A Dyadic Study on Perceived Stress and Couple Adjustment During Pregnancy: The Mediating Role of Depressive Symptoms

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Abstract

Stress is associated with dyadic adjustment during transition to parenthood, but little is known about mechanisms underlying this link, particularly during prenatal period. This dyadic study explored the mediating role of depressive symptoms in the relationship between perceived stress and dyadic adjustment in expectant couples. One hundred and fourteen couples at the third trimester of pregnancy completed self-reports of perceived stress, depression, and dyadic adjustment. Results indicated that both parents' perceived stress was associated with their own lower relationship satisfaction directly and indirectly, through their own higher depressive symptoms. Mothers' perceived stress was also linked to higher fathers' depressive symptoms, and thus also to lower fathers' relationship satisfaction. Both parents' perceived stress was only directly associated with their own dyadic consensus, and their own and their partners' affectional expression. Findings suggest that interventions aimed at reducing expectant parents' perceived stress could protect against depressive symptoms and promote the couple's adjustment during pregnancy.

Keywords

pregnancy, couples, stress, depression, dyadic adjustment, actor-partner interdependence model

Introduction

It is widely acknowledged that the perinatal period is one of the most significant and stressful life events for both women and men (Bornstein & Venuti, 2013). New responsibilities and demands related to adjustment to parenthood may result in high levels of perceived stress and increase psychological vulnerability in both expectant parents (Condon, Boyce & Corkindale, 2004; Cowan

& Cowan, 2000; Morse et al., 2000). An extensive body of research has demonstrated the negative effects of maternal perinatal stress on parenting dimensions, as well as on fetus and child development (Lazinski et al., 2008). The majority of the studies focused on maternal depression in the postnatal period, highlighting its adverse impact on women's mental health and on family functioning (O'Hara & Wisner, 2014). Less attention has instead been paid on parental emotional states during pregnancy, although some studies reported that the rates of maternal depression before childbirth are similar to those in the postpartum (Gavin, et al., 2005). Specifically, the highest prevalence of prenatal depression (12.8%) has been observed in the last trimester (Bennett et al., 2004).

Over the last two decades, there has been a growing interest on the father's role and mental health during the transition to parenthood (Baldoni & Agostini, 2013). Paternal perinatal depression (PPND) is a mental health issue that affects a large number of new fathers, with an incidence rate three times higher than in the general population (Fletcher et al., 2015). PPND still receives little attention compared to maternal perinatal depression, and it seems to be underdiagnosed and undertreated (Baldoni, Matthey, et al., 2018; Musser et al., 2013). Longitudinal and meta-analytic findings defined the assessment of depressive symptoms in fathers as a primary need (Baldoni, Massey, et al., 2018; Cameron et al., 2016; Field, 2018; Figueiredo & Conde, 2011, underlining the importance of investigating the interrelationships among maternal and paternal adjustment dimensions. Despite research on this topic being dominated by maternal literature, the role of fathers' and couple's dimensions on family adjustment has been widely recognized (Garfield, 2018; Glover & Capron, 2017). Since mid-late pregnancy, transition to parenthood entails a significant couple reorganization, which may affect dyadic adjustment and deteriorate the quality of marital relationship (Belsky & Rovine, 1990; Belsky, et al., 1983;). Thus, it is important that perinatal research adopt a dyadic perspective by involving both couple members and taking into account the interdependence that exists between partners dealing with an inherently shared stressor such as transition to parenthood.

A number of previous studies reported significant positive associations between mothers' and fathers' psychological states (in terms of perceived stress, depression, and anxiety) and relationship satisfaction during the perinatal period, suggesting mutual influence within the couple (Da Costa et al., 2017; Giannotti et al., 2018; Kamalifard et al., 2018; Paulson & Bazemore, 2010; Rollè et al., 2017; Vismara et al., 2016).

Stress and Couple Adjustment during the Transition to Parenthood

Several authors highlighted the importance of conceptualizing stress in the couple as a dyadic phenomenon (Randall & Bodenmann, 2009), as the perceived stress of one partner could spill over to the close relationship and influence the other partner (Story & Bradbury, 2004). Thus, it is crucial to adopt a dyadic approach when studying the impact of perceived stress on relationship quality, which constitutes a marker of individual and family adaptation to parenthood (Bradbury et al., 2000; Randall & Bodemann, 2009).

Research reported associations between parents' perceived stress (mostly operationalized as parenting-related stress after childbirth) and lower relationship satisfaction for both mothers and fathers (Horowitz & Damato, 1999; Kwok et al., 2013; Salonen et al., 2010). A longitudinal study on first-time parents (Wallace & Gotlib, 1990) found that women's and men's parenting stress during pregnancy predicted lower marital satisfaction at six months postpartum. Dyadic studies on parents of young children (Choi, 2019; Lavee et al., 1996) reported cross-partner effects within the couple, with one partner's parenting stress being associated with her/his own as well as the partner's lower marital satisfaction and perceived marital quality. However, most studies on this topic focused on the postnatal period, and little is known about dyadic associations between perceived stress and couple's adjustment during pregnancy.

Depressive Symptoms as a Potential Mediator

Several risk factors may account for the onset of perinatal depression in both parents (Gawlik et al., 2014; Underwood et al., 2016; Yim et al., 2015), including the presence of perinatal stress (deMontigny et al., 2013; Razurel et al., 2016). Recent longitudinal research highlighted that

perceived stress predicted higher antenatal and postnatal depression in both mothers and fathers (Underwood, Waldie, D'Souza, et al., 2017; Underwood, Waldie, Peterson, et al., 2017). Other studies reported that parental stress was strongly, positively associated with both maternal and paternal depressive symptoms during the early postnatal period (Anding et al., 2016; Kamalifard et al., 2014; Mao et al., 2011). At the dyadic level, higher parenting stress of one partner's was found to be associated with higher depressive symptoms in the other partner during transition to parenthood (Soliday et al., 1999; Vismara et al., 2016). Thus, empirical evidence suggests a detrimental effect of perinatal stress on both individual and partner psychological adjustment during transition to parenthood (Philpott et al., 2017).

In turn, psychological difficulties during perinatal period have been shown to adversely affect family functioning and relational satisfaction in both mothers and fathers. (Boath et al., 1998; Letourneau et al., 2012). Previous studies have shown that depressive symptoms are associated with lower marital satisfaction and relationship quality in both women and men (Fincham et al., 1997; Kouros et al., 2008). Maternal and paternal depressive symptoms were also found to be a risk factor for negative co-parenting dynamics (Bronte-Tinkew et al., 2009; Tissot et al., 2017), which are strongly related to dyadic adjustment. A study on perinatal depression in fathers highlighted that paternal depressive symptoms were associated with an increased risk of poor dyadic adjustment as reported by both fathers and mothers (Ramchandani et al., 2011).

Based on the aforementioned statements, it seems reasonable to hypothesize that perceived stress might be associated with dyadic adjustment also indirectly, through depressive symptoms. In the postnatal period, Rollè et al. (2017) found that, for both mothers and fathers, the relationship between parenting stress and lower dyadic adjustment was fully mediated by their lower mental health. To the authors' knowledge, no study has investigated the potential mediating role of depressive symptoms in the relationship between perceived stress and dyadic adjustment in the perinatal period, adopting a dyadic approach.

The Present Study

The prenatal period is of critical importance due to their significant implications for dyadic adjustment and parenting (Belsky et al., 1983; Glover & Capron, 2017). To date, most studies on expectant parents have adopted an individual perspective and have involved mainly mothers. In light of the complex interplay between paternal and maternal psychological states (Goodman, 2004) and the interdependence that exists between dyad members (Kenny et al., 2006), and given the importance to include fathers in perinatal research (Paulson et al., & Bazemore, 2016), there is the need to adopt a dyadic approach in the study of adjustment to the transition to parenthood.

The present study aims to fill an important gap in the literature by investigating the potential mediating role of depressive symptoms in the associations between perceived stress and dyadic adjustment in couples at the third trimester of pregnancy, adopting a dyadic approach and using the ActorPartner Interdependence Mediation Model (APIMeM; Ledermann et al., 2011). Specifically, we examined whether perceived stress was associated with individual and partner dyadic adjustment directly and indirectly, through individual and partner depressive symptoms.

Following theory and research discussed earlier, our general hypotheses were that, for both mothers and fathers, (a) higher perceived stress would be directly associated with lower individual and partner dyadic adjustment; and (b) more severe individual depressive symptoms would mediate the direct associations between higher perceived stress and lower individual dyadic adjustment. Due to the scarcity of previous dyadic studies, no hypotheses were formulated about the indirect associations through the partner's depressive symptoms.

Method

Participants and Procedure

A sample of expectant mothers and fathers was recruited in the waiting room of the Operative Unit of Obstetrics and Gynecology of the Infermi Hospital of Rimini (Italy). Couples were enrolled while waiting for their regular gynecological visit. This study included the following: (a) expectant parents at the third trimester of pregnancy; (b) the biological parents of the future baby; (c) subjects currently involved in a couple relationship at the time of assessment and both willing to participate

in the study; and (d) parents able to read and well understand Italian. High-risk pregnancies were excluded from the research. Written informed consent was obtained from all subjects. Each partner filled out the questionnaires separately from their partner in a quiet room of the hospital and returned them directly to the researchers. Ethical approval was obtained from the Ethical Committee of the CEIIAV, Servizio Sanitario Regionale Emilia Romagna, Italy.

Of the 124 recruited couples, 10 were excluded from the analyses, since one of the two partners did not respond to scales assessing one or more of the study variables. Thus, the final sample consisted of 114 couples (114 mother and 114 fathers). The majority of mothers (n = 96, 84.2%) and fathers (n = 108, 94.7%) were Italian. Fathers (M = 36.35, SD = 7.15, range 22–58 years) were moderately older than mothers (M = 32.62, SD = 5.02, range 19-44 years; $F(1,111) = 56.27$, $p < .001$, Cohen's $d = 0.61$). Secondary education was the highest educational level reported by about half of both mothers (50%) and fathers (52.6%), and most of both mothers (n = 78, 68.4%) and fathers (n = 98, 86%) were employed. About half of the couples (n = 56, 49.1%) were married, and 44 women (38.6%) and 43 men (37.7%) already had children at the time of assessment.

Measures

All subjects were asked to complete the following self-report questionnaires.

Perceived Stress. Perceived stress was studied using the Perceived Stress Scale (PSS; Cohen et al., 1983) Italian version (Fossati, 2010). This 10-item self-report measures the frequency of feelings and thoughts related to perceived stress during the last month. PSS reliability (Cronbach's alpha = .85) and construct validity have been widely demonstrated (Cohen et al., 1983). Participants rate each item using a five-point scale (0 = never to 4 = very often). Cronbach's alpha in the current study was .65 for mothers and .77 for fathers.

Depressive Symptoms. Depressive symptoms were investigated using the 20-item Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), Italian version (Fava et al. 1982). Respondents are asked to rate on a four-point scale (0 = never to 3 = always) how often they

experienced the symptoms listed during the past week. In this study, Cronbach's alpha was .78 for mothers and .75 for fathers.

Dyadic Adjustment. Couple adjustment was assessed using the Dyadic Adjustment Scale (DAS; Spanier, 1976), Italian version (Garbarino et al., 2014). The DAS includes 32 items assessing relationship quality in married or cohabiting couples. The DAS includes our subscales: dyadic satisfaction (10 items assessing the perception of happiness in the couple's relationship, such as the contemplation of separation/divorce, the frequency of quarrels, the pleasure of spending time together); dyadic cohesion (5 items regarding the amount of time that partners spend on mutually enjoyable activities, such as social interests, dialogue, common goals); and dyadic consensus (13 items on the level of agreement between partners on different topics such as free time management or religion); affectional expression (4 items on how partners express their feelings, love and sexuality). Respondents rated each item on a five- or six-point scale (e.g., 0 = always to 5 = always disagree). Two additional items require a dichotomous answer (Yes = 0, No = 1). This scale has shown a high internal consistency (Cronbach's alpha = .96), as well as a good construct validity (Spanier, 1976). In this study, Cronbach's alphas in women and men were, respectively, .66 and .68 for dyadic satisfaction, .72 and .71 for dyadic cohesion, .87 and .84 for dyadic consensus, and .61 and .53 for affectional expression.

Data Analysis

A series of preliminary analyses were performed. Bivariate correlations between study variables were calculated separately for mothers and fathers and within couples. Differences between mothers' and fathers' mean scores in the study variables were tested using repeated measures analysis of variance (ANOVA). To test for the need to include covariates in the dyadic model, mothers' and fathers' depressive symptoms and dyadic adjustment dimensions were correlated with age (Pearson's correlations), and compared among groups based on nationality (i.e., Italian or other), education (i.e., primary, secondary, or tertiary education), employment status (i.e., employed or unemployed), marital status (i.e., being married or not), and parenthood (i.e., having children or

not) using ANOVA. Variables were included as covariates if they were at least moderately correlated ($r \geq |.30|$) or significantly associated (ANOVAs) with the mediator or outcome variables for either mothers or fathers (Frigon & Laurencelle, 1993).

A simple Actor–Partner Interdependence Model (APIM; Kenny et al., 2006) was preliminarily applied using structural equation modeling (Ledermann & Kenny, 2017), to test for the direct associations of mothers' and fathers' perceived stress with both their own and their partners' dyadic adjustment. An APIMeM (Ledermann et al., 2011) was then estimated to test for the role of each parent's depressive symptoms in mediating these associations. Only direct paths that were significant in the simple APIM were maintained in the APIMeM. To preliminarily test empirical distinguishability by gender, each path was constrained as equal among parents, and constraints were individually tested (Garcia et al., 2015; Ledermann et al., 2011). For each constraint, a χ^2 difference test ($\Delta\chi^2$) was performed to determine if constraining that association as equal across parents would significantly worsen model fit. For all models, the maximum likelihood estimation method was used. Model fit was evaluated based on the following criteria: root mean square error of approximation (RMSEA) $\leq .06$, standardized root mean-square residual (SRMR) $\leq .08$, and comparative fit index (CFI) $\geq .95$ (Hu & Bentler, 1999). The significance of the indirect effects in the APIMeMs was established using bootstrapping (Preacher & Hayes, 2008).

Given the use of structural equation modeling with observed variables in our dyadic analyses, we followed sample size recommendations in multiple regression analyses, as suggested by Kenny and Cook (1999). A power analysis indicated that, with six independent variables (i.e., two mother and father predictors and two covariates) and $\alpha = .05$ (two-tailed), at least 98 couples were needed to reach enough power (.80) to detect a medium effect size. A post-hoc power analysis using the Monte Carlo method (Muthén & Muthén, 2002) indicated that, with two covariates, two independent variables, two mediator variables, and six outcome variables, an effect size of .25 (small-to-medium), and 114 couples, an adequate model fit would be obtained: $\chi^2(13) = 13.89$, $p = .38$, RMSEA = .03, and SRMR = .03.

Interpretation of results was based on both statistical significance ($p \leq .05$ and bootstrapped 95% confidence intervals not including zero for indirect associations) and measures of effect size, with Pearson's *r* of .10 considered small, .30 medium, and .50 large, and Cohen's *d* of 0.20, 0.50, and 0.80 considered small, medium, and large, respectively (Cohen, 1988). Power analysis was performed with G*Power 3.1 (Faul et al., 2007). Preliminary analyses were conducted with IBM SPSS 25, and the APIM and APIMeM were estimated using path analysis in Mplus 7.4 (Muthén & Muthén, 2012).

Results

Preliminary Analyses

Bivariate correlations between same variables in the couples indicated that the higher scores in perceived stress, depression, and dyadic adjustment dimensions a parent reported, the higher the other parent's score. These correlations were significant for all variables except perceived stress ($p = 0.19$), with small-to-medium effect sizes (*r*s between .13 and .44) (Table S1; see Supplemental File). Mothers and fathers did not differ in dyadic satisfaction ($F(1,113) = 0.38$, $p = .54$, $d = 0.06$); cohesion ($F(1,113) = 1.54$, $p = .22$, $d = 0.14$); consensus ($F(1,113) = 0.48$, $p = .49$, $d = 0.08$) or in affectional expression ($F(1,113) = 2.56$, $p = .11$, $d = 0.16$). Mothers reported slightly higher perceived stress ($F(1,113) = 6.86$, $p = .01$, $d = 0.33$) and moderately higher depressive symptoms than fathers ($F(1,113) = 20.97$, $p < .001$, $d = 0.52$; Table S1). The correlations of age with depressive symptoms and dyadic adjustment were null-to-medium, ranging from -.15 to .08 ($p > .05$) for mothers and from -.18 ($p > .05$) to .30 ($p < .001$) for fathers (Table S1). Fathers' age correlated .30 with their own dyadic consensus; thus, this variable was included as a covariate in the dyadic models. Nonsignificant results of ANOVAs indicated that mean scores in depressive symptoms and dyadic adjustment did not differ based on education, employment status, marital status, and parenthood in either mothers or fathers. Hence, these variables were not entered in the dyadic models. Fathers' nationality was instead included in the APIMeM, as non-Italian fathers

showed significantly, strongly higher depressive symptoms and lower dyadic satisfaction compared to Italian fathers (Table S2; see Supplemental File).

Simple APIM

There were no differences among parents in the direct associations of perceived stress with individual and partner dyadic adjustment dimensions, as all $\Delta\chi^2$ tests were nonsignificant ($p > .05$). The more parsimonious model with empirically indistinguishable associations was thus tested, with all paths constrained to be equal across gender. The fit of this model was adequate ($\chi^2(18) = 18.85$, $p = .40$, RMSEA = .02, SRMR = .05, CFI = 1.00).

Mothers' and fathers' perceived stress was directly associated with their own lower dyadic satisfaction ($b = -.31$, $SE = .06$, $z = -5.29$, $p < .001$), consensus ($b = -.27$, $SE = .06$, $z = -4.74$, $p < .001$), and affectional expression ($b = -.19$, $SE = .06$, $z = -3.31$, $p = .001$). At the partner level, for both mothers and fathers, their own perceived stress was directly associated with their partners' lower dyadic satisfaction ($b = -.12$, $SE = .06$, $z = -2.04$, $p = .04$) and affectional expression ($b = -.20$, $SE = .06$, $z = -3.28$, $p = .001$). Mothers' and fathers' perceived stress was unrelated to their own ($b = -.09$, $SE = .06$, $z = -1.42$, $p = .16$), as well as their partners' ($b = -.09$, $SE = .07$, $z = -1.15$, $p = .17$) dyadic cohesion (Figure S1; see Supplemental File). Dyadic cohesion was hence excluded from subsequent dyadic mediation analyses.

APIMeM

Mothers and fathers differed in the individual ($\chi^2(1) = 4.46$, $p = .04$) and partner ($\chi^2(1) = 3.83$, $p = .05$) associations of prenatal stress with depressive symptoms. These associations were thus allowed to be freely estimated across parents. The fit of this model was adequate ($\chi^2(30) = 30.52$, $p = .44$, RMSEA = .01, SRMR = .07, CFI = 1.00).

Total and indirect associations are reported in Table 1. Path estimates are shown in Figure 1. There were significant indirect associations of perceived prenatal stress with individual and partner dyadic satisfaction. For both mothers and fathers, perceived prenatal stress was associated with their own higher depressive symptoms, and thus with their own lower dyadic satisfaction. However, the

association of perceived prenatal stress with higher depressive symptoms was significantly stronger for mothers than for fathers. Mothers' perceived prenatal stress was also linked to higher fathers' depressive symptoms, and thus to lower dyadic satisfaction in fathers. Fathers' perceived prenatal stress was instead unrelated to their partners' depressive symptoms. After the inclusion of depressive symptoms as the mediator variable, the direct association of mothers and fathers' perceived stress with their partners' lower dyadic satisfaction was no longer significant, as it was in the simple APIM. Instead, the inverse direct associations of parents' perceived stress with their own dyadic satisfaction, consensus, and affectional expression, and with their partners' affectional expression remained significant. Depressive symptoms did not mediate the associations of perceived stress with dyadic consensus and affectional expression since depressive symptoms were unrelated to these dyadic adjustment dimensions at both individual and partner levels.

Table 1.

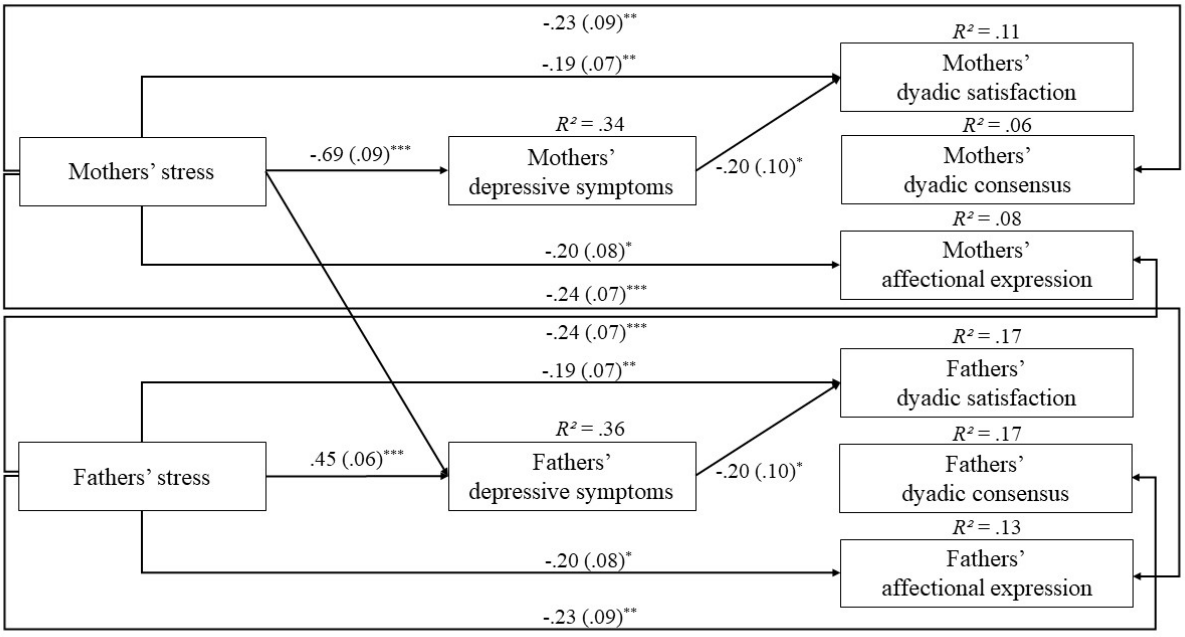
Total and Indirect Effects in the APIMeM

	Outcome variable								
	Dyadic satisfaction			Dyadic consensus			Affectional expression		
	b	*SE*	95% CI	*b*	*SE*	95% CI	*b*	*SE*	95% CI
Individual stress → Individual dyadic adjustment									
Total effect $X_{Mother} \rightarrow Y_{Mother}$	-.33	.08	[-.50, -.19]	-.29	.07	[-.41, -.14]	-.20	.06	[-.32, -.08]
Total IE $X_{Mother} \rightarrow Y_{Mother}$	-.15	.07	[-.33, -.04]	-.06	.06	[-.18, .04]	.00	.06	[-.12, .12]
Specific IE $X_{Mother} \rightarrow M_{Mother} \rightarrow Y_{Mother}$	-.14	.07	[-.34, -.02]	-.05	.06	[-.17, .05]	-.01	.06	[-.12, .10]
Specific IE $X_{Mother} \rightarrow M_{Father} \rightarrow Y_{Mother}$	-.01	.02	[-.04, .02]	-.01	.01	[-.04, .01]	.01	.02	[-.01, .06]
Total effect $X_{Father} \rightarrow Y_{Father}$	-.28	.06	[-.40, -.15]	-.26	.07	[-.38, -.12]	-.21	.06	[-.33, -.09]
Total IE $X_{Father} \rightarrow Y_{Father}$	-.09	.05	[-.21, -.02]	-.03	.04	[-.13, .03]	-.01	.04	[-.09, .06]
Specific IE $X_{Father} \rightarrow M_{Father} \rightarrow Y_{Father}$	-.09	.05	[-.21, -.02]	-.04	.04	[-.13, .03]	-.01	.04	[-.09, .06]
Specific IE $X_{Father} \rightarrow M_{Mother} \rightarrow Y_{Father}$	.00	.01	[-.01, .02]	.00	.01	[-.01, .02]	.00	.01	[-.02, .01]
Individual stress → The partner's dyadic adjustment									
Total effect $X_{Father} \rightarrow Y_{Mother}$	-.08	.07	[-.21, .04]				-.20	.06	[-.32, -.09]
Total IE $X_{Father} \rightarrow Y_{Mother}$	-.01	.04	[-.08, .07]	-.02	.03	[-.08, .03]	.03	.03	[-.03, .10]

Specific IE $X_{Father} \rightarrow M_{Mother} \rightarrow Y_{Mother}$	.00	.02	[-.02, .05]	.00	.01	[-.01, .03]	.00	.01	[-.01, .02]
Specific IE $X_{Father} \rightarrow M_{Father} \rightarrow Y_{Mother}$	-.02	.03	[-.07, .05]	-.02	.03	[-.08, .03]	.03	.03	[-.03, .10]
Total effect $X_{Mother} \rightarrow Y_{Father}$	-.13	.07	[-.29, -.02]				-.20	.06	[-.32, -.08]
Total IE $X_{Mother} \rightarrow Y_{Father}$	-.06	.05	[-.17, .03]	-.05	.04	[-.15, .03]	.05	.05	[-.06, .15]
Specific IE $X_{Mother} \rightarrow M_{Father} \rightarrow Y_{Father}$	-.04	.02	[-.11, -.01]	-.02	.02	[-.07, .01]	.00	.02	[-.04, .03]
Specific IE $X_{Mother} \rightarrow M_{Mother} \rightarrow Y_{Father}$	-.02	.05	[-.10, .09]	-.04	.04	[-.11, .04]	.05	.05	[-.04, .15]

Note. X indicates the independent variable, M the mediator, and Y the outcome variable. APIMeM = actor-partner interdependence mediation model; IE = indirect effect; *b* = standardized estimate; *SE* = standard error; CI = confidence interval.

Figure 1. *APIMeM testing the mediating role of depressive symptoms in the relationship between perceived stress and dyadic adjustment.*



Note. Standardized path estimates are reported. Standard errors are in parentheses. Covariates, nonsignificant paths and within- and between-partner correlations are omitted from the figure for clarity.

$^{*}p < .05$. $^{**}p \leq .01$. $^{***}p \leq .001$.

Discussion

In this study, we examined whether the stress perceived by expectant parents at the third trimester of pregnancy was associated with individual and partner dyadic adjustment directly and indirectly, through individual and partner depressive symptoms. We extended previous findings on postnatal period, testing the proposed dyadic mediation model in the prenatal period.

Partly in support of our first hypothesis, we found direct associations between mothers' and fathers' perceived stress and lower individual dyadic satisfaction, consensus, and affectional expression. This was in line with current literature on postnatal period showing that more highly stressed parents tend to feel less satisfied of their couple relationship, and to report less agreement and

emotional affection (Bradbury et al., 2000; Rollè et al., 2017; Salonen et al., 2010). Contrary to hypotheses, perceived stress was unrelated to the way in which expectant parents are involved in shared activities and interests (i.e., dyadic cohesion). At the partner level, in partial support of our first hypothesis, mothers' and fathers' perceived stress was negatively associated with dyadic satisfaction and affection expression of their partners. The partner-level associations we found in expectant parents are consistent with those documented in parents of young children (Lavee et al., 1996), and they provide additional evidence to the dyadic stress model of a spillover effect (Emery et al., 1984) of perceived stress on couple satisfaction not only after childbirth but also during prenatal period (Randall & Bodenmann, 2017). Contrary to hypotheses, parents' perceived stress was unrelated to partners' dyadic cohesion and consensus.

As to indirect associations, our findings were in line with our second hypothesis only for the individual-level associations of perceived stress with dyadic satisfaction. Mothers' and fathers' perceived stress was associated with their higher depressive symptoms, and thus with their lower dyadic satisfaction. This was in line with previous evidence that perceived stress is related to more severe depressive symptoms in males and females during the transition to parenthood (Glazier, et al., 2004; Greenhalgh et al., 2000; Underwood, Waldie, D'Souza, et al., 2017; Underwood, Waldie, Peterson, et al. 2017b), and extends the previous literature on post-partum period suggesting that depressive symptoms may adversely affect couple satisfaction also before childbirth (Letourneau et al., 2012). Noteworthy, we observed that the association of perceived stress and depressive symptoms was stronger for mothers than for fathers. A possible explanation for this is that expectant mothers tend to be more vulnerable compared to their partners in the last trimester of pregnancy, due to the influential psychological and biological changes related to pregnancy (Figueiredo & Conde, 2011). Moreover, previous findings suggest that emotional difficulties might be particularly evident in primiparous mothers (Alehagen et al., 2009), as is the case of the majority of our sample. Research evidenced that mothers usually report higher level of depressive symptoms and stress than fathers during transition to parenthood, including prenatal period (Teixeira et al.,

2009; Vismara et al., 2016). In addition, male depressive symptoms are generally milder and less defined and may occur more frequently in comorbidity with other syndromes (Winkler et al., 2004). Studies on gender differences showed that fathers manifest their distress through a wide array of symptoms such as anxiety, irritability, anger attacks, somatic symptoms, and addictions (Leach et al., 2016; Martin et al., 2013). Another explanation might be that the CES-D, used in this study to assess depressive symptoms, is mainly focused on the female depressive symptomatology. It may disregard several aspects of PPND clinical manifestations (Baldoni et al., 2018), capturing only partially the association of perceived stress with psychological suffering.

At the partner-level, we found that mothers' perceived stress was associated with more severe paternal depressive symptoms, and thus with lower paternal dyadic satisfaction. It is plausible that this association was related to the time of assessment. The third trimester of pregnancy is the final homestretch of the prenatal period, and maternal health is considered the primary focus of the couple and the family. Thus, maternal worries and vulnerabilities may have an impact on the partner's emotional states due to their link with a safe labor and a successful childbirth. In addition, the effects of paternal stress may be reduced in this specific critical period in favor of a focus on maternal psychological and physical well-being.

Contrary to hypotheses, perceived stress was associated with individual dyadic consensus and with individual and partner affectional expression only directly, since depressive symptoms were unrelated to these dyadic adjustment dimensions. In this regard, other studies have shown a lack of association between depressive symptoms and dyadic adjustment, highlighting the role of other potential mechanism that may moderate this association, such as attachment style (Scott & Cordova, 2002).

The fact that depressive symptoms mediated the association of perceived stress with dyadic satisfaction only might be attributable to the satisfaction scale being proposed as the most psychometrically sound among the DAS subscales (Kurdek, 1992). However, further research is needed to elucidate this issue.

Altogether, the findings of this study indicated direct and indirect dyadic associations between the perceived stress and dyadic adjustment dimensions of expectant couples. Screening for parents' perceived stress during pregnancy is thus critical, as it may lead to maladjustment at both the individual and couple levels. Noteworthy, findings suggest that for fathers, not only their own stress and depressive symptomatology but also their partner's stress may negatively affect their relationship satisfaction. This must be especially considered in clinical practice, since the association of maternal stress with paternal mental health may constitute a risk for later father involvement and adequate co-parenting (Bronte-Tinkew et al., 2009).

This study has several strengths. First, we adopted a dyadic approach to model the complex interplay that may occur within the couple. The use of the APIM (Kenny et al., 2006) allowed us to examine paternal dimensions both individually and interdependently. The timing of assessment is also a key point of this study since most previous research was based on postnatal assessment. Similarly, the adverse impact that perceived stress may exert on expectant mothers and fathers is still underinvestigated.

However, our findings need to be interpreted with caution, considering the limitations of the study. This cross-sectional study provides only a restricted snapshot of a specific situation in a limited timeframe, and the use of longitudinal design is to prefer in research on perinatal adjustment. Larger samples are needed to confirm the validity and generalizability of our findings. The inclusion of other parenting-related variables such as dyadic coping, prenatal attachment, and co-parenting should be considered to extend the proposed dyadic model. Finally, the use of self-report questionnaires may limit the sensitivity and validity of the assessment, in particular regarding the fathers (Baldoni et al. 2018; Matthey et al., 2000).

Conclusions

This study draws attention to the interrelationships that may occur among maternal and paternal dimensions during prenatal period, highlighting the importance to address this complex dyadic issue from the early stage of pregnancy. As suggested by Randall and Bodenmann (2009), perceived

stress can affect the quality of close relationships, especially in the context of a dyadic stress, as is the case of adjustment to parenthood and the upcoming childbirth. Despite post-partum being considered a preferential time window for the study of emotional distress during perinatal period, the potential effects of perceived stress on individual and dyadic outcomes should be addressed also prenatally. We encourage perinatal practitioners to screen expectant mothers and fathers for perceived stress at early stage of pregnancy. In light of our findings, interventions aimed at reducing expectant parents' perceived stress could protect against depressive symptoms and promote the couple's adjustment during the prenatal period. Similarly, interventions aimed at enhancing quality of marital relationship during perinatal period should include an appropriate assessment of maternal and paternal perceived stress and affective symptomatology.

We strongly encourage perinatal researchers and clinicians to move from an individual to a dyadic perspective, and to include fathers in psychological assessment since early pregnancy.

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