



# Maternal and Paternal Prenatal Emotion Regulation Difficulties as Predictors of Infants' Communication Skills

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## Abstract

According to the fetal programming hypothesis, early experiences and environmental factors shape human development as early as the fetal period. Emotional arousal due to changes and requirements in the transition to parenthood negatively affects emotion regulation skills of parents, and as a result, increased emotion regulation difficulties play a negative role on children's development. The present study aimed to investigate the predictive role of prenatal parental emotion regulation difficulties on communication skills of infants. A total of 97 first-time parent couples and their infants (57 girls, 40 boys) participated in the study. A convenience sampling method was used and the data was collected at two different times. Time 1 and Time 2 were representing the third trimester of pregnancy and the 12<sup>th</sup> postnatal month, respectively. Prenatal parental emotion regulation difficulties were measured by having first-time parent couples complete the Difficulties in Emotion Regulation Scale-16 at T1. In addition, parents were requested to fill out Communication subscale of Ages and Stages Questionnaires and a demographic form containing gender of infants, socioeconomic status and birth history at T2. The relationships between the obtained study variables were examined with Pearson correlation coefficient. The correlation-based findings revealed that higher prenatal maternal and paternal emotion regulation difficulties were associated with lower communication skills of infants, supporting the hypotheses. This study is thought to be a resource for

preventive programmes by identifying protective and risk factors for infants' communication skills and emphasizing the potential role of the prenatal period on child development.

**Keywords:** Maternal prenatal emotion regulation difficulties, paternal prenatal emotion regulation difficulties, infancy, communication skills, preventive studies

### **Maternal and Paternal Prenatal Emotion Regulation Difficulties as Predictors of Infants' Communication Skills**

One of the important transitions experienced by approximately 90% of married couples is the transition to parenthood (Houseknecht, 1988). It has effective consequences not only for the parents but also for the parent-infant relationship and infant development. This transition is also categorized as both normative and developmental (Deave et al., 2008). Researches have indicated that the transition to parenthood, which starts with the couple's decision to become pregnant and ends when the child is 2 years old (Cowan et al., 1991; Gottlieb & Pancer, 1988), is a stressful and uncertain process and causes more extensive changes than other developmental stages of the family life cycle (Cowan & Cowan, 1995; Priel & Besser, 2002). Couples' adaptation to their new roles, developing new relationships and reorganizing their existing relationships are among the requirements that occur in the process of transition from childlessness to having children (as cited in Kılıçaslan, 2007).

Although most of the studies to date have emphasized the role of parental factors in the postnatal period of the transition to parenthood on child development, it has been also revealed that parental factors in the prenatal period are significantly related with child outcomes. For example, researches have pointed out that there is a positive relationship between prenatal social support perceived by mothers and children's IQ scores (Lähdepuro et al., 2023). It has also been reported that the prenatal maternal depression plays an important role in explaining the executive functions (Power et al., 2021) and communication skills of children (Aoyagi et al., 2019; Ibanez et al., 2015; Rogers et al., 2020). In addition, research has shown that children's emotional reactivity and self-regulation skills (O'Donnell et al., 2014) and communication skills (Ibanez et al., 2015; Rogers et al., 2020) are negatively affected by maternal prenatal anxiety. This prenatal anxiety is also positively associated

with behavioral and emotional problems in children (O'Connor et al., 2002; Kingston et al., 2012). Besides, prenatal maternal stress was also related with decrease in childhood IQ (LeWinn et al., 2009) and memory abilities (O'Donnell et al., 2009). Finally, recent studies have found that prenatal emotion regulation difficulties of parents predict infants' negative affect levels (Boe, 2020; Cao et al., 2018), decrease in arousal and attention (Ostlund et al. 2019), and orienting/regulatory capacity (Boe, 2020). In light of all this, the literature on the detrimental role of stress and mental health during the transition to parenthood on child outcomes (Penner & Rutherford, 2022) has highlighted the importance of emotion regulation skills during pregnancy. In the current study, the link between prenatal parental emotion regulation difficulties and communication skills was focused.

The study has both theoretical and practical importance. Examining the role of the prenatal period of the transition to parenthood in infant development contributed to the theoretical importance. The practical importance is that the current study might be a resource that can be used by prevention and early intervention programs planned for couples who plan to have children and are in the process of transition to parenthood.

### **Prenatal Parental Emotion Regulation Difficulties**

Emotion regulation, which refers to physiological, behavioural and cognitive processes related to monitoring, evaluating and modulating emotional expressions and experiences to achieve one's goals, is known to facilitate adaptation to situational demands (Bridges et al., 2004; Izard & Ackerman 2000). An increasing number of studies have shown that difficulties in emotion regulation play an important role in explaining maladaptive behaviors and various psychopathologies (Gross & Jazaieri 2014; Sheppes et al., 2015).

Considering that emotion regulation capacity can fluctuate according to situational factors and is sensitive to life experiences, it has been shown that the transition to parenthood can explain changes in emotion regulation capacity (Penner & Rutherford, 2022; Rutherford et al., 2015). Accordingly, emotional arousal as a result of the changes and requirements of the transition process plays a negative role on emotion regulation skills.

Parental emotion regulation skills are known to predict self-regulation skills (Rutherford et al., 2015), physiological regulation (Shih et al., 2018), and emotional socialization (Hajal & Paley, 2020) in children. Studies on the role of prenatal emotion regulation skills on child outcomes have shown that prenatal high-level emotion regulation difficulties are associated with the infant's high-level negative affect (Boe, 2020; Cao et al., 2018), low-level orienting/regulatory capacity (Boe, 2020) and arousal and attention (Ostlund et al. 2019).

### **Fetal Programming Hypothesis**

The mechanism that explains how prenatal parenting factors are related to children's development and that has been supported by research in recent years is based on the fetal programming hypothesis. According to this hypothesis, early experiences and environmental factors shape human development as early as the fetal period (Barker, 1998; 2004). The fetus adapts its phenotype (stress reactivity, etc.) in utero based on maternal nutritional and hormonal cues from the outside world transferred through the placenta in order to optimally adapt to postnatal environmental conditions (as cited in Pluess et al., 2011).

Neural connectivity between brainstem, limbic and cortical brain regions develops rapidly during the third trimester of pregnancy (Geva & Feldman, 2008). Important events that occur during this period can change the connectivity between these regions to prepare the fetus for future events (as cited in Babineau et al., 2015). The impact of prenatal events on behavioural regulation has been reported as early as the first days of life (Glover, 2011; O'Connor et al., 2003). The role of emotional symptoms and stressors experienced by mothers during the prenatal period in explaining 4-month-old infants' negative behavioural reactivity to novel situations has been demonstrated (Davis et al., 2011). Moreover, such environmental factors in the prenatal period may have lifelong effects (Monk, 2001; van den Bergh & Marcoen, 2004). It is not known exactly how maternal psychological stress signals are transmitted to the fetus. However, it has been suggested that the interaction between maternal environmental factors, placental changes and fetal epigenetic programming may be candidate for explanatory mechanisms (Blair et al., 2011).

As a result, the fetal programming hypothesis may explain the role of mothers' prenatal mood disturbances and experiences on children's cognitive development. For example, Pluess et al.

(2011), who investigated the role of prenatal maternal anxiety on child outcomes, found a positive relationship between anxiety reported by mothers in the 20<sup>th</sup> week of pregnancy and negative affect of infants in the sixth month after birth and explained these results with the fetal programming hypothesis.

### **Infants' Communication Skills**

Communication skills that consists of the components of sharing attention, following attention, directing attention and language (Beuker et al., 2013), develop rapidly in infancy through the interplay of biological and environmental factors (AlHammadi, 2017; Carroll, 2007). Children who have difficulties with communication skills are at risk for later problems such as neurodevelopmental deficits (Hawkins et al., 2016), academic problems (Young et al., 2002), or behavioral and emotional disorders (Johnson et al., 2010). When considering how these negative developmental outcomes are associated with poor communication skills, investigating the factors associated with the development of these skills is of particular importance (Schjølberg et al., 2011).

Researches reporting risk factors for communication skills especially point to child characteristics such as gender or diseases (Choudhury & Benasich, 2003; Guarini et al., 2009; Reilly et al., 2007; Schjølberg et al., 2011), family factors such as parents' education level or maternal distress/depression (Choudhury & Benasich, 2003; Schjølberg et al., 2011; Tomblin et al., 1991), and environmental factors such as economic status or child care (Bradley & Vandell, 2007; Hart & Risley, 1995) as candidates. A limited number of studies have drawn attention to the importance of the prenatal period on early communication skills by finding the role of gestational diabetes (Dionne et al., 2008) or alcohol use during pregnancy (O'Leary et al., 2009). Early identification of infants' and young children's communication problems and early intervention were expected to be related with better language outcomes, especially in children at risk (Warren, 2000). Therefore, the present study also examined the possible detrimental role of prenatal parental emotion regulation difficulties on infants' communication skills and thus aimed to contribute to the identification of protective and risk factors for early communication skills.

## **The Role of Paternal Factors in Communication Skills**

Recent conceptual advances in the father-child relationship have supported both a direct and indirect role of fathers on their children's development (Cabrera et al., 2009; Kolak & Volling, 2013). Studies have found that there is a relationship between fathers' education and income levels and father responsiveness in father-child interactions, and that children of responsive and supportive fathers have higher levels of social competence (Cabrera et al., 2011; McDowell & Parke, 2009). In addition, it has been shown that children who do not have contact with their fathers have more difficulty in regulating their emotions (Vogel et al., 2006). These results support the direct role of fathers on their children's development. In addition, fathers' spending money to improve the quality of children's experiences at home (Cabrera et al., 2009); fathers' cooperation with mothers in childcare (Kolak & Volling, 2013; Schoppe-Sullivan et al., 2009); and fathers' marital conflicts with mothers (Kuo et al., 2017) indirectly play a role in their children's behaviour problems and self-regulation skills (as cited in Cabrera et al., 2018)

Despite all these direct and indirect effects mentioned above, most of the studies on parenting have neither used fathers as participants nor controlled the role of fathers on child development (Cabrera et al., 2018). When we look at the studies examining the transition to parenthood (Deave & Johnson, 2008), paternal factors have been investigated in topics such as fathers' experiences during pregnancy (Condon, 2006); prenatal education and fathers' readiness for parenthood (Gage & Kirk, 2002); fatherhood in the early postnatal period (Gottfredsdottir, 2005); father involvement (Sarkadi et al., 2008); fathers' depression levels (Garfield et al., 2014). However, there is limited research examining the role of prenatal paternal factors on children's development. For example, studies have reported that there is a positive correlation between prenatal paternal depression and infant crying (van den Berg et al., 2009), withdrawal (Mäntymaa et al., 2008) and fussiness (Dav'e et al., 2005). However, other studies failed to show the significant role of prenatal paternal depression (Capron et al., 2015; Fredriksen et al., 2019; Spry et al., 2020). As it is understood from these results, mothers and fathers assume distinctive roles in the developmental levels of their children. Further research that including father is thus needed. Besides, most of the research examining the role of paternal mental health on child outcomes has generally focused on the predictive role of paternal depression and neglected other important risk factors (Fisher, 2016).

Based on all these, in the present study, the role of prenatal parental emotion regulation difficulties on infants' communication skills was studied by including both mothers and fathers.

### **Study Goal and Hypotheses**

Although many studies show the relationship between parental emotion regulation and children's development during the transition to parenthood, there is limited research that studies these factors in the prenatal period. In addition, factors related to parents in the transition to parenthood were mostly studied by including mothers. Factors related to fathers and fathers' experiences in this particular process have been addressed in very few studies. Accordingly, the aim of the present study was to examine the predictive relationship between prenatal parental emotion regulation difficulties and infants' communication skills. To the best of our knowledge, this is the first study to investigate this relationship by including both mothers and fathers. Based on the existing research, it was expected that high levels of prenatal parental emotion regulation difficulties would be negatively related to the communication skills of infants.

### **Method**

#### **Participants**

The participants of the study consisted of 97 parent couples expecting their first baby and the babies of these couples. The data of the study were collected at two different times. At Time 1, representing the third trimester of pregnancy, the participants were only the parents, while at Time 2, representing the 12<sup>th</sup> postnatal month, the participants were the parents and their babies. The study was conducted in Istanbul, Turkey and the data were collected by convenience sampling method. Parent couples in the study came from structures representing all socio-economic levels, and these couples were reached through the Obstetrics and Gynecology Polyclinics of various hospitals. The inclusion criteria were that the mother was in the third trimester of her first pregnancy ( $\geq 28$ th week), was 18 years of age or older at the estimated date of delivery, and lived with her husband. Exclusion criteria were the presence of a serious chronic disease in the mother or father, past obstetric complications, and presence of major fetal anomalies. Data were collected voluntarily at all stages of the study.

The gender of the infants of the 97 couples participating in Time 1 was 40 boys (41%) and 57 girls (59%). The gestational age of the participant mothers at the time of completing the questionnaire ranged between 28 and 40 weeks ( $M = 35.52$ ,  $SD = 3.23$ ).

The mean age of participant mothers and fathers at the time of completing the Time 1 questionnaires was 28.06 ( $SD = 3.71$ ) and 30.68 ( $SD = 3.92$ ), respectively. 61% of mothers and 98% of fathers were employed, either part-time or full-time. 60% of the mothers had a bachelor's or graduate degree. In addition, 90% of the fathers have a high school degree or above. In addition, 59% of the families reported their average monthly income as medium level.

At Time 2, representing the 12th postnatal month, 91 parent couples and their infants constituted the research participants. The reasons for the loss of participants were the diagnosis of a genetic disease after the birth of the participant baby, the participant family moving out of the city, the divorce of the participant parents, and the health measures taken by the participant families during the COVID-19 pandemic. Descriptive statistics of demographic variables of participant parents and their infants for Time 2 are shown in Table 1.

**Table 1.** Descriptive statistics of demographic variables for Time 2

Demographic Variable ( $N = 91$ )	$M$	$SD$
Infant's birth week	38.81	1.43
Infant's birth length (cm)	49.97	2.57
Infant's birth weight (g)	3312.71	460.57
Demographic Variable ( $N = 91$ )	%	
Mode of labour (normal birth)	40.5	
Complications in labour (no)	91.9	

## **Procedure**

The data of the study were collected after obtaining the necessary permissions from the Non-Interventional Clinical Research Ethics Committee and hospital administrations. The questionnaire data were obtained from both mothers and fathers.



After obtaining the necessary approvals from the hospital administrators for the study, informed consent forms were delivered to the mothers and fathers by the expert staff at the hospitals or by the researcher. Questionnaire booklets were delivered to the mothers and fathers who gave consent for participation through the researchers. At Time 1, the parents completed the Difficulties in Emotion Regulation Scale-Short Form and the Family Demographic Form. At Time 2, the parents were asked to answer a questionnaire booklet consisting of the Family Demographic Form and the Ages and Stages Questionnaires-Communication. The time required for the participant mothers and fathers to answer the scales was approximately 15 minutes for each time. The completed questionnaire booklets were collected by the researchers.

## **Materials**

### ***Difficulties in Emotion Regulation Scale-Short Form (DERS-16)***

In order to assess the level of prenatal emotion regulation difficulties of the participant couples, the Difficulties in Emotion Regulation Scale-Short Form (DERS-16; Bjureberg et al., 2016) was used. The scale consists of 16 items that load on 5 factors: clarity, goals, impulse, strategies and non-acceptance. Parents were asked to rate on a 5-point Likert scale (1 = *almost never* and 5 = *almost always*). High scores obtained from the scale indicate a high level of emotion regulation difficulties. The psychometric evaluation of the Turkish form of scale was investigated by Yigit and Guzey Yigit (2017). They showed that Cronbach's alphas for internal consistency was .92. In the current study, the internal consistency coefficient of the scale was calculated as .95 and .91 for mothers and fathers, respectively.

### ***Family Demographic Form***

The Family Demographic Form, prepared by the researcher, aimed to obtain information about the infant, such as pregnancy status and gender of the baby; about the parents, such as age, occupation, marital status, employment status, education, total family income, and duration of marriage; and about the pregnancy period and the health history of the mother and the infant. The education level of the mother and father and the monthly income level of the family were converted into z-scores and averaged in order to calculate the SES of the family (Cronbach's  $\alpha = .72$ ).

### ***Ages and Stages Questionnaires (ASQ)-Communication***

Communication subscale of the Ages and Stages Questionnaires (ASQ) developed by Squires et al. (1999) was used to assess infants' communication skills. The ASQ was developed to screen the development of children between the ages of 3-72 months. The Turkish adaptation of the scale was conducted by Kapci et al. (2010). Within the scope of the study, the 12<sup>th</sup> month form of the ASQ-Communication subscale, which includes 6 items (e.g., "When your baby wants something, does he tell you by pointing to it?"), was used. The mothers of the children participating in the study filled in by choosing one of the options "yes", "sometimes" and "not yet". Low scores obtained from the communication subscale indicate high communication problems of infants.

### **Data Analysis**

The data analyses of this study are presented in two sections. First, descriptive statistics of the study variables obtained using IBM SPSS 25.0 package programme (IBM Corp., 2017) are presented. Then, the relationships between demographic variables, prenatal parental emotion regulation difficulties, and infants' communication skills were analyzed using Pearson correlation coefficient. Correlation coefficients were defined as  $-/+ .10$  and around "low level",  $-/+ .30$  and around "medium level" and  $-/+ .50$  "high level" according to Cohen's (1988) accepted criteria.

### **Results**

#### **Descriptive Statistics**

Before testing the hypotheses of the study, normality, linearity and homoscedasticity assumptions of the variables in the study were checked and univariate and multivariate outlier analyses were performed. All of the study variables were normally distributed and descriptive statistics such as mean, standard deviation and range of Time 1 and 2 variables are shown in Table 2.

**Table 2.** Descriptive statistics of study variables and correlation coefficients between variables

Variables	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>	1	2	3	4	5	6	7
1. ASQ-Communication	49.58	7.33	30.00	60.00	--	-.25*	-.22*	.02	.12	.01	.04
2. DERS-16: Mother	2.25	0.85	1.13	5.00		--	.27**	-.19	-.13	-.10	-.04
3. DERS-16: Father	1.95	0.64	1.00	4.63			--	.11	-.03	-.06	-.11
4. Infant's Gender	0.59	0.50	0.00	1.00				--	.02	.11	.15
5. Age-Mother	28.06	3.71	19.00	37.00					--	.72**	.41**
6. Age-Father	30.68	3.92	24.00	41.00						--	.27**
7. SES	0.04	2.43	-8.13	4.09							--

Note. ASQ = Ages and Stages Questionnaires, DERS-16 = Difficulties in Emotion Regulation Scale-Short Form. The infant's gender was coded as 0 = boy, 1 = girl. SES = socioeconomic status.

\* $p < .05$ . \*\* $p < .01$ .

### Findings of Correlation Analyses

Table 2 also showed the correlations coefficients between the variables. Bivariate correlations revealed that demographic variables such as the gender of the infant ( $r = .02, p > .05$ ), the age of the mother ( $r = .12, p > .05$ ), the age of the father ( $r = .01, p > .05$ ) and the SES of the family ( $r = .04, p > .05$ ) were not significantly related with the outcome variable of the study, the infant's communication skills.

The infant's communication skills at the 12th month, which was the outcome variable of the study, was significantly and negatively correlated with the mother's prenatal emotion regulation difficulties ( $r = -.25, p < .05$ ) and the father's prenatal emotion regulation difficulties ( $r = -.22, p < .05$ ). As the mother's prenatal emotion regulation difficulties increased, the infant's 12<sup>th</sup> month communication skills decreased. Consistent with this, low level communication skills were reported in infants of fathers with high level prenatal emotion dysregulation difficulties.

In addition, a positive and significant relationship was found between the mother's prenatal emotion regulation difficulties and the father's prenatal emotion regulation difficulties ( $r = .27, p < .01$ ).

## **Discussion**

Most of the studies to date have generally investigated the importance of parental factors during the transition to parenthood for children's development, focusing only on the postnatal period of this process. Moreover, in the majority of these studies, the participants were only mothers. Therefore, the present research examined the predictive role of parental emotion regulation difficulties in the prenatal period of the transition to parenthood on communication skills of infants.

The findings of the present study revealed that both mother's and father's emotion regulation difficulties during pregnancy predicted the infant's communication skills at 12 months. Accordingly, as parental emotion regulation difficulties in prenatal period increase, communication skills of infant decrease. The results were consistent with previous researches that pointed out the negative role of prenatal parental emotion regulation difficulties on child development (Boe, 2020; Cao et al., 2018; Ostlund et al. 2019).

The transition to parenthood brings with it a series of changes and requirements. As a result, an increase in emotional arousal occurs, which plays an explanatory role for changes in the capacity for emotion regulation that are highly sensitive to life experiences (Rutherford et al., 2015). In addition, prenatal emotion regulation difficulties are associated with high levels of depression (Cao et al., 2018), high psychological stress, negative parenting expectations, low social support, and problems in coping skills (Boe, 2020). Considering all these, it is an expected finding that prenatal emotion regulation difficulty is a predictor variable in the current study.

This finding can be explained by the fetal programming hypothesis (Barker, 1998; 2004). According to this hypothesis, emotion regulation difficulties experienced during pregnancy may have shaped the cues transferred through the placenta, adapted the phenotype of the infant based on the shaped cues, and negatively affected the development of brain regions (changes in neural connectivity between brainstem, limbic and cortical brain regions) (Lupien et al., 2009). As a more specific example, emotion regulation difficulties experienced during pregnancy may affect the

behavioural development of the child by increasing maternal blood cortisol levels and other stress hormones, in a similar way to prenatal maternal anxiety. Maternal cortisol can cross the placenta by altering the  $11\beta$ -HSD2 barrier enzyme, altering the fetal context and influencing the development of neurological entities (O'Donnell et al., 2012).

### **Conclusion and Suggestions**

The present research has important theoretical and practical implications. From a theoretical perspective, parental factors in the transition to parenthood have mostly been studied by including mothers. Paternal factors and fathers' experiences in this special process have been addressed in very few studies. The present study investigated the role of prenatal emotion regulation difficulties on infants' communication skills by including both mothers and fathers and contributed to the literature. From a practical perspective, the present study may provide insight into prevention and early intervention programs planned for couples who are planning to have children and are in the transition to parenthood.

In addition to its contributions, the present study has several limitations. Firstly, the participant couples of the study were reached through the free of charge pregnancy trainings offered by the hospitals. If the research model is tested with couples reached through different methods, a stronger generalization can be made. Secondly, the findings of this study are based only on the self-reports of mothers and fathers. Research on the role of the prenatal period in child development can also be conducted using objective measurement tools. In particular, the use of multiple methods (questionnaire, observation, etc.) will reduce subjectivity. In addition to all these, this study only addressed the role of the prenatal period. Future studies may examine the factors related to the prenatal period together with the postnatal period and control the role of postnatal factors (postnatal anxiety, depression, etc.).

In conclusion, this study, which shows the negative relationship between prenatal parental emotion regulation difficulties and infant's communication skills at 12 months and supports fetal programming effects in explaining the role of prenatal emotion regulation difficulties, is thought to be important in terms of drawing attention to preventive programs.

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