

Maternal Perceptions of Paternal Investment Are Associated With Relationship Satisfaction and Breastfeeding Duration in Humans

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This study examined potential pathways in the associations between breastfeeding and mothers' relationship satisfaction, including her satisfaction with father involvement (FI) and parity, among mothers not working outside the home at 6 months. Mothers ($n = 222$) completed questionnaires at 4 time-points, 3 to 24 months postpartum as part of a longitudinal cohort study. In this study, we were interested in two main outcome variables: mothers' relationship satisfaction with their partner (RS) and continuation of breastfeeding after 3 months. Our first analysis revealed that breastfeeding at 3 months postpartum predicted decreased RS at 6 months postpartum, which was mediated by mothers' dissatisfaction with FI in infant caretaking at 6 months postpartum. These associations depended on mothers' parity: Multiparous breastfeeding mothers were the most dissatisfied with FI. Second, mothers' satisfaction with FI at 6 months also predicted increased RS at 24 months through increased RS at 12 months, but not through

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FI at 18 months. Third, we found that high dissatisfaction with FI at 6 months was the only significant predictor for the discontinuation of breastfeeding from 3 to 6 months postpartum. Our results suggest that multiparous breastfeeding mothers might be more dissatisfied with FI in caregiving than nonbreastfeeding mothers and primiparous breastfeeding mothers. Furthermore, mothers' satisfaction with FI seems a potent predictor of overall RS up to 24 months postpartum and the continuation of breastfeeding from 3 to 6 months postpartum, regardless of parity.

Keywords: breastfeeding, father involvement, parity, relationship satisfaction

The behaviors and investment of both mothers and fathers affect child outcomes. While most research has focused on the effects of maternal behavior and maternal health on child development, a growing number of studies have considered the impact of the father's involvement (Grossmann & Grossmann, 2009; Sarkadi, Kristiansson, Oberklaid, & Bremberg, 2008; Swain et al., 2014). However, the level of father involvement affects not only child outcomes, but also the mother's mood and health behaviors during pregnancy and postpartum (Giurgescu & Templin, 2015; Martin, McNamara, Milot, Halle, & Hair, 2007). Moreover, the mother's perception of paternal engagement in childcare can be a reciprocal process in the mother's development as a parent and as a partner in a new family structure. Our previous work demonstrated that mothers who were breastfeeding at

3 months reported lower satisfaction in the relationship with the partner at 3 months compared with women who were not breastfeeding at 3 months (Cost et al., 2016). Because breastfeeding, either directly at the breast or by expressing breast milk for bottle-feeding, demands a high level of resources from the mother and is facilitated by social support (Haroon, Das, Salam, Imdad, & Bhutta, 2013; The United States Breastfeeding Committee, 2018), we hypothesized that mothers' satisfaction with father involvement would mediate the association between breastfeeding and decreased satisfaction in the relationship with the partner (see Figure 1A for theoretical model). Thus, mothers' satisfaction with father involvement will play an important role in the transition to parenthood, with regards to both the solidity of the romantic relationship and the investment in breastfeeding.

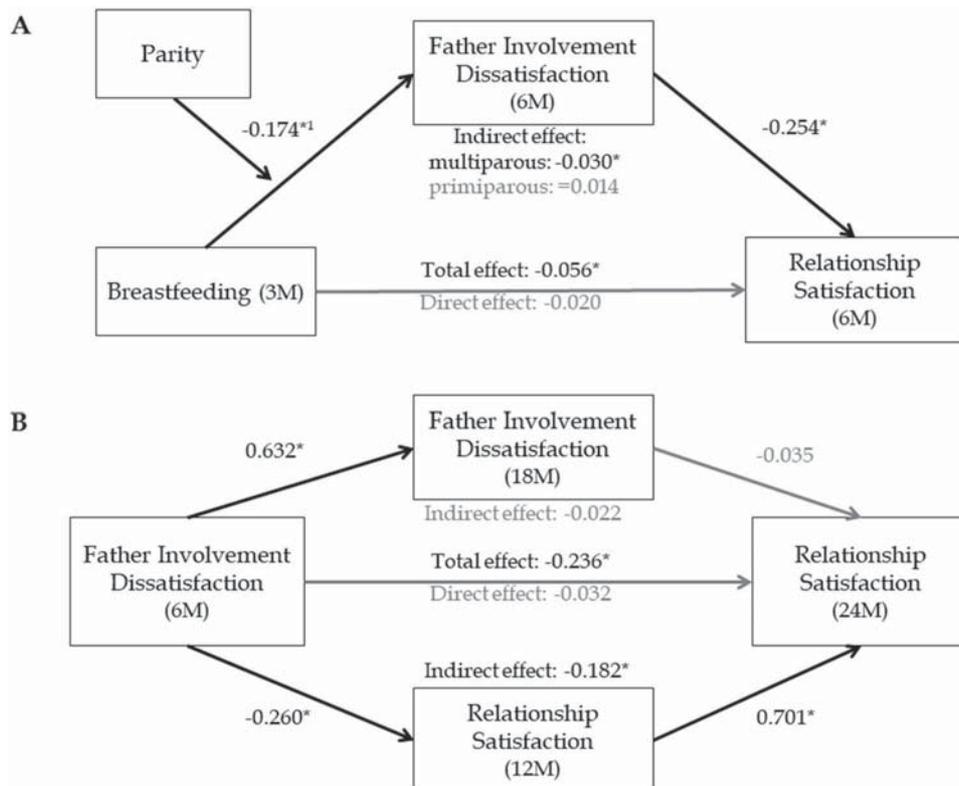


Figure 1. (A) Conditional Mediation Model. Path coefficients in which the interaction between breastfeeding at 3 months and parity predict higher levels of dissatisfaction with father involvement at 6 months, which predicts lower levels of relationship satisfaction at 6 months. (B) Parallel mediation models for the longer-term effects of dissatisfaction with father involvement at 6 months on relationship satisfaction at 24 months through relationship satisfaction at 12 months. * $p < .05$.

Relationship Changes in the Peripartum

During pregnancy, mothers often report high levels of relationship satisfaction (RS; Dyrdal, Røysamb, Nes, & Vittersø, 2011). Conversely, mother's assessment of the relationship quality with the partner often declines in the postpartum (Mortensen, Torsheim, Melkevik, & Thuen, 2012). A well-supported explanation for this decline is violated expectations surrounding childcare. Several studies found that mothers engaged in more childcare activities than did fathers, often by very large margins and irrespective of cultural background (Craig & Mullan, 2011). Breastfeeding is an important component of parental care, which is necessarily carried out by the mother—even if breast milk is expressed for bottle-feeding the baby by someone else—and may contribute to the unequal division of parental care (Palmqvist, Zäther, & Larsson, 2015). Furthermore, mothers might have high expectations of the fathers' role in childcare prenatally, which fathers' actual involvement in childcare in the postpartum might fail to meet (Biehle & Mickelson, 2012).

While the partner relationship certainly changes in the first transition to parenthood, there are also relationship changes that occur with subsequent parenthood. For instance, previous studies have found that multiparous women reported lower relationship satisfaction and greater concern about their partner relationship than primiparous women (Nichols, Roux, & Harris, 2007). Although the reasons for decreased relationship satisfaction in multiparae compared with primiparae have not been explored previously, we hypothesized that a mother's dissatisfaction with the father's caregiving, particularly in multiparous breastfeeding mothers with increased childcare responsibilities, may contribute to decreased relationship satisfaction compared with primiparous mothers.

Breastfeeding

Major health organizations, such as the World Health Organization (WHO) and the American Academy of Pediatrics, recommend exclusive breastfeeding for the first 6 months of life. After that, infants might be fed complementary foods with continued breastfeeding up to 2 years of age or as long as mother and child desire to do so (Eidelman, 2012). Breastfeeding is recommended because of its comprehensive health-promoting effects for both infants and mothers (Eidelman, 2012) and has been associated with positive socioemotional outcomes in infants and mothers (Jonas & Woodside, 2016). Hence, breastfeeding is an important part of infant caregiving. Today, whether and for how long a woman chooses to breastfeed depends on different factors: psychological, socioeconomic, and health-related (reviewed by Thulier, 2009). Notably, it remains to be explored whether the behavioral act of breastfeeding at the breast complements the nutritional value of human milk or if the milk alone is sufficient for the array of health benefits for mothers and infants (Raju, 2011). Regardless of whether breastfeeding is done at the breast or the mother expresses the milk for bottle-feeding, breastfeeding demands high time and energy investment from the mother. For instance, the duration of suckling during a 24-hr period ranged from 25 min up to 5 hr and 25 min at 20 weeks' postpartum (Hörnell, Aarts, Kylberg, Hofvander, & Gebre-Medhin, 1999), while recommended duration and frequency of work breaks for mothers expressing milk is 30 min every 2 to 3 hours, or approximately 1.5 to 2 hr in a 8-hr

work day (The United States Breastfeeding Committee, 2018). Given this high maternal investment, paternal attitudes toward breastfeeding have a strong association with the mother's ability to overcome infant feeding difficulties and on the decision to continue to breastfeed (Cisco, 2017; Glenn & Quillin, 2007). While paternal attitudes toward breastfeeding may be explicit, such attitudes may also be latently expressed through gendered expectations of maternal "expertise" in the more challenging aspects of childcare that does not require paternal assistance or "interference" (Rose, Brady, Yerkes, & Coles, 2015).

Using a bioecological framework as described by Bronfenbrenner and Morris (2006), we considered the "conceptualization of the environment" from the perspective of the mother, using variables that reflected *her* evaluation of social roles and interpersonal relations, as *she* developed as a coparent and as a romantic partner in the context of changes in the family structure. Applying the components of the suggested bioecological model to our data, we propose that all mothers are new mothers in a changed family dynamic as a first context variable. Parity was a second context variable, with varying levels of caregiving demands dependent upon parity. Thereby, we considered the mother's mood to be a characteristic of her personal emotional resources.

In our model, we assumed three processes that might affect the developing mother: First, breastfeeding is a reciprocal interaction with the infant that increases in complexity over time. Second, mother's satisfaction with father involvement comprises ongoing daily social interactions, which form the mother's role in the changing environment with emotional and material resources that are more or less likely to be available to her as she adapts to her role as a mother and a romantic partner in the new family environment. Third, a mother's relationship satisfaction might be influenced by the regular interactions with her partner in the immediate environment, which affects the mother's ability to change and/or manage the family order. While the process satisfaction with father involvement is subjectively measured from the mother's experience, Bronfenbrenner and Morris (2006) explicitly state that both the subjective experience of the process and the objective measurement of the process are "driving the course of human development" (p. 797). Although our model focuses on the subjective experience, it is not our intention to negate the equal importance of the objective experience of quantifying father involvement. Finally, both our models included a time factor, with a first model considering 3 to 6 months postpartum and the second model considering 6 to 24 months postpartum.

While relationship satisfaction, satisfaction with father involvement, breastfeeding, and parity have all been studied in various contexts, we have not found any study that has considered how each of these components are related to each other in the transitional time of the first 6 months postpartum and how they could affect longer term outcomes in the partner relationship (for conceptual model, see Figure 1A). We argue that our multivariate approach better estimates the parameters associated with the mother's postpartum context compared with the existing literature. Furthermore, because this is a developmental period for both the mother and the father, quantification of the *timing* component in satisfaction with father involvement is important for families, health care providers, and policymakers to facilitate optimal outcomes in marital relationship satisfaction and breastfeeding continuance (for conceptual model, see Figure 1B).

We tested three hypotheses. First, based on previous findings indicating that mothers experienced decreased relationship satisfaction in the postpartum and that mothers also have unmet expectations of father involvement in the postpartum, we hypothesized that the negative association between breastfeeding at 3 months postpartum and relationship satisfaction at 6 months postpartum (Cost et al., 2016) would be mediated by mothers' dissatisfaction with father involvement at 6 months postpartum, and that this mediation would depend on parity. Second, based on the idea that the transition to parenthood is a developmental period for the mother (Hoekzema et al., 2017) and subject to contextual factors (Bronfenbrenner & Morris, 2006), we hypothesized that mothers' satisfaction with father involvement at 6 months postpartum would predict long-term relationship satisfaction at 24 months postpartum through both satisfaction with father involvement at 18 months and relationship satisfaction at 12 months postpartum. Last, based on findings suggesting that social support is a key facilitator of breastfeeding (Haroon et al., 2013), we hypothesized that, among mothers breastfeeding at 3 months, high satisfaction with father involvement at 6 months postpartum would increase the likelihood of a mother maintaining breastfeeding from 3 to 6 months postpartum.

Method

Participants

Mothers were derived from the Maternal Adversity and Neurodevelopment Study (MAVAN) study cohort. The MAVAN study is a longitudinal, prospective and multicenter cohort study that follows mothers and their infants from pregnancy to 14 years' postpartum. Mothers were recruited during the second trimester of pregnancy through the Ultrasound Department and the Women's Health Concerns Clinic at St. Joseph Hospital (Hamilton, Ontario, Canada) and the Hospital Obstetrics Departments of St. Joseph Hospital (Hamilton, Ontario, Canada). The study was approved by the local ethics boards at all research sites. All women gave their written, informed consent for participation. Of the 222 mothers who met inclusion criteria for this study (see Results), 217 had a partner at all assessment time-points, while four mothers who had a partner at 6 months did not have a partner at 12 months, one of which also did not have a partner at 24 months. At 6 months, 213 mothers were coresiding with their partner, eight were not coresiding, and one mother did not answer the question on whether or not she was coresiding.

Questionnaires

Sociodemographics. Maternal age at childbirth, parity, and socioeconomic status were assessed during the second trimester of pregnancy with the "Health and Well-Being of Mothers and their Newborns Questionnaire" (HWB), a composite of several measures on the health of mother and child. The socioeconomic risk variable (SES-risk) was calculated to include both income and education, with two groups represented: 0 = high income AND high education; 1 = low income OR low education. Based on national census data, income was dichotomized along federal low-income guidelines per total family income after tax (Statistics Canada, 2008). Education was stratified into University education

OR no University education. Our SES groups were defined by the amount of socioeconomic risk that has previously been associated with parenting outcomes (Belsky, Bell, Bradley, Stallard, & Stewart-Brown, 2007), with group zero having no risks associated with income or education and group one having risks associated with either income or education.

Symptoms of depression. The Edinburgh Postnatal Depression Scale (EPDS) is a 10-item screen for postpartum depression. With high sensitivity (86%) and high specificity (78%), the EPDS is considered the "gold standard" to assess symptoms of depression in the peri-partum (Cox, Holden, & Sagovsky, 1987). Participants completed the EPDS at 3, 6, 12, 18, and 24 months postpartum. In our sample, 14.2% of mothers meet the screening criteria for "possible depression" with symptom scores ≥ 10 , which is comparable to the global pooled prevalence estimate of postpartum depression of 11.9% (Woody, Ferrari, Siskind, Whitford, & Harris, 2017). Symptoms of depression are implicated in multiple antecedents and outcomes of maternal development, such as relationship satisfaction, support from the partner, and breastfeeding initiation (Jonas & Woodside, 2016). In the bioecological model, personal characteristics, such as age, socioeconomic risk, and symptoms of depression would represent aspects of the person that contribute to the processes of development. Our questionnaires at 6 months postpartum included questions on whether the mother had resumed working outside the home. In the bioecological framework, the context for mothers still on maternity leave and mothers who have resumed working outside the home would be very different and would place different constraints on the mother as she develops. We therefore have decided to include only mothers still at home at 6 months postpartum in these analyses.

Breastfeeding. Breastfeeding was assessed using the HWB. At 3 and 6 months postpartum, mothers answered the following questions: (1) "At what age did you stop breastfeeding (or giving breast milk to) your baby?" and (2) "How old was your baby when you fed him/her for the first time with something other with breast milk?". From the responses to these questions we created two separate dichotomized variables: Exclusive breastfeeding at 3 months (breastfed only vs. breastfed + formula or formula only) and any breastfeeding at 6 months postpartum (breastfed only, breastfed + formula/food vs. formula/food only). We chose to use exclusive breastfeeding at 3 months postpartum because our questionnaire did not quantify the frequency or duration of breastfeeding at 3 months beyond whether it was exclusive or supplemented, which would increase the variability in the necessity of maternal resources in the feeding interaction (Hörnell et al., 1999). We chose to use any breastfeeding at 6 months postpartum because the Canadian Pediatric Society (Critch & the Canadian Paediatric Society, Nutrition and Gastroenterology Committee, 2013) recommends the introduction of solid foods at 6 months, which would severely limit or eliminate the exclusive breastfeeding group at 6 months. Participants could also indicate whether they had never initiated breastfeeding or if they were bottle-feeding expressed breast milk. All mothers stated that they were *breastfeeding*. However, we cannot rule out the possibility that mothers (or their partners or someone else) sometimes *did* feed expressed breast milk from a bottle or cup. This may be especially likely with increased breastfeeding duration.

Relationship satisfaction. We used the McGill Assessment of Relationship Commitment, the Marital Strain Scale, and the

Quality of Marriage Index at 6 months postpartum to create a relationship satisfaction scale. The Marital Strain Scale was used to assess chronic stress with one's romantic partner (Pearlin & Schooler, 1978). The Quality of Marriage Index assessed relationship closeness (Norton, 1983). The McGill Assessment of Relationship Commitment measured the mother's commitment to the relationship with her partner. The three scores for the Marital Strain Scale (reversed score), the Quality of Marriage Index, and the McGill Assessment of Relationship Commitment were normalized with feature scaling using the sample range. We constructed an average score using the normalized scores for each of the three scales, which showed good face validity. We assessed internal consistency of our combined measure with Cronbach's alpha. We found that good internal consistencies for the combined relationship satisfaction measure at 6 months (Cronbach's alpha = .813) and at 24 months postpartum (Cronbach's alpha = .808). A high score indicates high satisfaction with the relationship and high relationship commitment. It is important that these questionnaires did not include questions on childcare or household chores, thus allowing us to separate the relationship satisfaction component from the satisfaction with father involvement component (see [online supplemental materials](#) for a list of all questions included).

Dissatisfaction with father involvement. For the scale measuring satisfaction with father involvement we selected the following four items from the Childbearing Attitudes Questionnaire (CAQ) completed at 6 and 18 months postpartum (see the [online supplemental material](#) for a list of all questions included). All four items were normalized with feature scaling using the sample range. Again, an average score was derived and used for all subsequent analyses. The scale was considered to have good face validity and internal consistency was acceptable for the father involvement dissatisfaction scale at 6 months (Cronbach's alpha = .768) and at 18 months postpartum (Cronbach's alpha = 0.761). The latter score did not include the question on tension over household tasks because it was not available at that time-point. A high score indicates high levels of dissatisfaction in father involvement in household chores and childcare.

Statistical Analyses

We ran several preliminary analyses ([online supplemental material](#)). First, we explored potential covariates (maternal symptoms of depression, maternal age, and SES-risk) using Spearman's Rank correlation or independent samples nonparametric tests. Next, we ran an analysis of covariance (ANCOVA) to confirm the interaction between breastfeeding at 3 months postpartum and parity to predict the dissatisfaction with father involvement (mediator), adjusting for the previously identified covariates. Third, we examined the normality of the distribution of residuals as well as outliers and influential cases in a multiple linear regression of respective models; exclusion of 11 cases with standardized residuals > |3| and high Mahalanobis distance (>15) did not change interpretation of the results.

To test our first hypothesis, we ran a conditional mediation analysis using the SPSS Macro "Process," Version 2.15 (Hayes, 2013), to assess whether the association between exclusive breastfeeding at 3 months and decreased relationship satisfaction at 6 months postpartum was mediated by variation in satisfaction with father involvement at 6 months postpartum and whether this effect

was modified by parity. Our second hypothesis examined potential long-term associations between mothers' dissatisfaction with father involvement at 6 months postpartum and relationship satisfaction at 24 months postpartum. To address this hypothesis, we ran a parallel mediation analysis with mothers' dissatisfaction with father involvement at 6 months postpartum predicting reduced relationship satisfaction at 24 months postpartum, with relationship satisfaction at 12 months postpartum and dissatisfaction with father involvement at 18 months postpartum as parallel mediators. For all mediation analyses, we ran 10,000 bootstrap samples to generate bias corrected bootstrap 95% confidence interval (95% CI; Hayes, 2013). For our third hypothesis, we used logistic regression to predict whether mothers were still breastfeeding at 6 months postpartum (any breastfeeding yes/no) from parity, maternal SES risk, maternal age, relationship satisfaction at 6 months postpartum, and satisfaction with father involvement at 6 months postpartum.

Results

For our sample from the initial cohort of mothers ($n = 497$), we required that the mothers had completed the question about having a partner, that they had partners at 6 months postpartum ($n = 401$), and that the mothers had not returned to work or were not working outside the home at 6 months postpartum ($n = 288$). We also required that mothers had a complete data set for predictors (exclusive breastfeeding at 3 months), outcomes (relationship satisfaction), mediators (satisfaction with father involvement), moderators (parity), and covariates (age, SES, EPDS) at the 6-month assessment ($n = 222$). The final sample consisted of 222 mothers, 77% of the sample that met selection criteria. Of the 401 mothers who had a partner at 6 months postpartum, there were no statistically significant differences (all $p > .05$), between participants that were included in the analysis and those who were not included in the analysis in any of the covariates or outcome variables. Of the mothers who had complete data and who met all other exclusion criteria except employment outside the home at 6 months, there were no statistically significant differences in the covariates or outcome variables in mothers who were employed outside the home at 6 months postpartum ($n = 88$; this number is less than the 113 women who reported working outside the home because of those 113, 25 had incomplete data on relationship satisfaction) and those who were not employed outside the home at 6 months postpartum ($n = 222$; [Figure 2](#)).

Covariates

Because of the agreement of family income category from prenatal to 6 months (Cohen's Kappa $\kappa = 0.949$, $p < .001$), and high agreement for EPDS score from prenatal to 3 and 6 months postpartum, Pearson's $r(336) = .658$, $p < .001$), we used the "last observation carried forward" approach (LOCF) so as not to lose too many participants because of missing data in covariates. The age of the mothers at birth ranged from 18 to 43 years ($M = 31.27$ years; $SD = 4.66$ years). Sociodemographic and participant characteristics are given in [Table 1](#). Higher maternal symptoms of depression at 6 months postpartum were associated with more dissatisfaction with father involvement and with reduced relationship satisfaction. Thus, EPDS score was included in all subsequent analyses to adjust for maternal mood ([Table 2](#)).

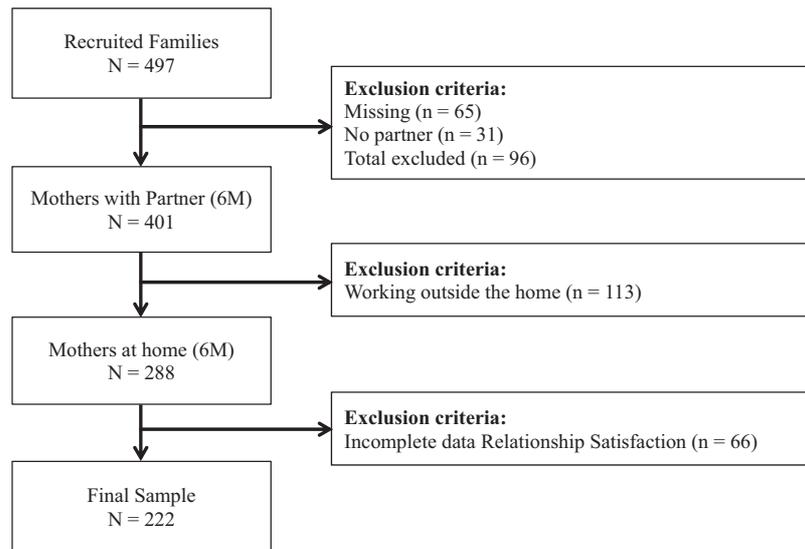


Figure 2. Participants and exclusion criteria.

Hypothesis 1

We hypothesized that dissatisfaction with father involvement would act as a mediator in the association between exclusive breastfeeding at 3 months postpartum and mothers’ relationship satisfaction at 6 months postpartum. Furthermore, we tested whether this association might be moderated by parity, which may

Table 1
Sociodemographics, Participant Characteristics, and Descriptive Statistics

Variable	n	%
Data collection site		
Montréal	105	47.3
Hamilton	117	52.7
Child gender		
Male	113	50.9
Female	109	49.1
Breastfeeding at 3 months		
No exclusive breastfeeding	110	49.5
Exclusive breastfeeding	112	50.5
Breastfeeding at 6 months		
No breastfeeding	83	45.1
Any breastfeeding	101	54.9
Parity		
Multiparous	98	44.1
Primiparous	124	55.9
Combined SES		
University degree and high income	97	43.7
Below university degree or low income	125	56.3
	<i>n</i>	<i>M (SD)</i>
Relationship satisfaction at 6 months	222	.857 (.134)
Relationship satisfaction at 24 months	177	.845 (.138)
Father Involvement dissatisfaction at 6 months	222	.349 (.224)
Father involvement dissatisfaction at 18 months	178	.296 (.242)
EPDS at 6 months	222	6.205 (4.705)
EPDS at 18 months	117	6.671 (5.290)

Note. SES = socioeconomic status; EPDS = Edinburgh Postnatal Depression Scale.

increase caregiving demands for the parents. Indeed, we found a significant moderated mediation in the association between breastfeeding and relationship satisfaction via dissatisfaction with father involvement (Table 3 and Figure 1A) in the multiparous women (effect = -0.030; SE = 0.012, 95% CI [-0.057, -0.010]), but not in the primiparous group of mothers (effect = 0.014, SE = 0.010, 95% CI [-0.003, 0.036]). This indicates that for multiparous mothers who were exclusively breastfeeding at 3 months, dissatisfaction with father involvement at 6 months was significantly associated with relationship satisfaction at 6 months (variance explained by the mediation term was 2.56% of the total variance and 7.26% of the variance explained by breastfeeding and father involvement). However, this association did not hold for primiparous breastfeeding mothers (variance explained by mediation term: 0.60%). Effect sizes for the path coefficients of the mediation model for primiparous and multiparous women are provided separately in a Supplementary Table (S2; available in the online supplemental material). Preliminary analysis of variance (ANOVA), regression, and alternative models including reversed mediation are included in the online supplemental material.

Hypothesis 2

We hypothesized that satisfaction with father involvement at 6 months postpartum would predict long-term relationship satisfaction at 24 months postpartum through dissatisfaction with father involvement at 18 months postpartum and, at the same time, through relationship satisfaction at 12 months postpartum, regardless of parity or breastfeeding status. There was a significant total effect of dissatisfaction with father involvement at 6 months postpartum (effect = -0.236; SE = 0.055; p < .001) on relationship satisfaction at 24 months postpartum. However, we could only partially support our mediation hypothesis, in that we found a significant mediation of this association by relationship satisfaction at 12 months postpartum mediated this effect (effect = -0.182; SE = 0.050; 95% CI [-0.304, -0.104], R² mediation = .210), but not by father involvement dissatisfaction

Table 2
Correlation Coefficients and z-Values for Covariates

Variable	Age of mother at birth		SES-risk at 6 months		EPDS at 6 months	
	<i>r</i>	<i>p</i>	<i>z</i>	<i>p</i>	<i>r</i>	<i>p</i>
Dissatisfaction with father involvement	.010	.878	-.751	.452	.315	<.001
Relationship satisfaction	-.014	.838	-.841	.398	-.280	<.001

Note. SES = socioeconomic status.

tion at 18 months postpartum (effect = -0.022 ; $SE = 0.035$; 95% CI $[-0.100, 0.036]$; R^2 mediation = .158; Figure 1B). The direct effect was nonsignificant (effect = -0.032 ; $SE = 0.060$; 95% CI $[-0.150, 0.087]$), after entering the indirect effects (Table 4; Figure 1B). This indicates that it is the mother's satisfaction with *early* involvement of the father, more so than the *later* involvement of the father that predicts relationship satisfaction more than a year later. All coefficients are illustrated in Figure 1B. Effect sizes for the path coefficients are provided in Table 4.

Hypothesis 3

Last, we hypothesized that among mothers who were exclusively breastfeeding at 3 months, high dissatisfaction with father involvement at 6 months postpartum would increase the likelihood that the mother would still breastfeed at 6 months postpartum. We found that among mothers who were exclusively breastfeeding at 3 months postpartum, mothers' dissatisfaction with father involvement predicted whether the mother was still engaged with any breastfeeding at 6 months postpartum ($B = 5.801$; $SE = 2.092$; odds ratio (OR) = 330.558; Wald = 7.686; $p = .006$; percentage of correct classification = 67.1%). Of note, parity, SES, maternal age, or relationship satisfaction were not predictive of mothers' breastfeeding behavior at 6 months postpartum.

Discussion

In the present study, we explored the role of parity and mothers' satisfaction with father involvement in caregiving in the association between maternal relationship satisfaction and breastfeeding status. Overall, we found that mothers' satisfaction with father involvement was a good predictor of the mother's relationship satisfaction in the short and longer term. Particularly for multiparous mothers, maternal satisfaction with father involvement mediated the association between breastfeeding status and relationship satisfaction. We also found that mothers' satisfaction with father involvement predicted breastfeeding continuance from three to at least 6 months postpartum. Thus, greater *early* father involvement in caregiving seems to have multiple beneficial effects on both the infant and the mother. We will discuss our findings on the mother's developmental trajectory as a mother and as a partner in response to contextual factors.

Satisfaction With Father Involvement and Relationship Satisfaction

We found that mothers' satisfaction with father involvement in household chores and in childcare was a mediator in the association between breastfeeding and the overall relationship satisfaction, with effect modification by parity. In the bioecological

Table 3
Conditional Mediation Results for Relationship Satisfaction at 6 Months

Variable	Estimate	SE	β	<i>t</i>	<i>p</i>	95% CI low	95% CI high
Outcome: Dissatisfaction with father involvement at 6 months ^a							
Constant	.220	.040		5.519	<.001	.141	.298
Breastfeeding at 3 months ^c	.118	.043	.264	2.730	.007	.033	.203
Parity ^d	.039	.042	.087	.934	.352	-.043	.012
Parity \times Breastfeeding at 3 months	-.174	.058	-.330	-3.025	.003	-.287	-.061
EPDS	.014	.003	.301	4.757	<.001	.008	.020
Outcome: Relationship satisfaction at 6 months ^b							
Constant	.989	.018		55.163	<.001	.954	1.025
Dissatisfaction with father involvement at 6 months	-.254	.037	-.423	-6.918	<.001	-.326	-.182
Breastfeeding at 3 months	-.020	.016	-.075	-1.287	.200	-.051	.011
EPDS	-.005	.002	-.187	-3.045	.003	-.009	-.002
Total effect	-.056	.026	-.104	-2.135	.034		
Direct effect	-.020	.016	-.075	-1.287	.200	-.051	.011
Indirect multiparous	-.030	.012			<.05	-.057	-.010
Indirect primiparous	.014	.010				-.003	.036
Conditional indirect effects	.044	.016			<.05	.017	.081

Note. CI = confidence interval; EPDS = Edinburgh postnatal depression scale.

^a $R^2 = .152$; $F(4, 217) = 10.040$; $p < .001$. ^b $R^2 = .269$; $F(3, 218) = 26.730$; $p < .001$. ^c breastfeeding coding (0 = not breastfeeding; 1 = breastfeeding). ^d parity coding (0 = multiparous; 1 = primiparous).

Table 4
 Parallel Mediation Results for Relationship Satisfaction at 24 Months ($n = 91$)

Variable	Estimate	SE	β	t	p	95% CI low	95% CI high
Outcome: Dissatisfaction with father involvement at 18 months ^a							
Constant	.057	.040		1.428	.157	-.023	.137
Dissatisfaction with father involvement at 6 months	.632	.088	.607	7.195	.000	.457	.806
EPDS at 24 months	.005	.004	.102	1.214	.228	-.003	.012
Outcome: Relationship satisfaction at 12 months ^b							
Constant	.982	.021		46.199	.000	.940	1.024
Dissatisfaction with father involvement at 6 months	-.260	.046	-.496	-5.598	.000	-.352	-.167
EPDS at 24 months	-.005	.002	-.223	-2.516	.014	-.009	-.001
Outcome: Relationship satisfaction at 24 months ^c							
Constant	.280	.106		2.635	.010	.069	.491
Dissatisfaction with father involvement at 18 months	-.035	.056	-.060	-.629	.531	-.146	.076
Relationship satisfaction at 12 months	.701	.105	.605	6.655	.000	.492	.910
Dissatisfaction with father involvement at 6 months	-.032	.060	-.052	-.527	.599	-.150	.087
EPDS at 24 months	-.005	.002	-.173	-2.255	.027	-.009	-.001
Total effect	-.236	.055	-.389	-4.255	.000	-.346	-.126
Direct effect	-.032	.060	-.052	-.527	.599	-.150	.087
Indirect effect dissatisfaction with father involvement at 18 months	-.022	.035	-.039		>.05	-.100	.036
Indirect effect Relationship satisfaction at 12 months	-.182	.050	-.319		<.05	-.304	-.104

Note. CI = confidence interval; EPDS = Edinburgh postnatal depression scale.

^a $R^2 = 0$; $F(2, 145) = 45.710$; $p < .001$. ^b $R^2 = .561$; $F(2, 145) = 33.307$; $p < .001$. ^c $R^2 = .552$; $F(4, 143) = 44.043$; $p < .001$.

model, the context of the mother (parity), influences the interaction of processes with the infant (breastfeeding) and with the partner (relationship satisfaction) through the process of satisfaction with father involvement in caregiving and chores. The development of the mother in her role as partner in the new family is constrained by the process of satisfaction with father involvement. For multiparous parents, there is an increase in the amount of caregiving required for multiple children compared with one child. An unequal division of caregiving between parents in combination with an increased need for caregiving may particularly strain the romantic relationship dynamics of the multiparous breastfeeding mothers. As previously noted, breastfeeding (or expression of breast milk for bottle-feeding) is necessarily carried out by the mother, which may create an unnecessarily unequal division of caregiving between parents. However, there is much more to caregiving than simply feeding the baby, which provides multiple opportunities for father involvement.

There may still be the possibility that mothers express breast milk and that the father would feed a mother's expressed milk, because research has shown that fathers are happy with doing so (Abbass-Dick & Dennis, 2018). However, the process of expressing milk is time consuming in itself and thus still requires the mother's effort (Crossland et al., 2016). Although the nutritional value of directly breastfed and expressed milk is equivalent, there may be other components to breastfeeding distinguished from breast milk per se, which may relate to behavioral aspects and the physiology of breastfeeding. During breastfeeding, mother and baby are in direct (often skin-to-skin) contact with one another and exhibit synchronous physiological and behavioral interactions while breastfeeding (Matthiesen, Ransjö-Arvidson, Nissen, & Uvnäs-Moberg, 2001). Similar effects may not exist when feeding expressed milk from the bottle. Further, bottle-feeding in itself has been shown to have adverse effects on breastfeeding (WHO, 1998). While there are

several factors, such as the prematurity status, age of the infant, working status of the mother, and body mass index of the mother, that determine whether a mother will express milk, there is large individual variation (Johns, Forster, Amir, & McLachlan, 2013). Generally, expressing milk seems to be more common in the early postpartum and among women who have returned to work outside the home (Johns et al., 2013), with about 40% of mothers reporting that they express milk occasionally (Johns, Amir, McLachlan, & Forster, 2016) or have fed expressed milk to their baby in the last 7 days (Centers for Disease Control, 2017).

We also found that mother's greater satisfaction with father involvement at 6 months postpartum predicted greater relationship satisfaction at 24 months postpartum, mediated by relationship satisfaction at 12 months postpartum, but not by satisfaction with father involvement at 18 months postpartum, indicating a long-term association between early measures of satisfaction with father involvement and later relationship satisfaction. In the bioecological model, now incorporating time from 6 to 24 months postpartum to allow processes and context to change, we again find that the mother's development as a partner in the family structure is constrained by the process of early satisfaction with father involvement, with no effect of the process of later father involvement. While we had previously reported that breastfeeding at 3 months postpartum was associated with decreased relationship satisfaction at six months (Cost et al., 2016), we demonstrate here that this association is completely mediated by the mothers' satisfaction with father involvement.

A previous study found that, in all domains of childcare, fathers are least involved in the physical care of the child (Kalmijn, 1999). In the early life of a child, many of the parent-child interactions may involve physical care of the child, such as feeding, diapering, bathing, while later interactions may be more social and father involvement increases as the child develops (Wood & Repetti,

2004). However, based on our findings, even if fathers do increase involvement with social, leisure, or even caregiving activities as the child develops, mothers' satisfaction with this later increase is not able to protect the relationship satisfaction at 24 months. These results support the idea of a "critical period" for father involvement to affect mother's relationship satisfaction, where early satisfaction with father involvement affects later relationship satisfaction, but later satisfaction with father involvement does not "rescue" the mother's relationship satisfaction. Similarly, we previously found a "critical period" in the first 6 months postpartum to affect change in maternal attitudes on self-efficacy and maternal worries (Cost et al., 2016).

Some previous work supports the associations between father involvement and longer-term relationship satisfaction. One study reported that women's relationship satisfaction increased if men developed more egalitarian views on gender roles over the course of the marriage (Amato & Booth, 1995). More recently, higher maternal relationship satisfaction in pregnancy and early postpartum was associated with better family coordination and better mother-father-child triadic interaction when the child was 18 months old (Korja et al., 2016). In an epidemiological study among Finnish couples, men's increased share of childcare tasks increased the couple's probability of having another child, which is perhaps an indirect measure of relationship satisfaction (Miettinen, Lainiala, & Rotkirch, 2015). The stability of relationship satisfaction associated with earlier father involvement satisfaction could indicate the early postpartum establishment of the mother's role as a committed partner in response to interpersonal relations in the changed family dynamic (Ralph, 2016; Rose et al., 2015).

Satisfaction With Father Involvement and Duration of Breastfeeding

Previous research has consistently found that support from fathers increases breastfeeding initiation, duration, and exclusivity rates (Bich, Hoa, & Mälqvist, 2014). In our study, mothers who were breastfeeding at 3 months postpartum were more likely to continue breastfeeding at 6 months postpartum if they also reported higher satisfaction with father involvement at 6 months postpartum. Within the bioecological framework, breastfeeding as a process in the development of the mother-child relationship is influenced by the process of the mother's satisfaction with father involvement, but not with the process of relationship satisfaction nor the context characteristic of parity. Taken together with our findings on the effects of satisfaction with father involvement in relationship satisfaction at 6 months and through to 24 months, the effects of satisfaction with father involvement on continuation of breastfeeding from 3 to 6 months indicates that this is a multifaceted and powerful process in shaping the development of the woman as a mother and as a romantic partner.

The results on the process of satisfaction with father involvement in continuation of breastfeeding should not be surprising, given that breastfeeding is a highly demanding task that requires maternal resources related not only to the maternal body, but also to psychosocial investment. Results from a recent Canadian randomized controlled trial that evaluated a coparenting intervention also found that increasing fathers' involvement in breastfeeding increased breastfeeding duration, paternal breastfeeding self-efficacy, and maternal satisfaction with support received by the

partner (Abbass-Dick, Stern, Nelson, Watson, & Dennis, 2015). Fathers' involvement in breastfeeding was conceptualized as couples working as coparents to achieve their breastfeeding goals and also how fathers can assist breastfeeding mothers in practice (Abbass-Dick et al., 2017). An advantage of a coparenting intervention is that it addresses *both* maternal satisfaction and fathers' actual involvement. A similar intervention enhancing the role of the father was applied in Vietnam and demonstrated the same results of increased initiation, maintenance and prolonged duration of exclusive breastfeeding (Bich et al., 2014). In a narrative review, Panter-Brick et al. (2014) argue that the most important priorities for parenting interventions are to engage fathers. Such interventions have been demonstrated to be effective in increasing breastfeeding rates, but may also improve the partner relationship.

While there is ample evidence that interventions that include education and partner involvement are more effective in increasing breastfeeding initiation and duration than mother-targeted interventions (Haroon et al., 2013), most breastfeeding interventions and publicly accessible support literature focuses on the mother alone. La Leche League International emphasizes mother-to-mother breastfeeding support. While acknowledging that support from the father is important, this is often framed as direct verbal encouragement (La Leche League International, 2016), rather than greater involvement in other caregiving activities or household chores. In the antenatal and family care office settings, men are often not included in discussions or even given the opportunity to ask questions about pregnancy or caregiving concerns (Sarkadi, 2014). When there are resources that do mention fathers, this is often in a negative context, such as domestic violence or substance abuse by fathers (Widarsson, Kerstis, Sundquist, Engström, & Sarkadi, 2012). With few exceptions, breastfeeding is often presented as a women's issue rather than a family issue, despite mounting evidence that father involvement is an important factor in breastfeeding performance.

Notably, maternal efforts to increase father involvement in childcare were not associated with the mother's views on gender roles, as egalitarian mothers were not able to negotiate greater father involvement (Edlund & Öun, 2016). Rather, it was the more egalitarian father's views on gender roles that predicted greater father involvement compared with fathers with more traditional views on gender roles, a finding replicated in several cultural contexts (Edlund & Öun, 2016). Furthermore, evidence from several studies (as reviewed by Cowan, Cowan, & Knox, 2010), shows that specifically couple-focused and parenting-focused interventions are effective at improving father involvement, even in the context of fragile families. The current findings support interventions at a systemic level, rather than putting the onus on the mother to negotiate increased father involvement on her own, that involve fathers to increase coparenting, which achieves beneficial outcomes for the mother, the child (Rollins et al., 2016), and the couple.

Limitations

As with most longitudinal studies, mother-child dyads that terminated study participation could bias the analysis of the subsample of mothers. Although we were able to retain 77% of the mothers who met study inclusion criteria, missing data was a limitation in this longitudinal study. Second, we did not have an objective measure of experimenter observation or a report from fathers on the amount of time the fathers spent engaging in household chores or childcare.

Rather, we focused on the mothers' satisfaction with father involvement, which may indicate increased father involvement and/or increased mother awareness of father involvement as interventional targets. We also use statistical mediation with both the mediator and the outcome measured at 6 months postpartum in our first analysis, however Hayes (2013) emphasizes theory and logic over temporality of assessments. Our breastfeeding variables are dichotomized and as such do not consider the time spent breastfeeding. Despite this limitation, we were able to consistently see an effect of breastfeeding on the outcomes. Also, our study was not a randomized control trial, so we are not able to determine causality. In the case of multiparous mothers, the age(s) of the other children may also affect dissatisfaction with father involvement. Future studies may also consider the degree of negative valence in postpartum depression affects the processes of maternal development. Finally, our study sample included only mothers with partners and who were not working outside the home at 6 months postpartum. As such, our study findings cannot be generalized to mothers who have returned to work because of corporate or federal policies, personal financial constraints, or personal preferences.

Conclusions

Overall, we suggest that the mother's early satisfaction with father involvement is an important predictor of breastfeeding duration up to 6 months postpartum and relationship satisfaction up to 24 months postpartum. These findings provide strong evidence for the adoption and integration of systemic interventions to increase early father involvement in childcare and household chores, as well as maternal awareness of father involvement. While randomized control trials have found that promoting father engagement improves breastfeeding outcomes, we would like to add that mother's satisfaction with father involvement also improves breastfeeding outcomes at 6 months postpartum and relationship satisfaction up to 24 months postpartum.

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