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Maternal and family predictors of infant psychological development in at-risk families: A multilevel longitudinal study

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Abstract

The impact of different parenting-related variables on child psychological development is widely acknowledged. However, studies about the specific influence of maternal and family dimensions on child early developmental outcomes in at-risk dyads are still scarce. The aim of this longitudinal study was to investigate the short- and middle-term effects of prenatal and postnatal family and maternal features, and child attachment, on child psychological development at 3 and 24 months in at-risk families. Forty-two mothers with psychological, social and/or demographic risk conditions and their first-born infants were assessed longitudinally. Measurements of maternal personality, psychological and depressive symptoms, family socioeconomic status (SES), child–mother attachment, and infant general psychological development were collected at multiple time points, through validated questionnaires and/or mother–child observation. Maternal and family dimensions showed a significant effect on child psychological development over time. The expected detrimental role of reported maternal depressive symptoms was observed both at 3 and 24 months of child's age. Data also highlighted the negative contribution of low family SES and an unexpected positive influence of maternal personality trait of psychoticism on child psychological development at 24 months. We also found a positive association between attachment security and child developmental outcome. These findings might have relevant implications for the implementation of early prevention programs by differentiating the specific predictive role of maternal child and familial factors on child psychological development in at-risk families.

KEYWORDS

at-risk families, attachment security, maternal depression, psychological development

1 | INTRODUCTION

There is consistent evidence that early childhood is a critical period in human development with short- and long-term effects on individual health and wellbeing (Phillips & Shonkoff, 2000). In particular, the primary role of the parent–child relationship for child healthy development is widely acknowledged in the literature. Parents or caretakers regulate the majority of a child's interaction with the environment, nurturing their ability to face emergent developmental challenges, within an intersubjective framework (Beebe et al., 2005; Trevarthen & Aitken, 2001). The essential contribution of parenting encompasses child cognitive, emotional, and motor skills (Borkowski, Ramey, & Bristol-Power, 2001; Colombo & Fagan, 1990; Tamis-LeMonda & Bornstein, 2002). Among the different dimensions of human parenting, sensitive responsiveness to infant cues, together with the ability to support autonomous exploratory behavior, are essential for the development of a

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secure child attachment relationship, which in turn fosters individual development (Ainsworth, Blehar, Waters, & Wall, 1977; Sroufe, 1979). Hence, parenting attitudes and behavior, as well as child attachment relationship, play a key role in shaping children's experiences and preparing them to manage the tasks of life (Bornstein, 2014). However, in the context of maternal and family psychosocial risk, optimal infant psychological development might be hindered at different levels, as a result of specific risk and protective factors. With this in mind, this study aims to longitudinally assess the specific influential role of different aspects of maternal psychological functioning, family context, and child–mother attachment on infant general psychological development in families with psychosocial risk factors.

2 | BACKGROUND

Several psychosocial or contextual risk factors can negatively affect parenting, the quality of child–mother relationship and, in turn, child developmental outcomes. Empirical protective determinants of parenting have highlighted the influence of three crucial aspects: (a) parent psychological functioning, (b) context, and (c) child characteristics (Belsky, 1984; Belsky, 2006). Elements of each subsystem of determinants are often associated with one another and can have positive or detrimental influence on parenting and child development.

2.1 | Maternal psychological functioning

With reference to maternal psychological characteristics, the effects of both psychopathological symptoms and personality traits have been investigated. Several studies have highlighted that both maternal internalizing and externalizing symptoms are associated with maladaptive parenting behaviors (Bergman, Sarkar, O'Connor, Modi, & Glover, 2007; Burstein, Ginsburg, & Tein, 2010; Cummings & Davies, 1994; Downey & Coyne, 1990; Pianta, Egeland, & Sroufe, 1990). However, most research has focused on the adverse impact of maternal depressive symptoms, which was shown to influence the quality of caregiving activities and of child attachment, thus leading to poor parenting skills and nonoptimal child adjustment (Beck, 1995; Downey & Coyne, 1990; Field, 2010; Toth, Rogosch, Sturge-Apple, & Cicchetti, 2009). Specifically, mothers with depressive symptoms tend to show lower levels of sensitive responsiveness, and more frequent hostile and intrusive behaviors compared to mothers with no such symptoms (Malphurs et al., 1996), though the strength of these effects are moderated by the timing of depressive symptoms as well as SES (Lovejoy, Graczyk, O'Hare, & Neuman, 2000; McCabe, 2014).

On the other hand, the influence of maternal personality features on parenting and their contribution to healthy child development has been far less investigated, despite the theoretically crucial role attributed to maternal psychological functioning as a determinant of parenting behaviors and cognitions (Belsky, 1984; Belsky, 2006; Bornstein, Hahn, & Haynes, 2011). Moreover, the existing studies focus on different personality dimensions, anchored in diverse personality models, making the generalization of the results more difficult. In some cases, the existing literature confirms the impact of maternal personality in shaping parenting behavior even though many personality factors do not show a clear predictive role (Clark, Kochanska, & Ready, 2000). Neuroticism and extraversion are among the most frequently investigated factors, as they are shared by different factor models of personality (Cattell, 1973; Costa & McCrae, 1985; Eysenck & Eysenck, 1976). Several studies found maternal Neuroticism to be negatively associated with different parenting dimensions, and child adaptive outcomes (Kochanska, Aksan, & Nichols, 2003; Kochanska, Clark, & Goldman, 1997). With respect to extraversion, literature provided mixed findings: some studies underlined a positive influence on maternal parenting style, whereas others revealed an association of this personality trait with power assertion and control (Kochanska, Aksan, Penney, & Boldt, 2007; Smith, 2010).

2.2 | Family socioeconomic status

Besides the individual level at which parents exert their influence on child healthy development, it is essential to consider the contextual level (Bronfenbrenner & Morris, 2006). The negative impact of poor social, cultural, and economic environment on psychological development of offspring is confirmed by several studies (McFadden & Tamis-Lemonda, 2013; Repetti, Taylor, & Seeman, 2002; Roubinov & Boyce, 2017). In particular, a low family socioeconomic status (SES) is identified as a negative predictor of child cognitive development and mental health (Reiss, 2013; Tarren-Sweeney & Hazell, 2006) and parenting practices are recognized to partially mediate this association. Familial socioeconomic disadvantages are often associated with a less stimulating developmental environment, in which educational, social, and health opportunities are reduced. Mothers with low SES have been found to show lower levels of sensitive responsiveness toward their children as well as more maladaptive parenting behaviors (Bárrig-Jó et al., 2016; de Falco et al., 2014; McLoyd & Wilson, 1991; Tamis-LeMonda & Bornstein, 2002). Therefore, infants of families with low SES are more at risk of manifesting mental and emotional problems during childhood (Najman et al., 2004). Despite the negative impact of low income on infant growth and child rearing, research has shown the role of several factors, such as external support and family context, in moderating this effect (Bradley & Corwyn, 2002).

2.3 | Child attachment in at-risk families

Over the last three decades, research has broadly demonstrated the positive association between child–parent attachment in general, and child–mother security of attachment in particular, and child developmental outcomes in various psychological domains (Bakermans-Kranenburg, Van Ijzendoorn, & Juffer, 2003; Belsky & Fearon, 2002; Groh, Fearon, Van Ijzendoorn, Bakermans-Kranenburg, & Roisman, 2017; Steele, Steele, & Croft, 2008). On the one hand, literature

highlighted that different risks associated with parenting quality, with specific reference to maternal health (Atkinson et al., 2000), may have negative effects on child attachment security (Cyr, Euser, Bakermans-Kranenburg, & Van Ijzendoorn, 2010; Raikes & Thompson, 2006). On the other hand, it has been shown that child attachment security plays a protective function on child adjustment even in the context of maternal and/or family psychosocial risk (Edwards, Eiden, & Leonard, 2006). However, studies are sparse and the strength of the protective function of child attachment in the context of other psychosocial risk factors is still unclear.

2.4 | Methodological approaches to psychosocial risk research

Research on the developmental outcomes of children raised in families with psychosocial risk factors often investigates the effect of one risk factor at a time. The study of the combined presence of different risks can have important implications for the clinical work with high-risk children, both in terms of policy and intervention (Appleyard, Egeland, Dulmen, & Sroufe, 2005). Moreover, theoretical and empirical work on this matter recommend the use of longitudinal measures and continuous-level measurement of risk factors. Indeed, when considering the effect of risk or protective factors on child adjustment, the factor intensity becomes crucial. However, a common practice in risk research is to reduce a quantitative continuous variable to a risk/no risk dichotomy. This approach results in a considerable loss of information about risk factor intensity (Cohen, 1983) and precludes the use of sample variability to predict developmental outcomes. As suggested by methodologists, this process can lead to incorrect conclusions due to low statistical power and false positives (Humphreys & Fleishman, 1974; Vargha, Rudas, Delaney, & Maxwell, 1996).

2.5 | The present study

Based on the methodological arguments described above and on the literature on the contribution of different parenting-related variables on child psychological development, the current study aims to investigate the predictive role of (1) maternal psychopathological and depressive symptoms, (2) maternal personality, (3) family SES, and (4) child–mother security of attachment, on child psychological development in at-risk families. In line with the literature, we expected that (a) maternal general psychological distress and depressive symptoms during pregnancy and more strongly after childbirth, would negatively impact child psychological development; (b) among personality dimensions, neuroticism and extraversion would show a detrimental and positive effect, respectively, on child psychological development; (c) lower SES would be associated with poorer psychological development; (d) security of child–mother attachment would be positively associated with child psychological development. Child psychological development was assessed at two different time-points, that is, 3 and 24 months, which were selected to represent the beginning (after the neonatal phase) and the endpoint of infancy. This study can contribute to the implementation of early prevention programs to support parenting skills in families with psychosocial and socioeconomic risk factors. Moreover, our findings can help health professionals identify maternal and familial characteristics that represent specific risk factors for future infant development, starting from pregnancy and/or during the first years of a child's life.

3 | METHODS

3.1 | Sample

This study is a secondary analysis of data from a broader longitudinal evaluation of a prevention and intervention program, which was intended to promote the psychological health of at-risk families living in the Trento Province, Northern Italy, by monitoring and supporting maternal and child psychological wellbeing. A total of 69 mothers were initially recruited. Of these, 10 mothers refused to participate, 12 were considered not eligible after screening for inclusion criteria, and 5 mothers dropped out of the study before its completion. Our sample includes a total of 42 dyads: 42 mothers (age at recruitment: $M = 26.69$ years, $SD = 6.69$) and their first-born infants (16 females, 26 males). The mothers were followed over time from the third trimester of pregnancy to 24 months of the child's age. Families' average SES was low-to-middle ($M = 24.36$, $SD = 14.38$), based on the Four Factor Index of Social Status (Hollingshead, 1975). Participation in the program was proposed to eligible mothers by health professionals (midwives, psychologists, and doctors) from four Public Health Services in the Trento Province. All mothers gave written informed consent. Mothers were visited by a trained psychologist to verify through clinical interview and psychological assessment that at least one of the following inclusion criteria was satisfied: (a) young maternal age (i.e., <22 years, considered a threshold between late adolescence and early adulthood); (b) single-parent family status; (c) low socioeconomic family status (i.e., <10 years of education and/or family income below poverty threshold for Italian population); (d) relevant psychological fragility symptomatology (i.e., being on psychological treatment at a public health service and/or showing depressive symptoms). The study was conducted in accordance with the standards of the National Code of Ethics for Research in Psychology of the Italian Psychological Association.

3.2 | Procedure

Participants were involved in an extensive longitudinal evaluation within a prevention program for at-risk families, with several home visits for mother–child psychological assessment. Data presented in this study were collected at five different time points: pregnancy, 3, 6, 18, and 24 months child's age. Specifically (see Table 1), concerning predictors of child development, maternal personality and family SES were assessed during pregnancy, maternal psychological symptoms were repeatedly measured during pregnancy, and at 6 and 18 months of child's age, and child attachment security was measured at 18 months. Concerning child developmental outcomes,

TABLE 1 Study variables, associated measures, and time of assessment

Variables	Measures		Time
Maternal psychological symptoms	SCL-90-R		Pregnancy, 6, and 18 months of child's age
Overall psychological distress		GSI	
Depressive symptoms		DEP	
Maternal personality	EPQ-R		Pregnancy
Psychoticism		P	
Extraversion		E	
Neuroticism		N	
Social desirability		Lie	
Socioeconomic status	SES		Pregnancy
Child psychological development	GMDS		3 and 24 months of child's age
Psychological and motor general development		GQ	
Child attachment	AQS-index		18 months of child's age

Note: AQS, attachment Q-Sort; DEP, depression subscale; EPQ-R, Eysenck Personality Questionnaire-Revised; GMDS, Griffiths Mental Development Scales; GQ, General Developmental Quotient; GSI, Global Severity Index; SCL-90-R, symptom checklist-90-Revised; SES, socioeconomic status (Hollingshead, 1975).

child psychological development was evaluated at 3 and 24 months of age. For each mother, data were collected by the one trained psychologist who visited the mother several times over 2 years and could establish a work alliance that might have been one of the reasons for the low drop-out rate, together with the information and support that families were receiving within the prevention program.

3.3 | Measures

The study variables, the associated measures, and the assessment times are displayed in Table 1.

3.3.1 | Maternal psychological symptoms

The *Symptom Checklist-90-Revised* (SCL-R-90; Derogatis, 1994) was used to measure maternal psychological symptomatology. The SCL-R-90 is a questionnaire that assesses psychological and physical distress through 90 self-report items that cover a wide range of symptoms and generates nine subscales (somatization, obsessive-compulsive dimension, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism) and three general indexes of psychopathology. Each item is rated on a 5-point scale ranging from "Not at all" to "Extremely" based on prevalent feelings and experiences in the 7 days before the assessment. For the purpose of this investigation, raw scores of the *Global Severity Index* (GSI) and of the Depression subscale (DEP) were considered. The GSI is a general index that measures the overall psychological distress, taking into account all of the 90 item scores (Italian normative sample: $M = 0.45$, $SD = 0.33$). The Depression subscale (DEP) (13 items) reflects a representative range of emotional, cognitive and somatic depressive symptoms, such as loss of energy, lack of motivation, hopelessness, suicidal thoughts, withdrawal, and dysphoric mood (Italian normative sample: $M = 0.46$, $SD = 0.42$). For both GSI and Depression, scores greater than or equal to 1 are considered of clinical interest.

3.3.2 | Maternal personality

Maternal personality was measured via the *Eysenck Personality Questionnaire-Revised* Short-Form (EPQ-R; Eysenck, 1991). The EPQ-R is a questionnaire that evaluates personality through 48 items that are organized in three independent dimensions: extraversion (E; a measure of sociability), neuroticism (N; a measure of negative emotionality), and psychoticism (P; a measure of the tendency to antisocial, risk-taking, impulsive, tough-minded behaviors). An additional scale is also included (Lie scale) which was originally developed to control for response distortion in terms of social desirability, and subsequently related to the personality dimension of "social acquiescence and conformity" (Birenbaum & Montag, 1989; Massey, 1980). Response to each item is dichotomous (yes/no). Studies that focused on the comparison between EPQ and EPQ-R short-form have confirmed the functional equivalence of the two editions (Francis & Katz, 1992). The Italian version of the EPQ-R (San Martini, Mazzotti, & Setaro, 1996), used in the present study, is considered a reliable and valid instrument to investigate personality dimensions according to Eysenck's Model (Dazzi, 2011). T scores ranging from 40 to 60 were considered as average scores.

3.3.3 | Socioeconomic status

A *Sociodemographic Questionnaire* was administered to collect sociodemographic information of the family (i.e., maternal and paternal age, job, education) to calculate the Four Factor Index of Social Status (Hollingshead, 1975), a widely used measure of family SES, which takes into account parents' level of education and job.

3.3.4 | Child attachment

The Italian version of the *Attachment Q-Sort* (AQS; Cassibba & D'Odorico, 2009; Cassibba, Van Ijzendoorn, & D'Odorico, 2000; Vaughn & Waters, 1990; Waters, 1995) was used to assess child's attachment security to their mothers at 18 months of age. AQS is a Q-Sort method that consists of 90 items that focus on the quality of child's secure-based behavior. After prolonged observation of child–mother interaction in a naturalistic setting – in this study 3 ± 1 home visits of approximately 90 min—a trained observer sorts the 90 items into 9 groups ranging from "most descriptive of the child" (9) to "least descriptive of the child" (1). Final AQS security

score ranges from−1.0 to +1.0 based on the correlation between child's profile and the profile of a prototypically securely attached child. No cut-off is provided to distinguish the secure child from an insecure one.

3.3.5 | Child psychological development

The *Griffiths Mental Development Scales* (GMDS; Griffiths, Battaglia, Savoini, & Huntley, 2007) is a well-established instrument to measure child level of psychological and motor general development. This procedure provides a General Developmental Quotient (GQ) and five separate subscales that assess many domains of functioning (Locomotor, Personal-Social, Hearing and Communication, Eye and Hand Coordination and Performance). The GQ was calculated according to the GMDS manual. The GMDS version used in this study assesses infants from 0 to 24 months. The GQ score has a theoretical mean of 100 and a standard deviation of 16. A score less than 68 is considered to be associated with child impairment. Children's scores on GMDS (0 or 1 for each item) were assigned by a psychologist who had attended specific training on this procedure.

3.4 | Data analysis

We first reported the distribution of eligibility criteria in our sample. Subsequently, we performed preliminary data analyses to check: (a) the correlation and mean difference within longitudinal variables using Pearson's correlation coefficient and non-parametric paired Wilcoxon signed-rank test, respectively; (b) whether measures differed significantly between sexes with Student's *t* test.

Afterward, two linear regression models were implemented with infant psychological development scores at 3 and 24 months as response variables, respectively. The first model investigated whether child general psychological development at 3 months could be predicted by maternal psychological symptoms (i.e., overall psychological distress, and depressive symptoms), all four maternal personality dimensions, and SES measure, all measured during pregnancy. The second model investigated whether child psychological development at 24 months could be predicted by maternal psychological symptoms at pregnancy, 6, and 18 months; all four maternal personality dimensions; SES during pregnancy; and child attachment at 18 months.

Given the longitudinal nature of the data, the variance inflation factor (VIF) was used to detect possible multicollinearity among independent variables (Fox & Weisberg, 2011). Multicollinearity can complicate detecting the effect of individual predictors. In this study, we dropped the regressors with the highest VIF scores from the models, refitted the reduced models, and recalculated the VIFs. This process was repeated until all VIFs were smaller than a threshold set at 4 (Zuur, Ieno, & Elphick, 2010). The full models, the correspondent VIF-reduced models, and the null models (i.e., with zero regression coefficients) were compared via Analysis of Variance tables to test whether a larger model added explanatory value over a smaller model. The significance level was set at .05 in all the analyses. Statistical analyses were performed using R software, version 3.4.2 (R Core Team, 2017).

4 | RESULTS

Considering the four possible risk conditions that were inclusion criteria to participate in this study 13 mothers in our sample were younger than 22 years, 14 were single parents, 9 had low SES, and 23 showed relevant psychological fragility symptomatology. Twenty-six dyads (61.90%) showed only one risk condition, 12 dyads (28.57%) showed 2 risk conditions, and 3 dyads (7.14%) showed 3 risk conditions.

TABLE 2 Descriptive statistics for study variables

	P		3 mo		6 mo		18 mo		24 mo	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Maternal variables										
Psychological symptoms										
Overall psychological distress	0.70	0.47			0.68	0.49	0.64	0.49		
Depression symptoms	0.90	0.56			0.76	0.59	0.81	0.66		
Personality										
Psychoticism	50.14	12.68								
Extraversion	52.67	10.45								
Neuroticism	49.00	8.45								
Social desirability	51.86	10.51								
Socioeconomic status	24.36	14.38								
Child variables										
Psychological development										
Psychological and motor general development			97.74	8.82					100.19	12.08
Child attachment							0.28	0.38		

Note: P, pregnancy; 3 mo, 3 months; 6 mo, 6 months; 18 mo, 18 months; 24 mo, 24 months.

Standard descriptive statistics for study variables are displayed in Table 2. Child general psychological development results suggest some stability (correlation) between 3 and 24 months with a medium effect size ($r = .32$, $p = .04$). Moreover, no significant difference in general development was found between 3 and 24 months ($V = 313.50$, $p = .20$), indicating continuity of this variable over time. The overall maternal psychological distress and depressive symptoms were stable between subsequent time points ($p < .05$), and no significant differences were found ($p > .05$) suggesting continuity (Bornstein, Putnick, & Esposito, 2017). Possible correlations between different regressors at the same time point were excluded ($p > .05$). No significant differences were found between males and females for the selected variables ($p > .05$).

According to our aims, the first linear model included all the variables collected at pregnancy as predictors of 3-month infant psychological development. This model allowed investigation of the impact of maternal psychopathological and depressive symptoms, maternal personality, and family SES on infant psychological development. In the model, depressive symptoms ($b = -14.13$, $t = -2.60$, $p = .01$) and social desirability ($b = -0.34$, $t = -2.73$, $p = .01$) variables were significant. The overall model was significant ($F(7, 34) = 3.00$, $p = .01$), and the multiple and adjusted R^2, which summarize the overall model fit on a scale from 0 to 1.00, were equal to 0.38 and 0.25, respectively. The VIF scores were less than 4 for all variables, except for the measures of overall psychological distress and depressive symptoms, which were equal to 5.19 and 6.65, respectively. Considering the VIF scores and the structure of the variables, we decided to drop the overall score, retaining the more specific ones (i.e., depressive symptoms and social desirability). We fitted the reduced model and found that the scale for depressive symptoms ($b = -8.06$, $t = -2.83$, $p < .01$) and social desirability ($b = -0.31$, $t = -2.50$, $p = .02$) during pregnancy were significant, with reduced standard error. The overall model was significant ($F(6, 35) = 3.15$, $p = .01$), with multiple and adjusted R^2 equal to .35 and .24, respectively. The VIF scores of all the variables in the reduced model were less than 4. Furthermore, comparing the models, we found that the complete model was not preferable to the reduced one ($F(33, 2) = 1.67$, $p = .20$). Moreover, the reduced model was then compared with the null model ($F(35, 6) = 3.15$, $p = .01$). The model with six predictors measured at pregnancy (i.e., depressive symptoms, psychoticism, extraversion, neuroticism, social desirability, and SES) of infant psychological development at 3 months was determined to have the best fit.

The second linear model was designed to investigate the impact on child psychological development at 24 months of maternal personality and family SES measured at pregnancy, maternal psychopathological and depressive symptoms measured before and after childbirth, and child attachment to the mother measured at 18 months of child's age. In particular, we considered overall psychological distress and depressive symptoms at pregnancy, 6, and 18 months, all four maternal personality variables, and SES at pregnancy, and child attachment at 18 months as predictors of child psychological development at 24 months. The psychoticism dimension ($b = 0.36$, $t = 2.42$, $p = .02$), the scale for social desirability ($b = -0.50$, $t = -3.42$, $p < .01$), and SES ($b = 0.30$, $t = 2.66$, $p = .01$) at pregnancy were significant. The depressive symptoms explanatory variable at 6 months was significant ($b = -8.16$, $t = -2.16$, $p = .04$), as well as child attachment security at 18 months ($b = 12.03$, $t = 3.00$, $p < .01$). The overall model was significant ($F(12, 29) = 4.34$, $p < .01$), with multiple R^2 equal to .64 and adjusted R^2 equal to .49. The VIF scores of overall psychological distress and depressive symptoms at pregnancy and at 18 months were greater than 4, therefore the overall psychological distress variables were discarded from the model altogether, and only the depressive symptoms at the three time points (i.e., pregnancy, 6, and 18 months) were retained. In the reduced model, depressive symptoms at pregnancy were significant ($b = 8.07$, $t = 2.15$, $p = .04$), as well as at 6 months ($b = -7.93$, $t = -2.56$, $p = 0.02$). Furthermore, the psychoticism dimension ($b = 0.36$, $t = 2.93$, $p < .01$), the scale assessing social desirability ($b = -0.48$, $t = -3.51$, $p < .01$), SES at pregnancy ($b = 0.28$, $t = 2.72$, $p = .01$), and child attachment at 18 months (b = 12.19, $t = 3.25$, $p < .01$) were still significant. The overall model was significant ($F(9, 32) = 6.06$, $p < .01$), with multiple R^2 equal to 0.63 and adjusted R^2 equal to 0.53. The VIF scores of all the independent variables were less than 4. Comparing the full model to the reduced one, we observed that dropping the overall psychological distress variables did not cause a consistent loss in model fit ($F(29, 3) = 0.32$, $p = .81$). Furthermore, the comparison of the reduced model with the null model was significant ($F(32, 9) = 6.06$, $p < .01$). In conclusion, the best model (i.e., the VIF-reduced model) with infant psychological development at 24 months as response variable comprised 9 predictors (i.e., depression symptoms at pregnancy, 6, and 18 months; four maternal personality variables and SES at pregnancy; and child attachment measured at 18 months). Best model results are displayed in Table 3.

5 | DISCUSSION

The aim of this study was to longitudinally assess the specific influential role of different aspects of maternal psychological functioning, family context, and child–mother attachment on infant general psychological development in families with psychosocial risk factors. To this aim, measures of several variables were collected at different time points across childbirth (i.e., maternal general psychopathological and depressive symptoms, maternal personality dimensions, family SES, child–mother attachment quality) and tested as possible determinants of infant psychological development at ages 3 and 24 months. This study extends the traditional research on maternal contribution to child developmental outcomes in at-risk families by considering different detrimental and protective determinants and adopting a continuous measurement approach in a multilevel longitudinal design. Based on the existing literature, we hypothesized a negative impact of psychopathological symptoms, low SES, and neurotic personality, but a positive influence of extraversion and child attachment security. Results of the study partially confirmed our hypotheses revealing the expected detrimental role of reported prenatal and postnatal maternal depressive symptoms both at 3 and at 24 months of child's age. Data also

TABLE 3 Predictors of child psychological development at 3 months (Model 1) and at 24 months (Model 2)

	Model 1		Model 2	
Predictors	***b***	**95% CI**	***b***	**95% CI**
Intercept	133.84***	[103.98, 163.70]	84.49***	[51.31, 117.67]
Pregnancy				
Depression symptoms	−8.06**	[−13.86, −2.27]	8.07*	[0.44, 15.70]
Psychoticism	−0.13	[−0.35, 0.09]	0.36**	[0.11, 0.61]
Extraversion	−0.13	[−0.37, 0.12]	−0.01	[−0.29, 0.26]
Neuroticism	0.02	[−0.37, 0.40]	0.25	[−0.19, 0.70]
Social desirability	−0.31*	[−0.56, −0.06]	−0.48**	[−0.76, −0.20]
Socioeconomic status	−0.02	[−0.21, 0.16]	0.28*	[0.07, 0.49]
6 months				
Depression symptoms			−7.93*	[−14.22, −1.63]
18 months				
Depression symptoms			−0.63	[−5.55, 4.30]
Child attachment			12.19**	[4.55, 19.82]
Adj-R^2	0.24		0.53	
F	(6, 35) 3.15*		(9, 32) 6.06***	

Note: *$p < .05$; **$p < .01$; ***$p < .001$.

highlighted the expected predictive associations of low SES and child attachment security (negative and positive, respectively) with child developmental outcome at 24 months. Moreover, results showed significant, though unexpected, contributions of different maternal personality dimensions on child psychological development at 24 months. First, we discuss results pertaining to each predictive factor of child psychological development in early and late infanthood. Second, we discuss the possible clinical implications of our findings for policy and intervention design for families with psychosocial risk.

With regard to maternal psychopathological symptoms, we found that the level of reported maternal depressive symptoms during the perinatal period intervenes in shaping child psychological development at 3 and 24 months. Specifically, we found that higher levels of maternal depressive symptoms at pregnancy are associated with lower child psychological development at 3 months. Furthermore, the level of maternal depressive symptoms both at pregnancy and at 6 months is also involved in predicting child outcomes at 24 months. These results, on the one hand, underline the impact of maternal depressive symptoms measured prenatally up to the 24th month of child's age, calling for very early assessment and supportive intervention. On the other hand, results underline the importance of considering the impact of the course of maternal depressive symptoms long after postpartum and at least until the first year after childbirth.

Our data are consistent with a large body of studies, also with at-risk families, confirming that depressive symptoms could affect the mother's abilities to stimulate, nurture, and support the infant's growth (Cummings & Davies, 1994). Mothers with depressive symptoms may display more difficulty in using sensitive and responsive behaviors with their child or may show more recurrent intrusiveness, controlling behavior, or withdrawal in the dyadic interaction. Thus, a less stimulating primary interpersonal context related to the mother's depressive symptoms may decrease the child's opportunities to learn and advance psychological functions. Moreover, this finding confirms the crucial impact of maternal emotional states during pregnancy and in the early months after childbirth on later infant development (Deave, Heron, Evans, & Emond, 2008; Murray, Fiori-Cowley, Hooper, & Cooper, 1996). Yet, in the present study, in contrast to the first postnatal year, levels of maternal depressive symptoms at 18 months of child's age were not associated with infant psychological development at 24 months. This result may reflect a greater exposure of the child to external influences given the increased amount of interaction with other family members or social partners, which could, in turn, moderate the impact of maternal psychopathology. Additionally, by the second year, emergent motor and linguistic abilities lead to a growing interest for exploration of the environment, changing the nature of the primary dyadic relationship and allowing the child to benefit from other sources of stimulation.

With respect to maternal personality factors measured at pregnancy, the expected role of neuroticism and extraversion were not confirmed. Instead, we found a negative predictive effect of social acquiescence already at 3 and up to 24 months of child's age. Moreover, surprisingly, we found that infant development at 24 months was positively associated with maternal level of psychoticism. Social acquiescence was measured via the EPQ-R Lie Scale, which has been linked to personality dimensions of conformity and "self-insight" (Crookes & Buckley, 1976; Francis, Philipchalk, & Pearson, 1991; Kirton, 1977). Therefore, it seems that maternal conformism, social desirability, and less insight about her own inner world might hinder optimal infant psychological development, possibly resulting in less effective parenting behavior, which may be more oriented to social approval and conventions than to the child's actual

needs. On the other hand, maternal psychoticism during pregnancy seems to favor child psychological development at 24 months in our sample of at-risk families. Eysenck psychoticism should not be considered as a measure of proneness to psychotic symptoms, but as a dispositional tendency to risk-taking, antisocial, and impulsive behaviors whose extreme can lead to externalizing psychopathology (Bech, 2016). As a matter of fact, in our sample, psychoticism score was independent from psychological symptomatology. Based on Eysenck's formulations, within nonclinical samples psychoticism could be considered in terms of "tough-mindedness," a tendency to face troubles with strength and determination, relying on the use of a logical approach to find solutions (Dazzi, Pedrabissi, & Santinello, 2004; Eysenck, 1954). Such maternal attitude could play a protective function on child healthy development within at-risk families, possibly allowing mothers to face more efficiently contextual adversities related to the risk condition in a way that reduces their impact on child wellbeing. Altogether, these findings seem to support the importance of analyzing in more detail the influence of maternal personality dimensions in empirical studies concerning child development, parenting cognitions, and practices (Bornstein et al., 2011).

Furthermore, we found a strong association between the quality of child attachment security to the mother, collected at 18 months, and child psychological development at 24 months. Specifically, children with a higher level of attachment security to their mother display higher scores of psychological development, confirming the robust positive predictive role of the quality of early affective relationship on child healthy growth, also found in families with psychosocial risk factors (Edwards et al., 2006). In fact, a secure child attachment helps the child to efficiently address developmental challenges within the healthy framework represented by maternal sensitive responsiveness. It seems that, also in families with psychosocial risk factors, secure child attachment could provide an adequate social-affective environment for the infant, promoting a secure base effect, which includes increased child exploratory behavior, sense of autonomy, and, ultimately, child psychological growth. Therefore, especially in the first years of life, attachment-based interventions are recommended in at-risk families with the aim of improving the quality of the dyadic interaction and infant attachment security, as significant protective factors.

Finally, our results showed that family SES negatively intervenes in predicting child development at 24 months. Our findings are in line with a large amount of research on the detrimental effect of low family SES (Reiss, 2013; Tarren-Sweeney & Hazell, 2006). In fact, lower family level of education and limited access to material resources could narrow a child's opportunities to interact with a more intellectually stimulating context. According to our findings, the negative effect of socioeconomic disadvantage is higher in late compared with early development. One possible explanation is that during early infanthood, the infant is almost exclusively focused on the primary relationship with the caregiver rather than on the exploration of the environment. Starting from the second half of the first year of life, infants become progressively more interested in the environment and acquire motor and cognitive skills that enable them to interact more actively with the external world while their experiences with the environment increase in number, complexity and diversification. At this point, the reduced material stimulation opportunities as well as the limited parenting skills appear to significantly limit the achievement of the child's full developmental potential. Yet, in our study, only about one fifth of the sample had a low SES, which may have impeded the ability to capture the effect of this risk factor on child psychological development earlier in infancy. The predictive association we found between SES and child development however, emerged from a sample of at-risk families with middle to low SES, suggesting that the intensity of this risk factor should be taken into account when defining eligibility criteria for prevention programs.

6 | LIMITATIONS OF THE STUDY

Some important limitations of this study deserve to be mentioned. We acknowledge that the small sample size may constitute a drawback and that it might have influenced the results and masked significant findings. Moreover, the lack of a control group (i.e., not at-risk) hindered the investigation of whether the same or a different pattern of child psychological development determinants would emerge in low-risk families. Furthermore, a measure of maternal IQ would have allowed for appropriate control of genetic influence on child psychological development. In addition, data on physiological parameters, social support, and a clinical assessment of depressive symptoms were not included in this study, limiting our understanding of psychological symptomatology processes at biological, psychological and social levels.

Future research should examine the association between risk and protective factors and specific sub-domains of child development, such as child's language, cognitive, and motor development. Finally, the specific paternal contribution to child psychological healthy development in at-risk families should be investigated.

7 | CONCLUSION

By considering multiple crucial risk and protective factors, collected from pregnancy to the second year of the child's age, and their predictive effect on infant early and late psychological development in families with psychosocial risk, this study enriches the literature on parenting-related influence on child health. Specifically, we highlighted time-specific differential influences of maternal, familial and child-related factors, which could inform health professionals working in the field of early prevention for families with psychosocial risk. In summary, we found antenatal and early postnatal maternal mental health, with the exception of depressive symptoms assessed during the second year of child's age, to be pivotal for infant early and late development. Moreover, during the second year of life, the security of child attachment to the mother seems to be a strong predictor of infant psychological development. Family SES and maternal personality, measured before childbirth, exert their influence on later child psychological development. In particular, the detrimental effect of low antenatal SES becomes evident only in the second year of child's life, whereas in the first year, maternal mental health and personality

play the most significant roles. These findings could be related to the fact that early development is mainly regulated within a dyadic framework that is not significantly hindered by limited cultural and material resources. Finally, we found that personality dimensions of high social conformity, low risk-taking, and low tough-minded attitude toward difficulties represent detrimental factors for child adjustment supposedly because of their association with less optimal parenting strategies. Altogether, this multilevel longitudinal study has several clinical implications that could support prevention policies and intervention for at-risk families. First, our findings confirm that, within this population, maternal depressive symptoms should be considered a serious jeopardy for infant mental health. Second, support interventions should not wait for postnatal depression to be assessed, given that by the third trimester of gestation depressive symptoms are already associated with child development up to the second year. Therefore, within at-risk families, support of mothers with depressive symptoms, even if they do not reach clinical significance, should start antenatally. Third, early support should focus on favoring a secure child–mother relationship and reinforce maternal sensitive responsiveness. Fourth, whereas very early support should target maternal health and child–mother attachment, during the child's second year, educational and/or material support strategies should be provided in the case of low SES. Finally, although further investigation is needed, maternal personality traits in at-risk families appear to deserve the attention of researchers and health professionals who are involved with prevention programs, as these characteristics seem to influence child developmental outcomes in both positive and detrimental ways.

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CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

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REFERENCES

Ainsworth, M., Blehar, M., Waters, E., & Wall, S. (1977). *Patterns of attachment: Observations in the strange situation and at home*. Hillsdale, NJ: Lawrence Erlbaum.

Appleyard, K., Egeland, B., Dulmen, M. H. M., & Alan Sroufe, L. (2005). When more is not better: The role of cumulative risk in child behavior outcomes. *Journal of Child Psychology and Psychiatry*, *46*(3), 235–245. https://doi.org/10.1111/j.1469-7610.2004.00351.x

Atkinson, L., Paglia, A., Coolbear, J., Niccols, A., Parker, K. C., & Guger, S. (2000). Attachment security A meta-analysis of maternal mental health correlates. *Clinical Psychology Review*, *20*(8), 1019–1040.

Bakermans-Kranenburg, M. J., Van Ijzendoorn, M. H., & Juffer, F. (2003). Less is more: Meta-analyses of sensitivity and attachment interventions in early childhood. *Psychological Bulletin*, *129*(2), 195–215. https://doi.org/10.1037/0033-2909.129.2.195

Bech, P. (2016). Neuroticism (Eysenck's theory), *In Encyclopedia of Personality and Individual Differences*. Springer.

Beck, C. T. (1995). The effects of postpartum depression on maternal-infant interaction: A meta-analysis. *Nursing Research*, *44*, 298–305. https://doi.org/10.1097/00006199-199509000-00007

Beebe, B., Knoblauch, S., Rustin, J., Sorter, D., Jacobs, T. J., & Pally, R. (2005). *Forms of intersubjectivity in infant research and adult treatment*. New York: Other Press.

Belsky, J. (1984). The determinants of parenting: A process model. *Child Development*, *55*, 83–96.

Belsky, J. (2006). Determinants and consequences of infant-parent attachment. In L. Balter, & C. S. Tamis-LeMonda (Eds.), *Child psychology: A handbook of contemporary issues* (pp. 53–77). New York, NY: Psychology Press.

Belsky, J., & Fearon, R. M. P. (2002). Infant–mother attachment security, contextual risk, and early development: A moderational analysis. *Development and Psychopathology*, *14*(2), 293–310. https://doi.org/10.1017/S0954579402002067

Bergman, K., Sarkar, P., O'Connor, T. G., Modi, N., & Glover, V. (2007). Maternal stress during pregnancy predicts cognitive ability and fearfulness in infancy. *Journal of the American Academy of Child and Adolescent Psychiatry*, *46*(11), 1454–1463. https://doi.org/10.1097/chi.0b013e31814a62f6

Birenbaum, M., & Montag, I. (1989). Style and substance in social desirability scales. *European Journal of Personality*, *3*(1), 47–59. https://doi.org/10.1002/per.2410030106

Borkowski, J. G., Ramey, S. L., & Bristol-Power, M. (2001). *Parenting and the child's world: Influences on academic, intellectual, and social-emotional development*. Psychology Press.

Bornstein, M. H. (2014). Human infancy and the rest of the lifespan. *Annual Review of Psychology*, *65*, 121–158.

Bornstein, M. H., Hahn, C. S., & Haynes, O. M. (2011). Maternal personality, parenting cognitions, and parenting practices. *Developmental Psychology*, *47*(3), 658–675. https://doi.org/10.1037/a0023181

Bornstein, M. H., Putnick, D. L., & Esposito, G. (2017). Continuity and stability in development. *Child Development Perspectives*, *11*(2), 113–119.

Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology*, *53*(1), 371–399. https://doi.org/10.1146/annurev.psych.53.100901.135233

Bronfenbrenner, U., & Morris, P. A. (2006). The bioecological model of human development. In R. M., Lerner (Ed.), *Handbook of child development: Theoretical models of human development* (1, 6th, pp. 793–828). Hoboken, NJ: Wiley.

Burstein, M., Ginsburg, G. S., & Tein, J. Y. (2010). Parental anxiety and child symptomatology: An examinzation of additive and interactive effects of parent psychopathology. *Journal of Abnormal Child Psychology*, *38*(7), 897–909. https://doi.org/10.1007/s10802-010-9415-0

Bárrig-Jó, P., Nóblega, M., Del Prado, J. N., Conde, G., Carbonell, O. A., & De Litvan, M. A. (2016). Attachment representations and maternal sensitivity in low socioeconomic status mothers. *International Journal of Psychological Studies*, *8*(3), 202–214. https://doi.org/10.5539/ijps.v8n3p202

Cassibba, R., & D'Odorico, L. (2009). *La valutazione dell'attaccamento nella prima infanzia. L'adattamento italiano dell'Attachment Q-Sort (AQS) di Everett Waters [Assessment of attachment in infants. The Italian version of the Attachment Q-Sort (AQS) developed by Everett Waters]*. Milano: Franco Angeli.

Cassibba, R., Van Ijzendoorn, M. H., & D'Odorico, L. (2000). Attachment and play in child care centres: Reliability and validity of the

Attachment Q-sort for mothers and professional caregivers in Italy. *International Journal of Behavioral Development*, *24*(2), 241–255. https://doi.org/10.1080/016502500383377

Cattell, R. B. (1973). *Personality and mood by questionnaire*. San Francisco, CA: Jossey-Bass.

Clark, L. A., Kochanska, G., & Ready, R. (2000). Mothers' personality and its interaction with child temperament as predictors of parenting behavior. *Journal of Personality and Social Psychology*, *79*(2), 274–285. https://doi.org/10.1037/0022-3514.79.2.274

Cohen, J. (1983). The cost of dichotomization. *Applied Psychological Measurement*, *7*(3), 249–253. https://doi.org/10.1177/014662168300700301

Colombo, J., & Fagan, J. (1990). *Individual differences in infancy: Reliability, stability, prediction*. New York, NY: Psychology Press.

Costa, P. T., & McCrae, R. R. (1985). *The NEO personality inventory manual*. Odessa, FL: Psychological Assessment Resources.

Crookes, T. G., & Buckley, S. J. (1976). Lie score and insight. *The Irish Journal of Psychology*, *3*(2), 134–136. https://doi.org/10.1080/03033910.1976.10557626

Cummings, E. M., & Davies, P. T. (1994). Maternal depression and child development. *Journal of Child Psychology and Psychiatry*, *35*(1), 73–122. https://doi.org/10.1111/j.1469-7610.1994.tb01133.x

Cyr, C., Euser, E. M., Bakermans-Kranenburg, M. J., & Van Ijzendoorn, M. H. (2010). Attachment security and disorganization in maltreating and high-risk families: A series of meta-analyses. *Development and Psychopathology*, *22*(1), 87–108.

Dazzi, C. (2011). The Eysenck personality questionnaire-revised (EPQ-R): A confirmation of the factorial structure in the Italian context. *Personality and Individual Differences*, *50*(6), 790–794. https://doi.org/10.1016/j.paid.2010.12.032

Dazzi, C., Pedrabissi, L., & Santinello, M. (2004). *EPQ-R Eysenck personality questionnaire revised*. Giunti OS Organizzazioni Speciali. Florence, Italy.

Deave, T., Heron, J., Evans, J., & Emond, A. (2008). The impact of maternal depression in pregnancy on early child development. *British Journal of Obstetrics and Gynaecology*, *115*(8), 1043–1051. https://doi.org/10.1111/j.1471-0528.2008.01752.x

Derogatis, L. R. (1994). *Symptom Checklist 90-R: Administration, scoring and procedures manual, National Computer Systems*. Minnesota: NCS Pearson.

de Falco, S., Emer, A., Martini, L., Rigo, P., Pruner, S., & Venuti, P. (2014). Predictors of mother–child interaction quality and child attachment security in at-risk families. *Frontiers in Psychology*, *5*, 898. https://doi.org/10.3389/fpsyg.2014.00898

Downey, G., & Coyne, J. C. (1990). Children of depressed parents: An integrative review. *Psychological Bulletin*, *108*(1), 50–76. https://doi.org/10.1037/0033-2909.108.1.50

Edwards, E. P., Eiden, R. D., & Leonard, K. E. (2006). Behavior problems in 18- to 36-month-old children of alcoholic fathers: Secure mother–infant attachment as a protective factor. *Development and Psychopathology*, *18*(2), 395–407. https://doi.org/10.10170S0954579406060214

Eysenck, H. (1954). The science of personality: Nomothetic. *Psychological Review*, *61*, 339–342.

Eysenck, H. J., & Eysenck, S. B. G. (1976). *Psychoticism as a dimension of personality*. London: Hodder & Stoughton.

Eysenck, H. J. (1991). *Manual of the Eysenck personality scales (EPS Adult)*. Hodder & Stoughton. https://doi.org/10.1177/014662168000400106

Field, T. (2010). Postpartum depression effects on early interactions, parenting, and safety practices: A review. *Infant Behavior and Development*, *33*(1), 1–6. https://doi.org/10.1016/j.infbeh.2009.10.005

Fox, J., & Weisberg, S. (2011). *An R Companion to Applied Regression* (2nd ed.). Thousand Oaks CA: Sage. Retrieved from http://socserv.socsci.mcmaster.ca/jfox/Books/Companion

Francis, L. J., & Katz, Y. J. (1992). The comparability of the short form EPQ-R indices of extraversion, neuroticism, and the Lie Scale with the EPQ for a sample of 190 student teachers in Israel. *Educational and Psychological Measurement*, *52*(3), 695–700. https://doi.org/10.1177/0013164492052003019

Francis, L. J., Philipchalk, R., & Pearson, P. R. (1991). The dual nature of the Eysenck Personality Questionnaire Lie Scale among college students in the USA. *Psychological Reports*, *69*(2), 511–514. https://doi.org/10.2466/pr0.1991.69.2.511

Griffiths, R., Battaglia, F. M., Savoini, M., & Huntley, M. (2007). *GMDS-R: Griffiths mental development scales, revised: O-2 anni: manuale [GMDS-R: Griffiths mental development scales, revised: O-2 years: manual]*. Giunti OS, Organizzazioni speciali.

Groh, A. M., Fearon, R. M. P., Van Ijzendoorn, M. H., Bakermans-Kranenburg, M. J., & Roisman, G. I. (2017). Attachment in the early life course: Meta-analytic evidence for its role in socioemotional development. *Child Development Perspectives*, *11*(1), 70–76. https://doi.org/10.1111/cdep.12213

Hollingshead, A. B. (1975). Four factor index of social status.

Humphreys, L. G., & Fleishman, A. (1974). Pseudo-orthogonal and other analysis of variance designs involving individual-differences variables. *Journal of Educational Psychology*, *66*, 464–472. https://doi.org/10.1037/h0036539

Kirton, M. (1977). Characteristics of high Lie scorers. *Psychological Reports*, *40*(1), 279–280. https://doi.org/10.2466/pr0.1977.40.1.279

Kochanska, G., Aksan, N., & Nichols, K. E. (2003). Maternal power assertion in discipline and moral discourse contexts: Commonalities, differences, and implications for children's moral conduct and cognition. *Developmental Psychology*, *39*(6), 949–963.

Kochanska, G., Aksan, N., Penney, S. J., & Boldt, L. J. (2007). Parental personality as an inner resource that moderates the impact of ecological adversity on parenting. *Journal of Personality and Social Psychology*, *92*(1), 136–150.

Kochanska, G., Clark, A., & Goldman, M. S. (1997). Implications of mothers' personality for their parenting and their young children's developmental outcomes. *Journal of Personality*, *65*(2), 387–420. https://doi.org/10.1111/j.1467-6494.1997.tb00959.x

Lovejoy, M. C., Graczyk, P. A., O'Hare, E., & Neuman, G. (2000). Maternal depression and parenting behavior. *Clinical Psychology Review*, *20*(5), 561–592. https://doi.org/10.1016/S0272-7358(98)00100-7

Malphurs, J. E., Field, T. M., Larraine, C., Pickens, J., Pelaez-Nogueras, M., Yando, R., & Bendell, D. (1996). Altering withdrawn and intrusive interaction behaviors of depressed mothers. *Infant Mental Health Journal*, *17*(2), 152–160. https://doi.org/10.1002/(SICI)1097-0355(199622)17:2<152::AID-IMHJ5>3.0.CO;2-S

Martini, P. S., Mazzotti, E., & Setaro, S. (1996). Factor structure and psychometric features of the Italian version for the EPQ-R. *Personality and Individual Differences*, *21*(6), 877–882. https://doi.org/10.1016/S0191-8869(96)00147-X

Massey, A. (1980). The Eysenck Personality-Inventory Lie scale—Lack of insight or…? *Irish Journal of Psychology*, *4*(3), 172–174.

McCabe, J. E. (2014). Maternal personality and psychopathology as determinants of parenting behavior: A quantitative integration of two parenting literatures. *Psychological Bulletin*, *140*(3), 722–750. https://doi.org/10.1037/a0034835

McFadden, K. E., & Tamis-Lemonda, C. S. (2013). Maternal responsiveness, intrusiveness, and negativity during play with infants: Contextual associations and infant cognitive status in a low-income sample. *Infant Mental Health Journal*, *34*(1), 80–92. https://doi.org/10.1002/imhj.21376

McLoyd, V. C., & Wilson, L. (1991). The strain of living poor: Parenting, social support, and child mental health. In Huston, A. C. (Ed.), *Children in poverty: Child development and public policy* (pp. 105–135). New York: Cambridge University Press.

Murray, L., Fiori-Cowley, A., Hooper, R., & Cooper, P. (1996). The impact of postnatal depression and associated adversity on early mother-infant interactions and later infant outcome. *Child Development*, *67*(5), 2512–2526. https://doi.org/10.1111/j.1467-8624.1996.tb01871.x

Najman, J. M., Aird, R., Bor, W., O'Callaghan, M., Williams, G. M., & Shuttlewood, G. J. (2004). The generational transmission of socio-economic inequalities in child cognitive development and emotional health. *Social Science & Medicine*, *58*(6), 1147–1158. https://doi.org/10.1016/S0277-9536(03)00286-7

Phillips, D. A., & Shonkoff, J. P. (2000). *From neurons to neighborhoods: The science of early childhood development*. National Academies Press. https://doi.org/10.17226/9824

Pianta, R. C., Egeland, B., & Sroufe, L. A. (1990). Risk and protective factors in the development of psychopathology!Maternal stress and children's development: Prediction of school outcomes and identification of protective factors. *Risk and Protective Factors in the Development of Psychopathology*, 215–235. https://doi.org/10.1017/CBO9780511752872.014

R Core Team (2017). *R: A language and environment for statistical computing*. Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/

Raikes, H. A., & Thompson, R. A. (2006). Family emotional climate, attachment security and young children's emotion knowledge in a high risk sample. *British Journal of Developmental Psychology*, *24*(1), 89–104.

Reiss, F. (2013). Socioeconomic inequalities and mental health problems in children and adolescents: A systematic review. *Social Science & Medicine*, *90*, 24–31. https://doi.org/10.1016/j.socscimed.2013.04.026

Repetti, R. L., Taylor, S. E., & Seeman, T. E. (2002). Risky families: Family social environments and the mental and physical health of offspring. *Psychological Bulletin*, *128*(2), 330–366. https://doi.org/10.1037//0033-2909.128.2.330

Roubinov, D. S., & Boyce, W. T. (2017). Parenting and SES: Relative values or enduring principles? *Current Opinion in Psychology*, *15*, 162–167. https://doi.org/10.1016/j.copsyc.2017.03.001

Smith, C. L. (2010). Multiple determinants of parenting: Predicting individual differences in maternal parenting behavior with toddlers. *Parenting*, *10*(1), 1–17.

Sroufe, L. A. (1979). The coherence of individual development: Early care, attachment, and subsequent developmental issues. *American Psychologist*, *34*(10), 834–841. https://doi.org/10.1037/0003-066X.34.10.834

Steele, H., Steele, M., & Croft, C. (2008). Early attachment predicts emotion recognition at 6 and 11 years old. *Attachment & Human Development*, *10*(4), 379–393. https://doi.org/10.1080/14616730802461409

Tamis-LeMonda, C. S., & Bornstein, M. H. (2002). Maternal responsiveness and early language acquisition. *Advances in Child Development and Behavior*, *29*, 89–127. https://doi.org/10.1016/S0065-2407(02)80052-0

Tarren-Sweeney, M., & Hazell, P. (2006). Mental health of children in foster and kinship care in New South Wales, Australia. *Journal of Paediatrics and Child Health*, *42*(3), 89–97. https://doi.org/10.1111/j.1440-1754.2006.00804.x

Toth, S. L., Rogosch, F. A., Sturge-Apple, M., & Cicchetti, D. (2009). Maternal depression, children's attachment security, and representational development: An organizational perspective. *Child Development*, *80*(1), 192–208. https://doi.org/10.1111/j.1467-8624.2008.01254.x

Trevarthen, C., & Aitken, K. J. (2001). Infant intersubjectivity: Research, theory, and clinical applications. *Journal of Child Psychology and Psychiatry*, *42*(1), 3–48. https://doi.org/10.1111/1469-7610.00701

Vargha, A., Rudas, T., Delaney, H. D., & Maxwell, S. E. (1996). Dichotomization, partial correlation, and conditional independence. *Journal of Educational and Behavioral Statistics*, *21*(3), 264–282. https://doi.org/10.3102/10769986021003264

Vaughn, B. E., & Waters, E. (1990). Attachment behavior at home and in the laboratory: Q-sort observations and strange situation classifications of one-year-olds. *Child Development*, *61*(6), 1965–1973. https://doi.org/10.1111/j.1467-8624.1990.tb03578.x

Waters, E. (1995). Appendix A: The attachment Q-set (version 3.0). *Monographs of the Society for Research in Child Development*, *60*(2-3), 234–246. https://doi.org/10.1111/j.1540-5834.1995.tb00214.x

Zuur, A. F., Ieno, E. N., & Elphick, C. S. (2010). A protocol for data exploration to avoid common statistical problems. *Methods in Ecology and Evolution*, *1*(1), 3–14. https://doi.org/10.1111/j.2041-210X.2009.00001.x

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