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## PERCEPTIONS OF EARLY RELATIONSHIPS DURING THE TRANSITION TO MOTHERHOOD: THE MEDIATING ROLE OF SOCIAL SUPPORT

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**ABSTRACT:** Perceptions of the availability of social support were assumed to mediate the association between the future mother's perceptions of early relationships and positive postpartum outcomes. We explored the idea that pregnant women's perceptions of early caretaking relationships as optimal associate with the perceived availability of, and satisfaction with, social support, which in turn, were assumed to affect postpartum depressive symptomatology, the APGAR (i.e., rates of Appearance [color]; Pulse [heart-beat]; Grimace [reflex]; Activity [muscle tone]; and Respiration [breathing], Nelson, 1987) scores of the newborn, and the mother's perceptions of the infant. Using a longitudinal design, we enrolled 120 first-time pregnant participants, who were assessed during the third trimester of pregnancy and eight weeks postpartum. Newborns were assessed immediately after birth. Findings confirmed the expected model, controlling for levels of depressive symptomatology during pregnancy. This model is discussed in the context of system and transactional models of mother–infant interactions.

**RESUMEN:** Se asumió que las percepciones de disponibilidad de apoyo social mediaban la asociación entre las percepciones que la futura madre tenía de las tempranas relaciones, y los positivos resultados posteriores al parto. Nosotros exploramos la idea de que las percepciones que la mujer embarazada tiene de que las tempranas relaciones de prestación de cuidado son óptimas, se asocian con la forma como se percibe la disponibilidad de y satisfacción con el apoyo social, todo lo cual se asume que a su vez afecta la sintomatología de depresión posterior al parto, los puntajes de APGAR del recién nacido, así como las percepciones que la madre tiene del infante. Usando un diseño longitudinal, inscribimos a 120 mujeres que por primera vez estaban embarazadas para participar en este estudio. Ellas fueron evaluadas durante el tercer trimestre del embarazo y a las 8 semanas después del parto. Los recién nacidos fueron evaluados inmediatamente después del nacimiento. Los hallazgos confirman el modelo esperado, controlando los niveles de la sintomatología depresiva durante el embarazo. Este modelo se discute en el contexto de los modelos de sistema y transaccionales de las interacciones entre las madres y sus infantes.

**RÉSUMÉ:** Nous pensons que les perceptions de la disponibilité d'un soutien social affectait l'association

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entre les perceptions de la future mère des relations précoces et des résultats post-partum positifs. Nous avons exploré le concept que les perceptions optimales que se font les femmes enceintes des relations précoces de mode de soin sont liées à la fois à la disponibilité perçue et à la satisfaction du soutien social qui, à leur tour, sont censées affecter la symptomatologie dépressive post-partum, les scores APGAR du nourrisson et les perceptions de la mère du nourrisson. Utilisant une approche longitudinale, nous avons inscrit 120 participantes enceintes pour la première fois. Ces participantes ont été évaluées durant le troisième trimestre de leur grossesse et les 8 premières semaines post-partum. Les nouveaux-nés ont été évalués immédiatement après leur naissance. Les résultats ont confirmé le modèle attendu, en contrôlant les niveaux de symptomatologie dépressive durant la grossesse. Ce modèle est discuté dans le contexte de modèles de système et de modèles transactionnels pour les interactions mère-bébé.

ZUSAMMENFASSUNG: Wir nahmen an, dass die Wahrnehmung der Verfügbarkeit sozialer Unterstützung, die spätere mütterliche Wahrnehmungen der frühen Beziehung und positive Ergebnissen nach der Geburt beeinflussen. Wir erforschten die Idee, dass die Wahrnehmung schwangerer Frauen zu frühen Beziehung zu Bezugspersonen in optimaler Verbindung stehen mit der wahrgenommenen Verfügbarkeit, oder der Befriedigung durch soziale Unterstützung, von denen umgekehrt angenommen wurde, dass sie die Symptomatologie der Wochenbettdepression, die APGAR Werte der Neugeborenen und die Wahrnehmung des Kindes durch die Mutter beeinflussen. Wir verwendeten eine Längsschnittuntersuchung und beteiligten 120 Erstgebärende, die im ersten Trimenon und wieder 8 Wochen nach der Geburt untersucht wurden. Die Neugeborenen wurden sofort nach der Geburt untersucht. Die Ergebnisse unterstützen das erwartete Modell, bei Kontrolle des Ausmaß der Depression während der Schwangerschaft. Dieses Modell wird im Kontext von systemischen und transaktionsanalytischen Modellen der Mutter – Kind Interaktionen diskutiert.

抄録：社会的支援の利用可能性の知覚 **perception** は、将来の母親の早期の関係性についての知覚と、良好な産褥の結果との間の関連を媒介すると想定された。われわれは以下の着想を探索した。すなわち、妊婦の早期の世話をする **caretaking** 関係性の知覚は、最適には社会的支援の利用可能性の知覚と、社会的支援の満足と関連し、それらは今度は産褥抑うつ症状、新生児の **APGAR** スコア、そして乳児についての母親の知覚に影響すると想定された。縦断研究のデザインを用いて、われわれは初回妊娠の **120** 名の参加者を登録した。彼女たちは妊娠後期と出産後 **8** 週に、評価された。新生児は出産直後に評価された。所見から、妊娠中の抑うつ症状の水準についてコントロールして、予期したモデルが確認された。このモデルは、母-乳幼児相互作用のシステムおよび交流モデルの文脈で議論される。

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The idea that perceptions of interpersonal bonds could play an important role in the regulation of distress and affect parenting is basic to conceptualizations of perceived social support within the framework of social cognition theory. Research on social support has produced consistent evidence that a person's perception of the availability of others as a resource contributes significantly to the individual's self-regulation of distress. In this context, the perceived availability of social support (and not actual support received) has been found to play an important role in the prediction of coping effectivity, well-being, and psychological and physical health (Cohen & Syme, 1985; Hobfoll, Nadler, & Lieberman, 1986; Sarason, Sarason, & Pierce, 1990; Wethington & Kessler, 1986). In addition, social support systems have been found to constitute a main factor affecting parenting (Belsky, 1984; Osofsky & Osofsky, 1985), and moderating parental stresses (Crittenden, 1985; Crnic, Greenberg, & Slough, 1986; Levitt, Weber, & Clark, 1986).

Another important body of research based on attachment theory (Bowlby, 1969, 1973, 1980), posited that early infant–mother experiences affect relationships and interpersonal competence during childhood and later on in life; this continuity is assumed to be mediated by internal working models of self and others that intervene in the interpretation of, and reaction to new interpersonal situations (Main, Kaplan, & Cassidy, 1985; van IJzendoorn, 1995), and affect the regulation of distress (Bowlby, 1969, 1973, 1980). Moreover, parents' early experiences with attachment figures have been found to affect parental sensitivity (Bowlby, 1988; Bretherton, 1985).

Empirical studies assessing adults' perceptions of early caretaking relationships have confirmed their relevance for the study of health and distress regulation (Gerlsma, Emmelkamp, & Arrindell, 1990; Parker, 1983a, 1994; Russek & Schwartz, 1997). Studies based on self-reported attachment styles in adulthood (Bartholomew & Horowitz, 1991; Hazan & Shaver, 1987) provide evidence of the relations between attachment styles, on one hand, and emotional self-regulation (Brennan & Shaver, 1995; Fuendeling, 1998; Kobak & Sceery, 1988), and physical symptoms (Hazan & Shaver, 1994), on the other hand. In addition, adult attachment research documents important associations between perceptions of early care and parameters of parenting (Deseiden, Teti, & Corns, 1995; Priel & Besser, 2000b; Rholes, Simpson, Blakely, Lanigan, & Allen, 1997).

Thus, despite their different theoretical backgrounds and diverse research focuses, empirical findings stemming from both social support and attachment theory perspectives have produced consistent evidence that a person's perception of the availability of others as a resource is associated with the individual's self-regulation of distress and parenting abilities. The association between early caretaking appraisals and perceptions of social support has been suggested as a theoretical possibility in several studies (Hazan & Shaver, 1987; Sarason, Pierce, & Sarason, 1990; Sarason et al., 1990; Wallace & Vaux, 1993; Westen, 1998). In an investigation of the relation between perceived social support and the retrospective estimation of the quality of early parental care and overprotection, Sarason and coworkers (1991) reported evidence of an association between the retrospective perceptions of parents as caring and supportive and perceptions of social support as present and available.

An integration of the empirical findings in the frameworks of adult attachment and social support theories suggests the plausibility of a mediating role for perceptions of social support, where, as reported before: (a) perceptions of early relationships associate with levels of distress and parenting capacities; (b) perceptions of early relationships associate with perceptions of social support; and (c) perceptions of social support as available and satisfying associate with reduced distress and improved parenting. Accordingly, we assumed that perceptions of more available and effective social support contribute to the explanation of the relation found between perceptions of caring early relationships and the reduction of distress, and optimal parenting. In the present study we explored this model in the context of the transition to motherhood, a process that constitutes a period of increased stress that challenges affect regulation, as can be seen in studies of postpartum depression (Hopkins, Marcus, & Campbell, 1984; O'Hara, Schlechte, Lewis, & Varner, 1991; Whiffen, 1992; Whiffen & Gotlib, 1993), and which imposes the developmental task of attachment to the new baby (Benoit, Parker, & Zeanah, 1997; Priel & Besser, 1999, 2000a; Priel & Kantor, 1988). Social support has been found to represent a major psychosocial variable involved in the adaptation to motherhood (Cutrona, 1984; O'Hara, 1986; Priel & Besser, 2000b). Using a longitudinal design, we explored the mediating role of social support in relation to three outcome variables: postpartum depressive symptomatology, the newborn's APGAR (i.e., rates of Appearance [color]; Pulse [heartbeat]; Grimace [reflex]; Activity [muscle tone]; and Respiration [breathing], Nelson, 1987) scores, and maternal perceptions of the baby.

The assumed mediating role of social support in the association between early relationships perceptions and postpartum depressive symptomatology is based on a conceptualization of both social support and appraisals of early patterns of relationships as regulators of maternal depressive symptomatology in the perinatal period. Moreover, because maternal affect regulation during pregnancy seems to affect the newborn's health status (Monk, Fifer, Myers, Sloan, Trien, & Hurtado, 2000; Ponirakis, Susman, & Stifter, 1998), we expected that the mother's perceptions of early relationships and social support during pregnancy would affect the newborn APGAR scores. Some support for this assumption can be found in reported positive causal associations between levels of social support during pregnancy and infant's health variables (Collins, Dunkel-Schetter, Lobel, & Scrimshaw, 1993; Dunkel-Schetter, Wadhwa, & Stanton, 2000; Lobel, DeVincent, Kaminer, & Meyer, 2000). Thus, we hypothesized that the associations between pregnant women's perceptions of early relationships and their newborns' health status would be mediated by the mother's perceived social support.

Social support systems are also one of the main factors affecting parenting in general (e.g., Belsky, 1984; Burchinal, Follmer, & Bryant, 1996; Osofsky & Osofsky, 1985) and in the postpartum period in particular (Crockenberg, 1981; Crnic et al., 1986). In the present study, we explored the contribution of social support to the relation between the mothers' perceptions of early relationships with their own mother, and their perceptions of infant "difficulty" (Bates & Bayles, 1984). We followed here a conceptualization of infant's perceived difficulty as a social coconstruction (Vaughn & Bost, 1999) that arises from both the infant's behavior and the observer's perceptions of it. This conceptualization provides a vantage point for the understanding of findings relating perceptions of infant's temperament to mother-child interactions and child development (Bates, Maslin, & Frankel, 1985; Belsky, 1984; Priel & Kantor, 1988).

To sum up, in the present report, we explored the idea that perceptions of social support may contribute to the continuity over time of the effects of maternal perceptions of her early caretaking relationships. Our main hypothesis is that perceptions of social support are one possible mechanism through which adults' appraisals of past interpersonal experiences might affect the present. Following Baron and Kenny's (1986) conceptualization of mediation effects, we assumed that perceptions of social support availability may provide a plausible explanation of how pregnant women perceptions of early caretaking relationships associate to postpartum affect regulation, the newborn's health status, and maternal perceptions of the infant.

## METHOD

### *Participants*

Participants were a sample of pregnant woman attending routine checkups at their community Well Baby Clinic in a middle-class, urban area in Israel. Participants were volunteers. To control for psychiatric factors known to affect depression in the postpartum period, we included in our sample only first-time natural pregnancies among married women without previous psychiatric history and without previous miscarriages. High-risk pregnancies were excluded. Eighty-eight percent of the women we approached agreed to take part in this research. The final sample included those participants who subsequently had normal childbirth and healthy babies. Our original sample included 125 women. Of these, three participants had miscarriages or premature deliveries, and two participants left the area before Time 2. The final sample included 120 participants, with a mean age of 25.20 ( $SD = 3.54$ ), and 10–18 years of formal education ( $M = 13.29$ ,  $SD = 1.69$ ).

### Measures

*The Parental Bonding Instrument (PBI).* Perceptions of early relationships were measured using the Mother scale of the Parker, Tupling and Brown (1979) Parental Bonding Instrument (PBI). This is a 25-item self-reported measure of participants' memories of their own mothers' behaviors and attitudes. The PBI yields two scores: one for care, and one for overprotection. These variables stem from two bipolar factors, with 12 items assessing care versus indifference and rejection, and 13 items assessing overprotection versus allowance of autonomy and independence. These variables were defined according to Bowlby's basic conceptualization of good parenthood as responsiveness to the child's desire for love and protection, on one hand, and respect for the child's desire to explore and extend his/her relationships with the environment on the other (Parker, 1983a, 1983b). According to a recent overview of the psychometric properties of this Inventory (Parker, 1994), the PBI has adequate psychometric properties, and there is convincing evidence about its construct validity. In the present sample,  $\alpha$  coefficients were .86 and .89 for the care and overprotection scales, respectively. It may be noted that care and overprotection, the basic dimensions assessed by the PBI scale, correspond to Hinde's (1974) assumption about the two key dimensions that define significant interpersonal relationships in general.

*Social Support Questionnaire (SSQ).* The 27-item Social Support Questionnaire (SSQ) was utilized (Sarason, Levine, Basham, & Sarason, 1983) as a measure of perceived ability in relation to and satisfaction with social support. The SSQ yields two scores: The Number Scale measures the perceived ability to enroll social support and consists of the average number of individuals listed across each of the SSQ items. The Satisfaction Scale assesses satisfaction with the social support perceived as available. A six-point Likert scale is used to assess satisfaction with social support. The construct and discriminant validity of the SSQ has been repeatedly demonstrated (Sarason et al., 1987). In the present study we obtained internal consistency coefficients of .96 and .93 for amount of, and satisfaction with, social support, respectively.

*The Center for Epidemiological Depression Scale (CESD).* Initially developed as a measure of depressive symptoms in community populations (Radloff, 1977), the CESD is a measure of distress centered on depressed mood. The CESD consists of 20 items that assess dysphoria, feelings of guilt and worthlessness, feelings of helplessness and hopelessness, and disturbances in eating and sleeping (Radloff, 1977). Respondents are asked to report, on a four-point scale, the frequency of those symptoms that have occurred recently. The CESD has demonstrated good internal reliability, as well as concurrent and construct validity (Radloff, 1977). Coefficients  $\alpha$  for CESD scores in the present study were .86 and .88 for Time 1 and Time 2, respectively. This scale has been shown to be valid and reliable in many different samples, including pregnancy and postpartum research (see, e.g., Fleming, Ruble, Flett, & Wagner, 1990; Priel & Besser, 1999, 2000a).

*Neonatal Perception Inventories (NPI).* The maternal perception of the infant was measured according to Broussard's Neonatal Perception Inventory (NPI) (Broussard & Hartner, 1971). The NPI includes the evaluation of maternal perceptions of a hypothetical average baby (Average Baby Scale), as well as the evaluation of maternal perceptions of her own baby (Your Baby Scale). Such a design allowed comparison of mothers' perceptions of the infant and their expectations from an average infant. NPI items refer to maternal descriptions of the baby's

crying, spitting, feeding, elimination, sleeping, and predictability. Broussard's NPI is generally appropriate to be used at the one- to two-month age level. In the present study, all infants were assessed at the eight-week age level. Each scale (Your Baby and Average Baby) consists of six items evaluated on a four-point scale, with lower scores representing more desirable infant behavior; i.e., a more positive maternal perception of the infant's characteristics. Both construct and criterion validity were reported for the Broussard NPI (Broussard & Hartner, 1971). Internal reliability coefficients for NPI scales in the present study were .80 and .76 for Your Baby and Average Baby scales, respectively.

### *Procedure*

A longitudinal design was utilized, with assessments made at three points in time. First (Time 1), participants who fulfilled the demographic and clinical criteria completed the CESD, PBI, and SSQ self-report measures during the last trimester of their pregnancy (mean pregnancy age = 25.96 weeks,  $SD = 7.33$ ). Second (Time 2), after childbirth the infant's APGAR scores were collected. Finally, (Time 3), eight weeks after childbirth, participants completed the NPI and the CESD scales. The order of presentation of the questionnaires at Time-1 and 3 was randomized. Depression assessments before and after giving birth will be referred to as CESD-1 and CESD-2, respectively.

## RESULTS

### *Descriptive Statistics and Reliability*

The mean score of depressive symptoms was 12.38 ( $SD = 5.89$ ) among pregnant women and 13.22 ( $SD = 6.53$ ) after childbirth; the difference was nonsignificant,  $t(119) = -1.33$ ,  $p = .18$ ). The norms established for the CESD scores in community samples indicate 16 as the cutoff point for depressive symptomatology. In our sample, 31% of the pregnant women and 36% of the new mothers scored above 16. The correlation between depressive symptoms assessments in the two occasions was .40 ( $p < .001$ ), indicating a moderately consistence level of depressive symptoms during pregnancy and after delivery.

### *Analytic Strategy*

To test the mediating role of perceived social support on maternal perceptions of the infants, the infant's APGAR scores, and the mothers' postpartum depressive symptomatology we used Structural Equation Modeling (Hoyle & Smith, 1994). Using AMOS 4.0 based on the variance-covariance matrix (AMOS 4.0, Aurbackle, 1999), we tested the adequacy of measurement models and the fit of the structural models, using maximum likelihood estimations. We used the  $\chi^2$  as a fit index to evaluate how the "proposed" model—i.e., the model being evaluated—fits the data when compared to the "saturated" model—the baseline model that represents perfect model fit. A nonsignificant  $\chi^2$  has traditionally been used as a criterion for not rejecting a SEM model. This nonsignificant  $\chi^2$  indicates that the discrepancy between the matrix of the parameters estimated based on the model being evaluated is not different from the one based on the empirical data. However, this is a very strict and sensitive criterion that is influenced by the number of variables and participants (Landry, Smith, Swank, & Miller-Loncar, 2000). We have thus also used additional fit indices: the Root-Mean-Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI), and the Goodness of Fit, and the Adjusted Goodness of Fit Indexes (GFI and AGFI).

In the following analyses, we first tested a full measurement model that defined the constructs: early relationships, social support, perceptions of the infant in terms of the indicator variables, and that included also the observed variables CESD-1, CESD-2, and APGAR. This model did not specify how the constructs might be related (i.e., we delineated all possible bidirectional associations between the variables).

We then analyzed the combined direct effects of early relationships perceptions on the infant's APGAR scores, maternal perceptions of the infant, and postpartum depressive symptoms, partialling out the effect of Time-1 depression from Time-2 depression. Finally, we specified the combined direct and indirect effect model. A correlation matrix for the study variables presented in Table 1. These data were provided to depict the first-order correlations among the separate indicator variables of perceptions of early relationships, social support, and infant perceptions that is not available through the assessment of the relations among the constructs examined in the model.

### *Analysis of the Measurement Models*

To explore the overall fit of the full measurement model, we performed a confirmatory factor analysis (Anderson & Gerbing, 1988; Hoyle, 1991) that revealed the accuracy of the underlying structure of the latent variables used in a measurement model.

We have proposed and compared two possible measurement models: in the *first* model, we have delineated all possible covariations among latent variables and observed variables, and with each other. In this model, we also tested the acceptability of the three latent variables used in this study: Early relationships, social support, and maternal perceptions of the infant are each defined by two indicators. In this measurement model, perceptions of early relationships, perceptions of social support, perceptions of the newborn, and perceptions of depression were independent constructs. However, because each of these constructs is measured by maternal self-report, they all share identical method variance. It could be argued, therefore, that all could be subsumed in to a large latent construct: maternal perceptions. Accordingly, we preformed and contrasted a *second* measurement model of a latent variable "Maternal Perceptions" assessed by eight indicators: maternal care and maternal overprotection, support number and support satisfaction, perception of own infant and perception of an average infant, CESD-1 and CESD-2.

In the analysis of the first measurement model, we delineated all the associations between the latent and the observed variables. Early relationships were assessed by two indicators: maternal care and maternal overprotection; social support was measured by the indicators support number and support satisfaction, and infant perception was assessed by the indicators perception of own infant and perception of an average infant.<sup>1</sup> The observed variables were CESD-1, CESD-2 and the APGAR scores. The specified full measurement model<sup>2</sup> was found to fit the data well (RMSEA = .000,  $\chi^2[15, N = 120] = 13.86, p = .54, GFI = .98, AGFI$

<sup>1</sup>This latent variable represent the residualized factor waited score of the discrepancies between maternal self-perceptions of her own and average baby. Compared with a simple arithmetical subtraction, determining a latent variable allowed obtaining a reliable discrepancy score controlling for measurement errors. Thus, the latent variable contains the reliable differences representing mothers' perception of their infant.

<sup>2</sup>Although there were no significant correlations between age, education, and the study variables (see Table 1), we analyzed this measurement model also, including the associations of age and education, with the three latent variables, as well as their covariations with each other. This model provided a good fit to the data (RMSEA = .000,  $\chi^2[21, N = 120] = 23.22, p = .33, GFI = .97, AGFI = .90, CFI = .99$ ). Only the correlation between age and education was significant. To simplify the presentation of the results we excluded age and education form all subsequent analyses.

**TABLE 1.** *Correlations Among the Study Variables*

<i>Variables</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>
1. Age	.29**	.00	-.03	.05	-.01	.05	-.13	-.06	.06	-.05
2. Education	—	.09	.08	-.00	-.15	-.08	-.11	-.02	-.08	.06
Early relationships										
3. Maternal care	—	—	-.36***	.18*	.34***	-.26**	-.28**	-.01	-.13	.33***
4. Maternal overprotection	—	—	—	-.11	-.17	.21*	.21*	.14	.23**	-.06
Social Support										
5. Number	—	—	—	—	.28**	-.21*	-.23**	-.04	-.23**	.30***
6. Satisfaction	—	—	—	—	—	-.34***	-.41***	.14	-.09	.44***
Infant perception										
7. Your baby	—	—	—	—	—	—	.49***	.12	.07	-.37***
8. Average baby	—	—	—	—	—	—	—	.08	.14	-.39***
Depression										
9. CESD-1 <sup>a</sup>	—	—	—	—	—	—	—	—	.40***	.03
10. CESD-2 <sup>b</sup>	—	—	—	—	—	—	—	—	—	.00
11. APGAR scores	—	—	—	—	—	—	—	—	—	—

*Note.*  $N = 120$  (two-tailed test).

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

<sup>a</sup> Depression measured at Time-1.

<sup>b</sup> Depression measured at Time-2.



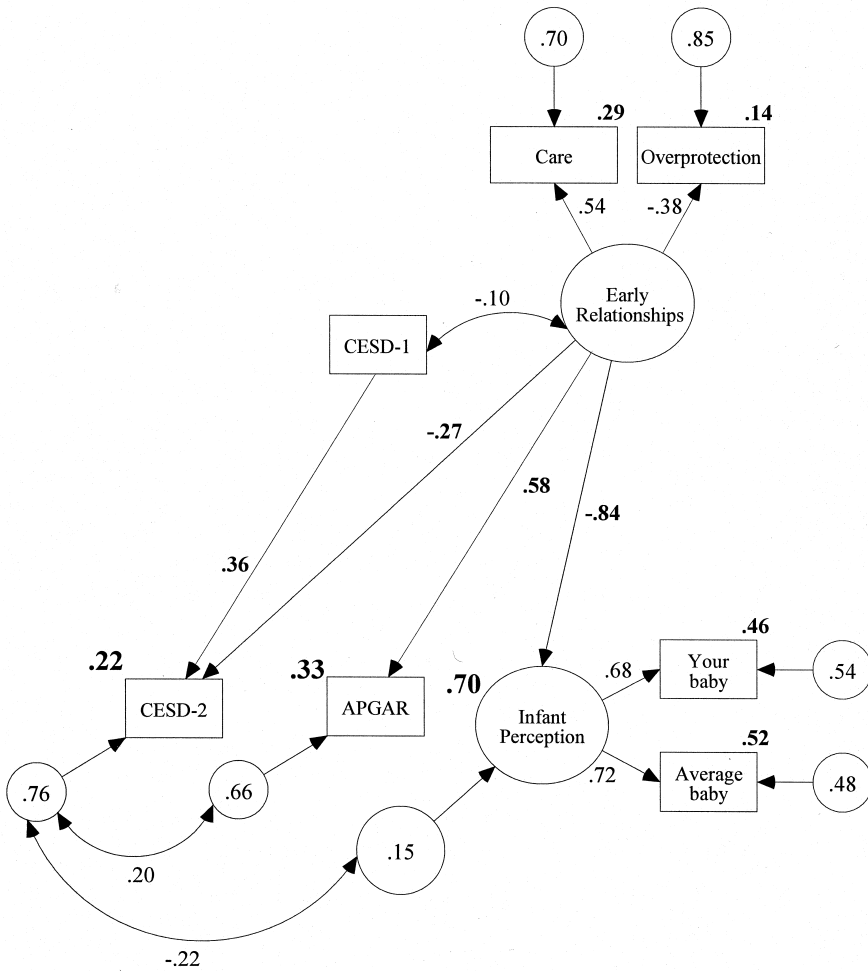
= .93, CFI = 1.0). The covariances between the three latent variable were significant: the path coefficient between early relationships and infant perceptions was  $-.53$ ,  $t = -3.35$ ,  $p = .001$ . The path coefficient between social support and infant perceptions was  $-.80$ ,  $t = -4.04$ ,  $p = .0001$ . The path coefficient between early relationships and social support was  $.64$ ,  $t = 3.34$ ,  $p = .001$ . For each latent construct, we examined the amount of variance ( $r^2$ ) in each of the indicator variables explained by the construct. All the factors indicators' paths and loading were substantial and statistically significant in the expected directions (Social Support explained 18 and 44% of number and satisfaction, respectively; Early relationships explained 57 and 22% of care and overprotection, respectively, and Infant perceptions explained 46 and 52% of Your and average baby, respectively).

To obtain a full measurement model that could be comparable to the second measurement model proposed, a latent variable "Maternal Perceptions" assessed by eight indicators, we recomputed the first full measurement model excluding the APGAR scores observed variable. This specified measurement model was found to fit the data well (RMSEA = .000,  $\chi^2[12, N = 120] = 9.75$ ,  $p = .64$ , GFI = .98, AGFI = .94, CFI = 1.0), whereas the specified measurement model for one latent construct did not fit the observed data (RMSEA = .13 > .08,  $\chi^2[20, N = 120] = 47.91$ ,  $p = .000$ , GFI = .90, AGFI = .84 < .90, CFI = .77 < .90). The fit of the measurement model of the three separate constructs was a better representation of the empirical data than the measurement model for one latent construct,  $\chi^2$  difference (8,  $N = 120$ ) = 38.16,  $p < .001$ . After verifying the acceptability of the measurement of the separated constructs, we proceeded to test structural models.

### *Analysis of Mediation*

*Structural models specification.* We followed Baron and Kenny's (1986) criteria for mediation according to which: (1) there must be a significant association between the latent predictor and latent outcome variables; (2) in an equation including both the latent mediator and the latent outcome variable there must be a significant association between the latent predictor and latent mediator and the latent mediator must be a significant predictor of the latent outcome variable. Then, if the significant direct relationship between the latent predictor and the latent outcome variables in the equation, including both the latent mediator and the latent predictor variable, declines, the obtained pattern is consistent with the mediation hypothesis. If the direct effect approaches 0, the mediator can be said to fully (although not necessarily exclusively) account for the relation between predictor an outcome (Baron & Kenny, 1986).

*Analysis of the direct effects model.* Following Baron and Kenny's (1986) recommendations, to test for mediation we estimated in the first step the combined direct effects of the early relationships latent predictor variable on the following outcomes: APGAR scores (observed variable), postpartum depressive symptomatology (observed variable), and on the infant perception (latent variable). We have controlled for CESD-1 and early relationships correlation as well as for the direct effect of CESD-1 on CESD-2. This procedure enabled us to control for baseline levels of depression while estimating the direct effect of early relationships on postpartum depression. We also specified and controlled for the covariance among the outcome variables; that is, the associations between postpartum-depression (CESD-2), infant's APGAR scores (error terms), and perceptions of the infant (disturbance) (see Farrell, 1994). This model (see Figure 1) provided a plausible fit to the observed data (RMSEA = .000,  $\chi^2[10, N = 120] = 17.5$ ,  $p = .17$ , GFI = .96, AGFI = .90, CFI = .95), showing that perceptions of early relationships of participants' own mothers as more caring and less overprotective were associated with higher infant APGAR scores (*path coefficient* = .58,  $t = 3.35$ ,  $p < .001$ ), with



Note: Rectangles indicate measured variables. Large circles represent latent constructs, small circles with numbers reflect residual or disturbance variances. Two-headed arrows represent correlations, and unidirectional arrows depict hypothesized directional, or “causal,” links. Standardized maximum likelihood parameters are used. Bold estimates are statistically significant as determined by critical ratios.

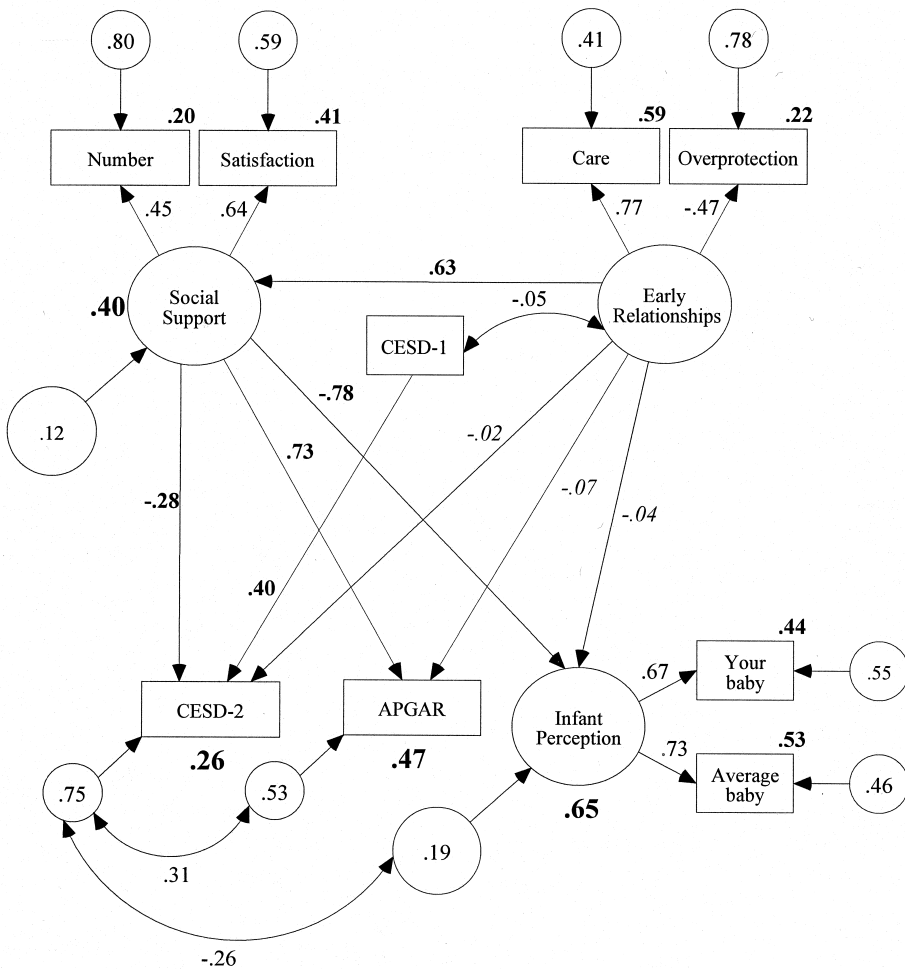
FIGURE 1. The direct effect model of early relationships on CESD-2, APGAR scores, and infant perception.

more positive perceptions of the infant (*path coefficient* =  $-.84$ ,  $t = -2.9$ ,  $p < .003$ ) and lower level of postpartum depressive symptomatology (*path coefficient* =  $-.27$ ,  $t = -2.3$ ,  $p < .05$ ). This direct effect model accounted for 33, 70, and 22% of the variance in APGAR scores, perceptions of the infant and postpartum depression, respectively.

*Analysis of the mediating model.* We proposed that social support mediates the effects of participants’ perceptions of early relationships on their perceptions of the infant, their postpartum depressive symptomatology, and the infants’ APGAR scores. We specified a complete mediation model that included one latent mediator: social support. In this model the latent predictor was early relationships, controlling for the association with CESD-1, and the direct effect of CESD-1 on CESD-2. The latent variable infant perception, the APGAR scores, and

CESD-2 assessments were the outcome variables in this model. We included the direct paths between early relationships and APGAR scores, infant perceptions, and postpartum depressive symptomatology (CESD-2), as well as the indirect effect of early relationships through social support on each of these outcome variables, controlling for the association between early relationships and CESD-1. As can be seen in Figure 2, as in the direct effects model, we also specified and controlled for the covariance among the outcome variables; that is, the associations between postpartum depression (CESD-2), infant's APGAR scores (error terms), and perceptions of the infant (disturbance) (see Farrell, 1994).

The specified mediation assumed that more positive early relationships (higher care and lower overprotection scores) should be associated with higher scores on social support, which in turn, should associate with a decrease in postpartum depressive symptomatology, more positive perceptions of the infant, and higher APGAR scores. This model (see Figure 2)



Note: Rectangles indicate measured variables. Large circles represent latent constructs, small circles with numbers reflect residual or disturbance variances. Two-headed arrows represent correlations, and unidirectional arrows depict hypothesized directional, or “causal,” links. Standardized maximum likelihood parameters are used. Bold estimates are statistically significant as determined by critical ratios.

FIGURE 2. The direct and indirect effects model of early relationships on CESD-2, APGAR scores, and infant perception mediated by social support.

provided a good fit to the data (RMSEA = .001,  $\chi^2(19, N = 120) = 19.28, p = .44$ , GFI = .97, AGFI = .92, CFI = 1.0), accounting for 40% of the variance of social support (*path coefficient* = .63,  $t = 2.32, p < .002$ ), 47% of the variance of APGAR scores (*path coefficient* = .73,  $t = 2.86, p < .004$ ), 65% of the variance of the infant perception variable (*path coefficient* = -.78,  $t = -2.73, p < .006$ ), and 26% of the variance of the postpartum depressive symptomatology (*path coefficient* = -.28,  $t = 2.13, p < .05$ ) variable.

Mediation has occurred when the indirect effect of a predictor through a mediator significantly reduces the predictor's direct effect (Baron & Kenny, 1986). As can be seen in Figure 1, the direct paths from early relationships to infant perceptions, APGAR and to CESD-2 while controlling for CESD-1 scores, were significant (*path coefficient* = -.84,  $t = -2.9, p < .003$ , *path coefficient* = .58,  $t = 3.35, p < .001$ , and *path coefficient* = -.27,  $t = -2.3, p < .05$ ; respectively). In Figure 2, however, these paths approached 0 (*path coefficient* = -.04,  $t = -.03$ , *path coefficient* = -.07,  $t = -.02$ , n.s., respectively, and *path coefficient* = -.02,  $t = -.08$ , n.s.). The drop in the coefficients of the direct paths from early relationships to infant perceptions, APGAR, and CESD-2, once the latent mediator was controlled, were significant according to Sobel's test (Baron & Kenny, 1986):  $Z = 2.71, p < .05$ ;  $Z = 2.1, p < .05$ ;  $Z = 1.98, p < .05$ , respectively. Thus, social support is an almost full (although not necessarily exclusive) mediator of the association between perceptions of early relationships and lower postpartum depressive scores (controlling for CESD-1), higher APGAR scores, and perceptions of the infant as easier to take care of.

To obtain the most parsimonious model, we modified the one presented in Figure 2, following Bentler and Mooijart (1989), by removing statistically nonsignificant paths. We removed the nonsignificant direct paths from early relationships to CESD-2, APGAR scores, and maternal perception of infant difficulty. No significant difference in the change in fit between the previous and the reduced model was found,  $\chi^2$  difference (3,  $N = 120$ ) = .24, n.s. The more parsimonious model was found to fit the data very well (RMSEA = .000,  $\chi^2(22, N = 120) = 19.52, p = .61$ ; GFI = 1.0, AGFI = .97, CFI = 1.0), accounting for 36%, 66%, 44%, and 26% of the variances of social support, maternal perceptions of the infant, APGAR scores, and postpartum depressive symptoms (CESD-2), respectively.

## DISCUSSION

This study's findings strengthen the assumption that social support mediates the association between new mothers' perceived early relationships with their own mothers, and postpartum depressive symptomatology, perceptions of the infant, and the newborns' APGAR scores. Our results delineate a process according to which pregnant women's perceptions of early relationships associate with their constructions of a social reality as reliable in case of distress. Perceptions of social support, in turn, associate with postpartum positive outcomes. These findings, and their limitations, will be discussed using a perspective from which organism and context are seen as inseparable, and affected by the previous history of their interactions (Sroufe, 1997).

According to this study's design, mothers' perceptions of caring relationships, and their perceptions of social support as available, are antecedents to maternal well-being, positive perceptions of the infant, and the newborn's APGAR scores. It should be noticed that this model does not imply directionality between the antecedent variables themselves (perceptions of early relationships and social support). Different explanations of the relationships between these two variables reflect diverse conceptions of the relative impact of past and present experiences: on one hand, perceptions of early relationships can be seen as affected by the participants' present conceptions of the degree to which social support is available and adequate for her; from this perspective perceptions of early relationships are seen as the construed most

fundamental level of support. On the other hand, perceptions of early relationships can be seen as affecting subsequent significant interpersonal relationships, including perceptions of social support.

Neither of these explanations of the direction of the association between perceptions of early relationships and perceived social support can be dismissed; moreover their simultaneous coexistence implies a transactional perspective that includes the continuous interplay of past and present experiences, of mental constructions and external circumstances. This model is germane to our conclusions about the mediating role of social support: For the pregnant women, the perceived availability of social support in the present, even though related to her perceptions of early relationships, constitutes in itself a significant condition—albeit not a necessary or sufficient one (Baron & Kenny, 1986)—for her own well-being and early interactions with the infant. Social support may, therefore, be seen as a relevant construct that associates with both intrapersonal and interpersonal processes. In fact, the problem of the direction of effects between the antecedent variables cannot be verified except in very long-term longitudinal studies, and under rather stable conditions. Moreover, if we accept the possibility that it is not infrequent for intrapsychic changes to take place when circumstances change, it seems relevant to ask, in addition to questions of origins (what comes first?) questions about processes (how does it happen?). Analysis of mediation might provide an approximation to the exploration of the latter.

The longitudinal design used in this study allowed us to refer, with a moderate degree of certainty, to the direction of the effects found in relation to the outcome variables; i.e., assessments of mothers' perceptions of early relationships and perceptions of social support actually antedated the assessments of postpartum depressive symptomatology (controlling for depression levels during pregnancy), as well as her perceptions of the infant and the newborn's actual APGAR scores.

Regarding the effects of social support on postpartum depressive symptoms, our results should be understood in the framework of the moderately stable levels of dysphoria assessed both during pregnancy and after delivery. Moreover, beyond the effects of perceptions of early relationships and social support, postpartum depressive symptomatology levels were found to be still significantly associated to depressive symptoms during pregnancy, supporting recent ideas of depressive mood as a process that takes place during the whole perinatal period (Cutrona, 1984; Fleming et al., 1990). An important issue for further research in this respect is the evaluation of plausible differences between recovery processes after childbirth among mothers with less, or less satisfactory, social support levels.

The mediating role played by social support in the association between participants' perceptions of early relationships and the newborn's APGAR scores suggests that mother–infant interactions might take place, on a somatic level, already before birth (Benoit et al., 1997; Priel & Besser, 2000a). The higher maternal distress levels (that associate with perceptions of lower levels of social support) may explain the newborn's health status at birth as related to physiologic concomitants of the mothers' affective state. Similar hypotheses have been suggested by studies reporting causal associations between stress during pregnancy and newborns reactivity and irritability (DaCosta, Dritsa, Larouche, & Brender 2000; Field et al., 1991) as well as by earlier investigations on the nature-nurture problem and infant temperament (Vaughn, Bradley, Joffe, Seifer, & Barglow, 1987). This explanation is corroborated, to some extent at least, by recent studies of the intrauterine effects of maternal anxiety reporting significant associations between maternal emotionality and APGAR scores (Ponirakis et al., 1998). The interpretation of the present research findings in relation to the newborns' APGAR scores is constrained by the fact that this study's design did not include evaluations of the physiologic mechanisms that might intervene in the association between maternal distress and newborn's

health outcomes. This remains an important issue for further research. Moreover, our findings point to the specific complexities of the earliest phases of mother–infant interactions in which the classic distinction, and controversial hierarchy, between experiential (i.e., mother–infant interaction) and inborn (i.e., endogenous behavioral characteristics) factors (van IJzendoorn, 1995) seem to be questioned.

In this study the assumption that pregnant women's perceptions of early relationships are related to their perceived social support, which in turn, associate with mothers' perceptions of infant difficulty, was confirmed. The conceptualization of infant's perceived difficulty as a social coconstruction (Vaughn & Bost, 1999) that arises both from the infant's behavior and the observer's perceptions of it, provides a vantage point for the understanding of these findings. Assuming that perceptions of the infant as difficult to take care for are affected by the mother's and the infant's characteristics and their interactive patterns (Bates & Bayles, 1984), our results point to the mother's appraisals of past and present relationships as playing an important role in her interpretations of infant difficulty; maternal reports of infant difficulty are, of course, subjective, but their relevance does not derive from their correspondence with objective reality (a criteria that might not be fulfilled), but from their well-documented effect on infants' behavior and development (Bates, Maslin, & Frankel, 1985; Belsky, 1984).

Several limitations of this study's findings and suggestions for further research should be noted. We assessed self-reported measures only, lacking evidence as to the networks of support that participants actually had, systematic observations of infants' behavior, or external evaluations of mothers' moods. Moreover, additional sources of assessment, such as multiple reporters of infant behavior, might have shed additional light on the processes studied (Bates & Bayles, 1984). In addition, the direction of the effects studied may be controversial. We based the assumed directions of the associations between social support and outcome variables on previous research findings, determining a research design in which social support was measured at Time 1 and outcome variables were assessed later on. This design does not invalidate, however, the possibility that both positive perceptions of support and positive outcomes at a later date may stem from a common factor active during the whole process. Such a factor could be responsible for both positive perceptions of social support and positive outcomes. Cohen and Wills (1985), for instance, suggested that the association between social support and well-being may stem from stable personality variables, such as social competence, that might explain both individuals' perceptions of available social support and well-being. Levels of optimism or positive affect may constitute possible general factors that could explain both higher levels of reported social support and more positive outcome variables; it should be noted that perceptions of early relationships are related to this process, but their effect is fully mediated by participants' levels of perceived social support. Another limitation of the present study refers to the use of questionnaire assessments instead of, for instance, interview or observation techniques. Future studies using the latter assessment procedures may further the study of the role played by perceived social support in the transition to motherhood.

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