

# **A Longitudinal Study of Maternal Depressive Symptoms, Negative Expectations and Perceptions of Child Problems**

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**ABSTRACT:** The aim of this longitudinal study was to examine the associations between maternal depressive symptoms and perceptions of children's problems. One hundred and nineteen mother-child dyads were followed from the third trimester of pregnancy for almost 10 years. Depressive symptoms and background factors of the mothers and the anticipated/perceived problems of their firstborn were assessed prenatally, postnatally, and when the child was 4-5 years and 8-9 years old. The simultaneous and long-term associations between maternal depressive symptoms and child's problems were examined. Maternal prenatal depressive symptoms, the continuity of negative expectations to postnatal problem perceptions, and high problem level at 4-5 years of child's age predicted high problem level in 8-9-year-olds.

**KEY WORDS:** maternal depression; Child Behavior Checklist (CBCL); Edinburgh Postnatal Depression Scale (EPDS); Neonatal Perception Inventory (NPI).

Many studies have shown that children of affectively ill parents do worse than children of parents without psychiatric problems, although many of the children also show resilience.<sup>1</sup> Postnatal depression, in particular, has been the focus of many recent studies

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and the adverse impact of postnatal depression on children is well documented.<sup>2,3</sup> Evidence from follow-up studies of postnatal depression shows long-term cognitive and academic consequences for children, at least under conditions where depression is associated with other risk factors.<sup>4,5</sup>

The harmful impact of maternal depression on a child begins prenatally. Newborn infants born to mothers who were depressed during pregnancy have been found to be less active, have poorer muscle tone, and to be more irritable and irregular in their sleeping rhythm than newborns of healthy mothers.<sup>6</sup> It has been documented that depressed mothers' prenatal norepinephrine and dopamine levels predict the corresponding hormone levels of the newborn and suggested that maternal depression during pregnancy may have an early biochemical influence on neonatal outcome.<sup>7</sup> In our earlier study, the presence of mother's depressive symptoms during pregnancy predicted child's behavioral difficulties at 8–9 years of age.<sup>8</sup> Allen, Lewinsohn and Seeley also reported that maternal (retrospectively recalled) emotional problems during the pregnancy predicted major depression and disruptive behavior disorder of their children in adolescence.<sup>9</sup>

Attachment theory<sup>10</sup> provides a different framework for understanding and explaining the relationship between maternal depression and child development. Mother's postnatal depression may contribute to difficulties in the formation of an affective bond with the infant,<sup>11</sup> and depression during pregnancy may have the same impact, since the birth of attachment in parents occurs during the pregnancy.<sup>12</sup> Mothers have representations of their infants long before conception.<sup>13</sup> Mothers' prenatal representations of their infants are documented to show considerable stability and be associated with infants' attachment classifications at the age of 12 months.<sup>14</sup> Mother's representation of attachment during pregnancy is also predictive of attachment status later<sup>15</sup>, and prenatal attachment predicts early mother–infant interaction.<sup>16</sup> Maternal depression affects many domains of mother–infant interaction and increases the risk for insecure attachment.<sup>17</sup> As insecurity of attachment increases and the attachment pattern becomes less adaptive, the risk of psychopathology increases.<sup>18</sup>

A third possible mechanism of transmission is the mother–child interaction, which is the context in which the mother establishes her perceptions concerning the baby. Mother's emotional impairment affects her perceptions of her child.<sup>19</sup> Mothers who are depressed or stressed have been shown to interact with their children more negatively, with more commands and criticism, which in turn may

elicit further problematic behavior on the part of the children.<sup>20</sup> Depressed mothers stimulate their infants less through talk and play, express more negative feelings toward them and are less sensitive to their cues than non-depressed mothers.<sup>2,21</sup>

It has been shown that objectivity and subjectivity in maternal perceptions are not easily distinguishable, and that maternal reports reflect both mother's and child's well-being.<sup>22</sup> It also has been shown that early perceptions of child's problems tend to have continuity and predict subsequent child socioemotional problems.<sup>23–25</sup>

### Aims

The first aim of this study was to investigate whether maternal depressive symptoms during pregnancy and during the postnatal period affect maternal expectations and perceptions of the baby. We assumed that maternal depressive status is associated with more negative maternal expectations during pregnancy and increased problem perceptions of the child postnatally and later, reflecting maternal negative representations of the child.

The second aim was to examine the issue of continuity and discontinuity in maternal problem perception concerning the child from perinatal stages to 4–5 years and 8–9 years of child's age. The hypothesis was that mother's negative expectations during pregnancy and negative early perceptions concerning the baby would be associated with high level of subsequent problem perceptions.

### Method

#### *Study Design*

This study is a part of a prospective follow-up study that started in Tampere, Finland, in 1989.<sup>26</sup> At the first stage, maternal depressive symptoms in a community sample of healthy first-time mothers were screened by means of questionnaires during late pregnancy (T1) and three times postnatally (T2 = after delivery, T3 = 2 months and T4 = 6 months postnatally). Maternal (prenatal) expectations and (postnatal) perceptions of the baby were assessed at the same time points. Of the postnatal measurements T3 was selected for analysis in this report due to a known incidence peak of postnatal depression at 2–3 months<sup>27</sup> and the first biobehavioral shift in infant development at the same age.<sup>28</sup> At the second and third stages of the follow-up study in 1994–1995 (T5) and in 1997–1998 (T6) maternal depressive symptoms were screened again and maternal reports

of the firstborn's emotional and behavioral status were gathered by means of questionnaires.

### *Sample*

The flow chart of the longitudinal study is shown in Figure 1. The sample was collected from all the maternity health clinics in Tampere, Finland, during a 6-month period in 1989–1990. The original sample of 349 mothers who agreed to participate in the study represented healthy Finnish first-time mothers. Only 10% of the target population declined to participate.

A group of 279 mothers (Sample A) was included in a more intensive study design.<sup>26</sup> Seventy-eight of the 279 mothers dropped out of the study during the first six months after delivery. The largest group of drop-outs (69 mothers) consisted of mothers who did not receive the questionnaires of the first postnatal survey in the obstetrics ward in the hospital during the summer. The drop-out groups at the perinatal stage, particularly the first and largest group of drop-outs, were analyzed carefully using prenatal data. They did not differ significantly from the respondent group by sociodemographic characteristics or by maternal prenatal level of depressive symptoms.<sup>26</sup> A group of 70 mothers (Sample B), who also participated in the study, was not included in the more intensive part of the longitudinal study due to time schedule of Study stage 1, and was also excluded at T5, but included again at T6 (Figure 1).

In Sample A, between T4 and T5 one mother withdrew from the study due to serious illness of the child, and thus at T5 and T6 questionnaires were sent to 200 mothers of the perinatal study stages (the follow-up sample). The questionnaires were completed at T5 by 158 recipients (79%) and at T6 by 142 of the 200 mother–child pairs (71%). Sample A consisted of those mother–child pairs for whom complete mother–child data was available from stages T1, T3, T5 and T6 ( $n = 119$ ), which is 34% of the original sample and 60% of the follow-up sample.

Due to relatively small sample size and the possibility of selective attrition, complementary analyses were also accomplished for the 165 mother–child dyads on whom complete data was available from stages T1, T3, and T6 (Sample A + B). The size of Sample A + B is 47% of the original sample and 61% of the sample of 270 mothers included in the follow-up at T6. Thus, the data from T5 is not included in these supplementary analyses.

To assess the possibility of selective attrition at the later stages, the drop-outs of both Sample A and Sample A + B were compared with respondents with respect to parental educational level, employment, marital status, previous psychiatric problems, health status and maternal prenatal level of depressive symptoms on the basis of data gathered at T1. Drop-outs did not differ statistically significantly from the study samples with respect to any of these background factors. Both Samples A and A + B included more mother–daughter dyads than mother–son dyads: 42% of the children were boys in Sample A and 43% in Sample A + B, whereas 64% were boys in the original sample ( $p = 0.001$ ) and 66% ( $p = 0.001$ ) among the follow-up sample drop-outs. The mothers in Sample A were younger than those among the follow-up sample drop-outs (maternal age below 24 years during the initial data collection 32% in Sample A and 11% among the follow-up

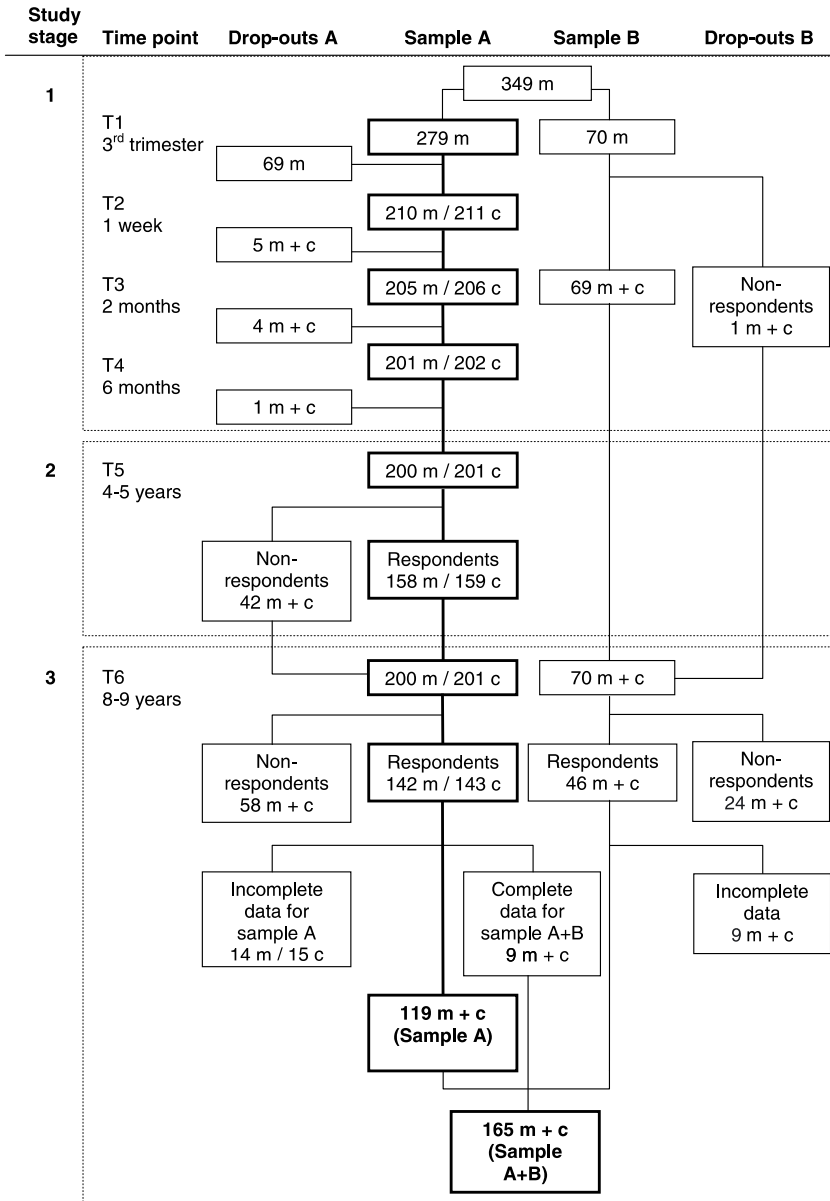


Figure 1. Flow Chart of the Study.

sample drop-outs, 25–29 years 46% vs. 59%, 30 years or older 22% vs. 31% respectively;  $p = 0.002$ ).

### Measures

The depressive symptoms of the mothers at each of the time points were screened using the *Edinburgh Postnatal Depression Scale* (EPDS). The EPDS is a self-report questionnaire originally designed for screening depression among women during the postpartum period, but it has been found also to have satisfactory validity among non-postnatal women.<sup>29,30</sup> When completing the EPDS the mothers are asked to choose from the options those that best describe their feelings during the previous seven days. The scale consists of 10 items scored on a four-step scale from 0 to 3, the sum score of items thus ranging from 0 (no depressive symptoms) to 30 (high level of depressive symptoms). With a cutpoint of 12/13 (also used in the present study), the sensitivity was 64% and specificity 96% for postnatal depression.<sup>26</sup> For non-postnatal major depression, sensitivity of 88% and specificity of 80% have been reported.<sup>30</sup>

The Neonatal Perception Inventory (NPI) is a questionnaire designed for the assessment of the mother's perceptions of her baby.<sup>23</sup> The mother is asked to assess the crying, vomiting, feeding, bowel movements, sleeping, and predictability of the behavior of her own baby (Your Baby) and of an average baby (Average Baby). The six items of both Your Baby and Average Baby sections are scored on a five-step scale from 1 (no concerns) to 5 (very many concerns). The sum score varies between 6 and 30 for both sections. The NPI score is obtained by subtracting the Your Baby sum score from the Average Baby sum score. According to Broussard and Hartner, the NPI score is categorized into better than average (positive) if the mother reports fewer problems in her baby than in an average baby and not better than average (negative), when the mother reports as many or even more problems in her baby compared with an average baby.<sup>23</sup> The proportions of positive and negative NPI scores from time points T1 (pregnancy) and T3 (2 months) are reported. Because the combined predictive ability of successive NPI reports has been reported to be greater than an NPI report at a single time point,<sup>23</sup> a combined measure of NPI reports was also formed by categorizing the NPI reports into those being negative at both time points and those including a positive NPI report at one or both of the time points.

The mothers completed the *Child Behavior Checklist* (CBCL) questionnaires<sup>31</sup> when the children were 4–5 years old (T5) and 8–9 years old (T6). The CBCL is an internationally used instrument designed to record children's competencies and problems as reported by their parents. The CBCL problem scale includes 118 items, each of which is scored on a three-step scale from 0 (item not true) to 2 (item very true or often true). The total problem sum scores were converted into normalized T scores, which were used as child outcome variables at both of the later stages. The cutpoint of 59/60 was used to separate problematic and non-problematic children. Sociodemographic and health data on the mothers was gathered at T1, T5 and T6 by questionnaires designed for this study.

### Statistical Methods

For descriptive purposes frequencies were used. Associations of pairs of categorized variables were examined by cross-tabulations, together with two-tailed Pearson chi square test, or Fisher's exact test, as appropriate. P-values less than 0.05 are interpreted as significant, and p-values less than 0.10 are reported as nearly significant. The simultaneous effects of potential predictors of problems at school age were analyzed by logistic regression. The results of the regression analysis are presented as odds ratios (ORs) and their 95% confidence intervals (95% CIs). The analyses were accomplished with SPSS for Windows version 9.0.

## Results

### Sample Characteristics

All of the mothers were Finnish and represented by sociodemographic characteristics Finnish first-time mothers.<sup>32</sup> The characteristics of the samples are presented in Table 1.

**Table 1**  
Background Characteristics of the Mothers in the Sample A and Sample A + B at 8–9 years of child's age (T6)

	<i>Sample A</i> ( <i>n</i> = 119) (%)	<i>Sample A + B</i> ( <i>n</i> = 165) (%)
Marital status		
Married or cohabiting	91	87
Single	9	13
SES of the family <sup>a</sup>		
Upper	85	84
Lower	15	16
Gender of the child		
Girl	58	57
Boy	42	43
Age of the mother		
34 or younger	48	47
35 or older	52	53

<sup>a</sup>Socioeconomic status (SES) of the family was determined by the occupation of the main breadwinner; for single mothers' families the SES of the family was determined by the occupation of the mother. The upper category consisted of white collar workers and entrepreneurs, the lower category of blue collar workers, students and others.

### *Maternal Depressive Screening Status and Child Problems*

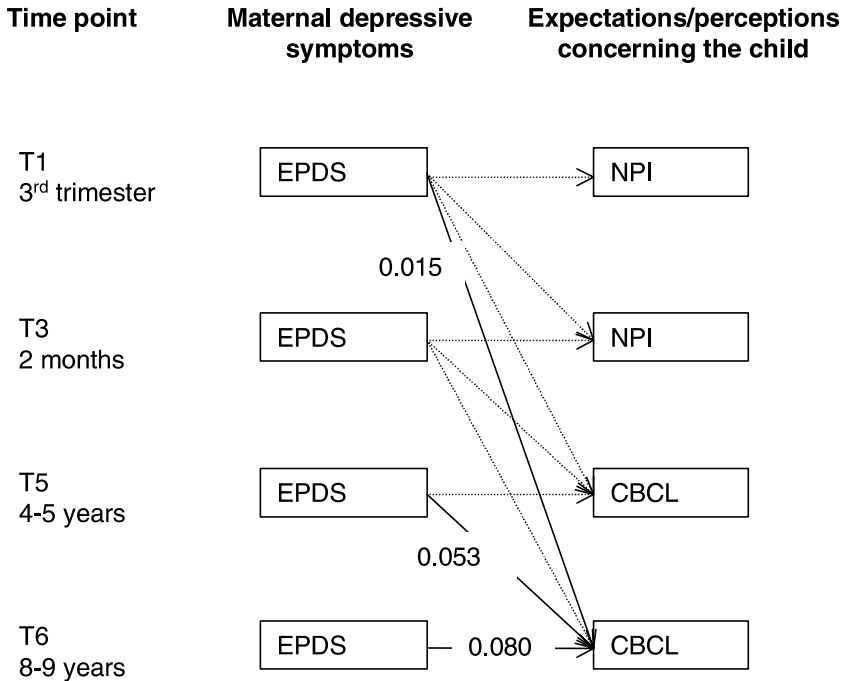
In Sample A, 9% of the mothers had significant depressive symptoms prenatally, 6% postnatally, 8% at 4–5 years and 6% at the latest stage. In Sample A + B the respective percentages were 12% prenatally, 9% postnatally, and 6% at the latest stage.

In Sample A, 42% of the babies had negative NPI report at T1 and 23% at T3. Twenty-one percent of children had high problem level according to the CBCL at T5 and 16% at T6. The associations tested, along with their p-values between mother's depressive status at different time points and her expectations of the baby and perceptions of the child are shown in Figure 2. Maternal concurrent depressive symptoms were not statistically significantly associated with negative expectations of the baby or negative perceptions of the child. However, at school-age (T6) the simultaneous association was nearly significant. The association between maternal prenatal depressive symptoms and child problems at T6 was statistically significant. The association between maternal depressive symptoms at T5 and high level of child problems at T6 was nearly significant (Figure 2).

In Sample A+B the proportions of negative NPI reports were 41% at T1 and 25% at T3. The percentage of children with high scores in the CBCL at T6 was 16% as in Sample A. None of the associations between maternal concurrent depressive symptom level and the level of problem perception was statistically significant even though at T6 the difference in percentages of high scoring children between the groups seemed high (15% vs. 33%,  $p = 0.166$ ). Maternal prenatal depressive symptoms were associated with high scores in the CBCL at T6 ( $p = 0.004$ ).

### *Continuity and Discontinuity of Problem Perceptions*

The frequencies of high scores in the CBCL reports and their associations with positive and negative NPI groups are presented in Table 2. In Sample A, although there was a tendency towards higher levels of problem perceptions at T5 among the high-scorers in the NPI, none of the associations was statistically significant at  $p < 0.05$  level. If the NPI remained negative at both time points, T1 and T3, the risk of high problem level at T6 was statistically significantly higher compared to children with positive NPI report at either or both time points (Table 2). The presence of high problem level at T5 was significantly associated with high problem level at T6 as well.



EPDS = Edinburgh Postnatal Depression Scale  
 Low vs. high score, cutoff 12/13

NPI = Neonatal Perception Inventory  
 Positive vs. negative

CBCL = Child Behavior Checklist, Total Problems  
 Low vs. high score, cutoff T 59/60

**Figure 2.** Associations Between the Presence of Maternal Depressive Symptoms and the Level of Child Problems at Successive Time Points. The Non-significant Associations ( $p \geq 0.1$ ) are Presented as Broken Lines.

In Sample A + B, negative NPI report at T1 was also statistically almost significantly associated with a high score in the CBCL at T6 (Table 2).

**Table 2**

Maternal expectations and perceptions in the NPI (T1 = third trimester of pregnancy, T3 = two months postnatally) and the frequencies (%) of high problem reports according to the CBCL at 4–5 years (T5) and at 8–9 years (T6)

<i>Maternal Perceptions</i>	<i>High CBCL Total Problems</i>					
	<i>Sample A at T5</i> ( <i>n</i> = 117 <sup>a</sup> )		<i>Sample A at T6</i> ( <i>n</i> = 119)		<i>Sample A + B at T6</i> ( <i>n</i> = 165)	
	<i>%</i>	<i>p</i>	<i>%</i>	<i>p</i>	<i>%</i>	<i>p</i>
T1 (NPI)		0.353		0.202		0.052
Positive	18		12		11	
Negative	27		22		24	
T3 (NPI)		0.291		0.371		0.174
Positive	19		14		14	
Negative	31		22		24	
Combined		0.175		<b>0.047</b>		<b>0.018</b>
Perceptions T1 and T3 (NPI)						
Positive at T1 and/or at T3	19		13		14	
Negative at both T1 and T3	36		36		37	
T5 (CBCL Total problems)				<b>0.029</b>		
Low			12			
High			32			

<sup>a</sup>*n* at T5 is lower due to missing data in the CBCL.

### *Factors Predicting Behavioral/Emotional Problems at 8–9 Years of Age*

Factors associated significantly ( $p < 0.05$ ) or nearly significantly ( $p < 0.10$ ) with high problem level at T6 according to previous analyses (negative NPI at both time points, T1 and T3, maternal depressive symptoms at T1, T5 and T6, and high CBCL problem level at T5) were included in a logistic regression analysis together with child's gender, maternal age, marital status and family socio-economic status (presented in Table 2). In Sample A, high problem level in the CBCL at T6 was predicted by prenatal maternal depressive symptoms (OR 6.3, 95% CI 1.6–25.1), high CBCL problem level at T5 (OR 3.2, 95% CI 1.0–9.7) and negative NPI reports both pre- and postnatally (OR 3.6, 95% CI 1.0–13.3).

When the analysis was repeated in Sample A + B (data from T5 and maternal depressive symptoms at T6 excluded; persistence of negative NPI reports from T1 to T3, maternal depressive symptoms and negative NPI report at T1 as well as background factors included), the factors remaining in the model were prenatal maternal depressive symptoms (OR 5.4, 95% CI 1.9–15.7) and negative NPI reports both pre- and postnatally (OR 4.2, 95% CI 1.4–12.4).

## Discussion

The main objective in this study was to concentrate particularly on mother's perceptions of her child, and the associations between perceptions and depressive symptoms over time. In the light of these results, the relationships between mother's depressive symptoms and the perceptions of problems in her child are variable over time. Long-term associations and continuities in problem perceptions are discernible.

The lack of simultaneous associations between maternal depressive symptoms and child problems at prenatal and postnatal stages was unexpected. At the later stages the finding may be due to the small sample size: the number of mothers with significant depressive symptoms was small and therefore statistical significance was not reached, although the perceptions of the symptomatic mothers were somewhat more negative than those of non-symptomatic mothers. However, prenatally and postnatally the percentages of negative NPI reports were essentially the same among mothers with and without depressive symptoms, and not even a trend towards greater percentages of negative reports among the children of mothers with depressive symptoms was detected. This suggests that the negativity of the early expectations and perceptions, at least when measured by the NPI, is a separate phenomenon from maternal depressive symptomatology. Early maternal expectations and perceptions seem to have an independent role in the occurrence of subsequent problem perceptions.

The findings may be understandable from the perspective of developmental psychopathology. It may be that the effect of maternal depression on a child cannot be seen simultaneously at the early stage but later when a child with lowered adaptive capacity is facing cumulative risk factors during development. According to the same theoretical background it is possible to explain why the prenatal depressive symptomatology of the mother predicted child problems years later.

The persistence of negativity from prenatal to postnatal stage predicted child's high problem level at the age of 8–9 years, suggesting that an early negative trajectory of perceptions has continuity over the following years. The continuity of certain aspects in maternal perceptions has earlier been reported in other studies than those of Broussard and Hartner,<sup>23</sup> Bates, Freeland and Lunsbury have reported a significant correlation between high NPI scores at 1 month and fussy-difficult temperamental rating in the Infant Characteristic Questionnaire at 4–6 months of age.<sup>33</sup> It has also been suggested that parents may shape their child's developing temperament according to their perceptions.<sup>34</sup>

Mother's perceptions and the child's actual characteristics are both important for child development. Mother's negative expectations during pregnancy may have been based at least in some cases on actual difficulties during the pregnancy (problems in fetal growth, for example). In these cases the negative expectations during pregnancy and negative perceptions at two months may both have a common foundation: the actual developmental problems of the child apart from difficulties of the mother or in the interaction. These child characteristics may have the persistence, which is seen in the maternal reports.

The findings should be interpreted with caution because the sample size was relatively small and the proportion of drop-outs was considerable, when the number of mother–child dyads included in the follow-up is considered. However, the proportion of respondents and the attrition rate are comparable with other longitudinal studies with follow-up time as long as in this study.<sup>4</sup> The main findings were similar for both samples analyzed in the present study, which supports the stability and generalizability of the results. The background characteristics of the follow-up group likewise did not differ significantly from the drop-out group, except for child gender and maternal age.

The fact that more mother–son dyads dropped out of the study may be due to boys on average having more behavioral problems compared with girls.<sup>35</sup> Mothers having trouble with their child may have been less willing to participate because of child problems or other reasons associated with the situation. Non-responding mothers may also have had more concurrent depressive symptoms, although this issue could not be measured on the basis of data available. If the drop-out groups included more problematic children and symptomatic mothers, their participation in the study would probably have strengthened the association between simultaneous maternal depressive symptoms and problem perceptions concerning the child.

The problems emerging through categorization should be mentioned. The dichotomization of mothers into low- and high-scorers by a cutpoint in the screening questionnaire limits the consideration of dimensionality in depression. Green<sup>36</sup> argues that valuable data is wasted by dichotomizing and suggests that the EPDS could be used as a continuous measure of mothers' emotional well-being pre- and postnatally. The majority of mothers span a continuum of depressive symptoms, and depressive symptom levels below the (rather high) cutpoint in EPDS may not be insignificant for a child. For practical purposes, however, the established cutpoint was used in this study and the issue of dimensionality must be returned to.

The number of mothers scoring high in the EPDS was somewhat lower compared, for example, with the results of a recent cohort study conducted in the UK, reporting 13.5% of mothers scoring high on the EPDS at 32 weeks of pregnancy and 9.1% at 8 weeks postpartum.<sup>37</sup> These lower proportions among the respondents in this study, however, are not likely to be due to selective attrition of depressed mothers during the follow-up, since the proportions of high-scoring mothers among the respondents of the follow-up did not differ from the proportions in the whole sample at the first study stage.<sup>26</sup> The lower proportion of high-scorers may be due to cultural factors: an international study exploring levels of postpartum depressive symptoms showed considerable variation in EPDS scores between countries, with lowest mean scores in Sweden, Australia and Finland.<sup>38</sup> Low scores in Finland may be due to the well-functioning social welfare and health service system (nearly all mothers attending maternity care and well-baby clinics), and a relatively good standard of living in a community with fairly homogeneous ethnic and social structure.

It could be argued that one limitation is the use of questionnaires to define "caseness": clinical interviews and observations made for smaller subsamples of mothers and children were not considered in this report. On the other hand, Hammen, Adrian, Gordon, Burge, Jaenicke & Hiroto<sup>39</sup> demonstrated that, compared with a mother's diagnosed affective disorder, self-reported depressive symptoms of mothers were related to a greater extent to children's difficulties (reported not only by mothers but also by teachers), and concluded that the relations between maternal psychiatric status and child disorder are a complex issue.

Many studies have examined the possible negative distortion of mother's perceptions due to depression. The results have been contradictory,<sup>40</sup> showing depression-related distortion of perception,<sup>19,41</sup> or increased accuracy,<sup>42</sup> or mixed results reporting bias being present

for boys but not girls,<sup>43</sup> and being significant but not accounting for the majority of variance.<sup>44</sup> Probably both arguments are true: depressed mothers tend to see their children more negatively and their children tend to have more problems. Maternal bias or the objective validity of maternal reports, however, was not the question to be addressed in the present study. We focused specifically on the relation between a mother's perceptions of her child and symptoms of depression experienced by mothers, and their relations over time.

The measures of child problems used in the present study are also measures of maternal problem perception, not diagnostic instruments. Furthermore, it should be emphasized that no "gold standard" exists to determine whether there are "real" or "objective" problems in the child or not. The problem reports of any informants may be biased,<sup>40,45</sup> and not all child problems really present at home are detected at school or in clinical interviews or observations. The context- and relationship-specificity of children's symptoms has long been acknowledged.<sup>46</sup> Generally, in both clinical and research settings the mother is still the primary source of information concerning infants and young children, and is usually the person who knows her child best.

### Summary

The results of this study suggest that the harmful impact of maternal depression on a child begins during the pregnancy. The relative importance of the prenatal period highlights the significance of the early interplay between biology and psychology, which forms the basis of attachment and later interaction. Professionals in maternal and child health care should pay particular attention to the persistence of maternal negativity concerning the baby from pregnancy to the postnatal period because this is a risk factor for the continuity of problem perceptions.

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