses were performed using JASP (https://jasp-stats.org/), a free, open-source statistical software. First, we performed descriptive statistics, assessed the reliability levels of the variables through Cronbach's alpha and McDonald's omega, and evaluated their associations using Pearson's correlation. Moreover, a mediational model

was developed, considering the maximum likelihood estimator with 5,000 bootstrap
simulations.

Results

First, the Kolmogorov-Smirnov test indicated the normality of the data. Table 1
shows the reliability levels and correlations between antenatal attachment, positive and
negative affects, resilience, and self-esteem. All variables presented reliability levels
within the recommended threshold (Kline, 2012). Also, all their associations were
significant ($p < .01$), with only negative affect having a negative direction.

[TABLE 1 AROUND HERE]

Moreover, we created a mediational model. For that, we added positive and
negative affect as predictors of antenatal attachment, being mediated by resilience and
self-esteem. The results can be seen in Table 2. The total effects refer to the influence of
the positive and negative affect (independent variables) on antenatal attachment
(dependent variable; $X \rightarrow Y$). The indirect effects refer to this influence through the
mediators (resilience and self-esteem; $X \rightarrow M \rightarrow Y$). Lastly, the direct effects refer to
X's remaining direct effect on Y after the inclusion of the mediators.

As seen in the Total Effects column, both positive ($\beta = .37$) and negative ($\beta = -.33$) affects are significant predictors of antenatal attachment. That is, the affective
dimensions influence the attachment style. Moreover, as shown in the Indirect Effect
columns, resilience ($\beta = .13$; $\beta = -.08$) and self-esteem ($\beta = .11$; $\beta = -.10$) are significant
mediators, indicating that these variables are responsible for part of the effects of affects
on antenatal attachment. Finally, after including the mediators in the model, the direct
effects were no longer significant. The model can be seen in Figure 1.

[TABLE 2 AROUND HERE]

[FIGURE 1 AROUND HERE]

Discussion

Affect, resilience, and self-esteem have been extensively studied within the parenting context, being significantly associated with several psychological problems, such as postpartum depression (Bos et al., 2013), distress and anxiety (Roos et al., 2013), and antepartum stress (Jesse et al., 2014), and different attachment styles (e.g., Bylsma et al., 2010; Karreman et al., 2012). However, prior research did not consider their influence on antenatal attachment, representing the bond developed from the parents towards the unborn baby (Condon, 1993). Therefore, the present research aimed to assess whether positive and negative affects predict antenatal attachment, and whether these relations occur through resilience and self-esteem (i.e., mediated). This study has an exploratory character, as such associations were not previously done.

Mediational Model

Our analysis developed a mediational model, using positive and negative affects as predictors of antenatal attachment, and resilience and self-esteem as mediator variables. First, our results showed that both positive and negative affects influence antenatal attachment. More specifically, higher levels of positive affect were linked with higher levels of antenatal attachment. This type of affect characterizes individuals who tend to experience more pleasurable mood states, being more energetic, concentrated, and engaged (Watson et al., 1988). Considered the purest type of bonding, an environment that allows these positive feelings (e.g., enthusiastic, proud, strong) to emerge might strengthen the link between the mother and the unborn child. On the other hand, negative affects were negatively linked to this type of attachment. Such results indicate the importance of reducing the influence of these negative feelings, allowing the development of a context where positive affects can prevail. These findings align with previous research, showing the significant associations between affect and

attachment styles. For instance, "negative" attachment styles (e.g., anxious) were frequently linked to negative affects (e.g., Molero et al., 2017; Schiffrin, 2014)

However, these effects should not be accounted exclusively for positive and negative affects, occurring through resilience and self-esteem. When included in the model, these variables mediated the relations between positive affect and antenatal attachment, helping to understand these links' underlying mechanisms. More specifically, positive affect helps to enhance resilience and self-esteem, which improves the antenatal attachment levels between mother and unborn child. Such findings highlight the crucial role of resilience and self-esteem in establishing healthy and beneficial attachment styles. This can be seen in prior research, which linked the variables to "positive" attachment styles (e.g., romantic, secure; Bylsma et al., 2010; Karreman et al., 2012). These mediations were also significant when considering the path from negative affect. Individuals that present a higher level on this variable tend to present higher subjective distress and aversive emotions (Watson et al., 1988). However, in this case, the predictions were negative. In other words, higher levels of negative affect lead to lower levels of antenatal attachment, with the promotion of resilience and self-esteem helping to reduce the effect on this relation.

Pregnancy leads to several physical, physiological, and psychological changes (e.g., Jenkin & Tiggermann, 1997; Wadhwa et al., 2002). Facing this period for the first time might lead parents to lots of uncertainty. Our findings might help to reduce the distresses that might arise with this new journey in soon-to-be-parents. They highlight the importance of positive emotions and greater resilience and self-esteem to develop a healthier antenatal attachment. More specifically, positive and negative emotions significantly improve or decrease the antenatal attachment between the mom and the baby. That is, positive emotions lead to a greater attachment, whereas negative emotions

decrease it. These associations might happen indirectly through the use of psychological mechanisms such as resilience and self-esteem. That is, they help in establishing this vital link between emotions and attachment. In other words, an environment that promotes positive emotions, helps parents work on their ability to face adversities, and improves their self-evaluation, might also help them develop a more significant link towards the baby.

Limitations and Future Studies and Conclusion

Some limitations should be considered in our research. First, the convenience sample (nonprobability), which does not represent the Brazilian population. Second, the limitation of using self-report measures can lead participants to provide biased responses to show a "good behavior". Social desirability should be measured to consider this potential effect (Soares et al., 2016). However, due to the anonymity of this study, we are confident its use did not influence our results. Finally, the most critical limitation, the use of a cross-sectional design, in which we assess the variables at a single time point. Therefore, replications would be helpful to assure that the model is consistent over time.

Future research can consider adding social desirability measures to control its effect. Also, future studies could test whether the model would replicate using different samples, such as second-time mothers or fathers. These can also assess personal and cultural influences, such as the quality of the hospital and care, household income, and age. Finally, future research can expand the model, considering other psychological variables, such as positivity, satisfaction with life, and personality traits, besides assessing their effect on postnatal attachment.

Implications and Final Considerations

It is essential to stimulate positive affect and help reduce negative mood states in soon-to-be mothers. Such environments help to enhance the antenatal attachment between the mother and the unborn child. Previous research has shown that higher levels of antenatal attachment assist in reducing the occurrence of psychological disorders, such as the presence of depression symptoms (Goecke et al., 2012) and anxiety (Condon & Corkindale, 1997), and to enhance mental well-being (Condon et al., 2013). Also, the effect of psychological variables should be considered. Our results showed that resilience and self-esteem have an essential role when linking affect to antenatal attachment. On the other hand, higher negative affect tends to decrease resilience and self-esteem, and attachment level.

Our findings might help guide the development of targeted interventions that aim to increase soon-to-be mothers' quality of life. Interventions that focus on developing positive affects during pregnancy and providing strategies for enhancing important psychological variables, such as resilience and self-esteem, can help increase antenatal attachment between parents and unborn babies. These can lead to a greater quality of life, and consequently, reduce pregnancy anxiety. More specifically, such environments can promote positive feelings like interest and attention to the pregnancy and own health, highlight the importance of maintaining an active routine, and develop an atmosphere where the mother will feel strong and proud. Finally, despite being frequently associated with variables within the parenting context (e.g., Bos et al., 2013; Jesse et al., 2014; Roos et al., 2013), our research introduces the predictive role of affect on antenatal attachment whether these relations are mediated through resilience and self-esteem. Such findings might help better understand the underlying mechanisms that enhance the bonding between mother and child.

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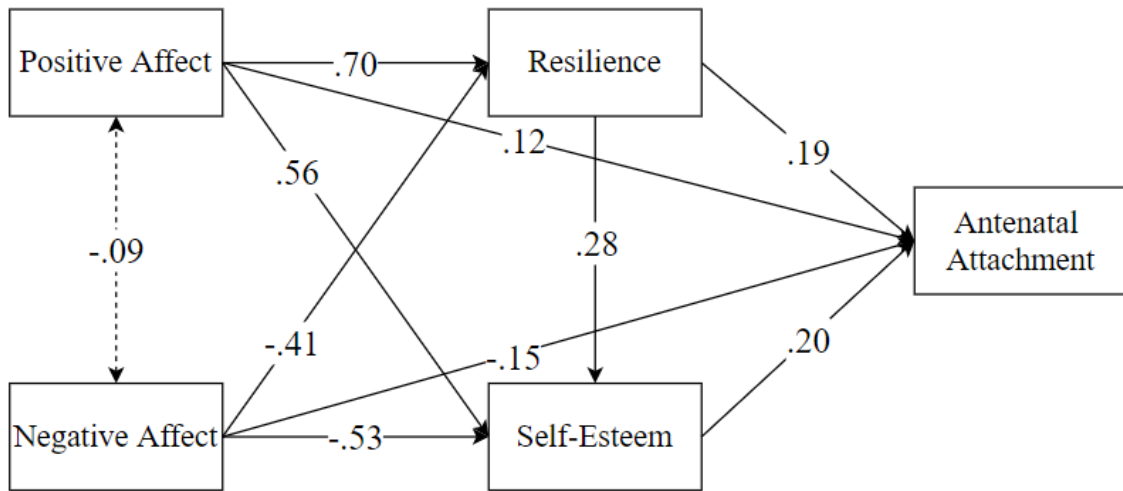484. doi:10.1016/j.jpsychores.2005.08.010

Figure 1. Mediational Model (Positive and Negative Affect, X → Resilience and Self-esteem, M → Antenatal Attachment, Y). Full lines = significant; Dashed lines = non-significant.

Table 1.

Descriptive Statistics, Reliability, and Correlations.

		M	SD	α	ω	1	2	3	4
1	Antenatal Attachment	4.27	.39	.79	.83				
2	Positive Affects	3.42	.72	.88	.89	.305**			
3	Negative Affects	2.04	.71	.86	.87	-.281**	-.177**		
4	Self-Esteem	3.26	.47	.87	.88	.408**	.468**	-.448**	
5	Resilience	5.35	.79	.87	.88	.407**	.553**	-.378**	.641**

Note: α = Cronbach's alpha, ω = McDonald's omega; ** $p < .01$

Table 2

Mediational Model Coefficients (Positive and Negative Affect, X → Resilience and Self-esteem, M → Antenatal Attachment, Y).

	Total Effects	**Indirect Effects**		**Direct Effects**
		Resilience	*Self-Esteem*	
	β [95%CI]	β [95%CI]	β [95%CI]	β [95%CI]
Positive Affect	.37 [.19, .55]**	.13 [.02, .26]*	.11 [.03, .20]*	.12 [-.07, .32]
Negative Affect	-.33 [-.55, -.14]**	-.08 [-.17, -.01]*	-.10 [-.20, -.03]*	-.15 [-.34, .04]

Note: * $p < .05$, ** $p < .001$

Supplemental Table 1

Characteristics of Sample

Age	n	%
18-19	14	5.3%
20-29	109	41.1%
30-39	134	50.6%
40-44	8	3%

Trimester

	n	%
First	76	28.7%
Second	111	41.9%
Third	78	29.4%

Family Income (In Brazilian Reais)

	n	%
Over 20 times the minimum wage	46	17.4%
Between 10 and 20 times the minimum wage	93	35.1%
Between 4 and 10 times the minimum wage	110	41.5%
Between 2 and 4 times the minimum wage	15	5.7%