

# A Longitudinal Study of Maternal Depression and Child Maltreatment in a National Sample of Families Investigated by Child Protective Services

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**Objective:** To assess whether a change in depression predicts a mother's change in maltreatment.

**Design:** Observational, repeated measures study.

**Setting:** National Survey of Child and Adolescent Well-being, 1999 to 2004.

**Participants:** Mothers who retained custody of a child aged 0 to 15 years following a maltreatment investigation and completed at least 2 of 3 surveys (n=2386).

**Main Exposure:** Change in depression status between baseline and 18- and 36-month follow-ups, assessed with the Composite International Diagnostic Interview Short Form.

**Main Outcome Measures:** Change in psychological aggression, physical assault, and neglect between baseline and 18- and 36-month follow-ups, assessed with the Conflict Tactics Scale Parent-Child version.

**Results:** One-third (35.5%) of mothers experienced onset or remission of depression. Onset of depression was associated with an increase of 2.3 (95% confidence interval, 0.2-4.4) psychologically aggressive acts in an average 12-month period, but was not statistically significantly associated with change in physical assault or neglect.

**Conclusion:** Depression is positively associated with maternal perpetration of psychological aggression in high-risk families.

*Arch Pediatr Adolesc Med.* 2009;163(10):922-930

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**A**S EVIDENCE ACCUMULATES on the short- and long-term consequences of child maltreatment, pressure to identify effective prevention strategies mounts. Emotional, social, and behavioral problems are among the short-term manifestations of child maltreatment,<sup>1-6</sup> while psychiatric disorder,<sup>7-11</sup> irritable bowel syndrome, chronic pain disorders, obesity, diabetes, heart disease, and cancer are among the long-term correlates of neglect and abuse.<sup>12-14</sup> Child maltreatment affects many children. In 2006, 3.3 million referrals regarding approximately 6.0 million children were made to child protective service agencies in the United States.<sup>15</sup> Unfortunately, few interventions have proven successful in reducing the incidence of maltreatment, especially among high-risk families.<sup>16-19</sup>

Depression is common, particularly among women, and is associated with a 2- to 3-fold increased risk of perpetrating physical abuse, psychological aggres-

sion, and medical neglect.<sup>20-22</sup> At least 8% of US children live with a parent who is currently depressed.<sup>23</sup> Depression is even more prevalent (23%) among custodial caregivers investigated for child maltreatment.<sup>24</sup> Although an association between emotional distress and poor parenting has been documented in several observational studies,<sup>20-22,25-34</sup> it remains unclear whether maternal depression is causally related to child maltreatment.

Most maltreatment research has relied on cross-sectional comparisons between depressed and nondepressed mothers of young children.<sup>21,25-27,34</sup> Even studies that collected temporally sequenced data relied on single measures of depression, maltreatment, and potential confounders.<sup>20,29</sup> Such studies are vulnerable to bias due to confounding.<sup>35</sup> Maternal depression is associated with many other risks (eg, substance abuse, limited social support, financial strain)<sup>36-41</sup> that are correlated with poor parenting—risks that could create a spurious association between depression and maltreatment. Women who

were maltreated as children are more likely to be depressed in adulthood<sup>8-10</sup> and to maltreat their own children.<sup>28,38</sup> Intimate partner victimization, child behavior problems, and maternal depression frequently co-occur,<sup>40-42</sup> and each may increase the risk of maltreatment. Spurious associations will arise if depressed and nondepressed mothers differ on correlated risks that are not well controlled in statistical models.

In this study, we make use of longitudinal data collected from a nationally representative sample of families investigated for maltreatment to examine whether change in depression status predicts change in maltreatment. By examining whether a mother's behavior differs in the presence and absence of depression, we come closer to approximating the counterfactual condition<sup>43</sup> and reduce bias due to confounding.<sup>35</sup> We use the fixed effects regression approach articulated by Paul Allison.<sup>44</sup> Bias due to temporally stable differences between depressed and nondepressed mothers (eg, childhood victimization) is effectively controlled using fixed effects regression.<sup>44</sup> A correlate that does not change over time cannot cause change in maltreating behavior. Bias associated with correlates that do change within mothers over time, which could serve as alternative explanations for change in maltreatment, is reduced by modeling repeated measures of potential confounders.

Understanding the causal nature of the association between maternal depression and child maltreatment is important because scarce public resources must be wisely invested to reduce maltreatment. Effective interventions such as the Nurse Home Visiting Program<sup>45,46</sup> and Parent-Child Interaction Therapy<sup>47</sup> require significant public resources and/or high levels of parental motivation. Thus, cost and effort pose significant challenges to implementing such interventions on a broad scale.<sup>19</sup> In contrast, depression is highly responsive to treatment<sup>48</sup> and can be addressed with less parental effort in the existing health system.

## METHODS

### STUDY DESIGN AND POPULATION

A longitudinal study using observational data collected for the National Survey of Child and Adolescent Well-being (NSCAW) was conceived to investigate whether change in maternal depression status predicts change in maltreating behavior. We hypothesized that depression would be positively associated with psychological aggression, physical assault, and child neglect. A representative sample of families ( $n=5501$ ) involved in maltreatment investigations completed by 92 child welfare agencies in 36 states was obtained.<sup>49</sup> Participation in the NSCAW was 64.2%. Caregivers completed baseline surveys 2 to 6 months after the investigation closed in 1999 or 2000 and at 18 and 36 months. Interviews were conducted in the home by trained research staff.<sup>50</sup> Details of the NSCAW are reported elsewhere.<sup>49</sup> Approval to conduct secondary analysis of the NSCAW was granted by the Human Subjects Committee at the Harvard School of Public Health.

Permanent caregivers who participated in at least 2 of 3 waves of data collection were eligible for the current study. Custody for at least 12 months prior to NSCAW enrollment was an additional criterion for caregivers of children older than 1 year.

These inclusion criteria were necessary to evaluate the change in 12-month maltreating behavior of the same caregiver over time. Despite a truncated reporting period for caregivers of children younger than 1 year at baseline, we opted to include these families in the study because rates of reported maltreatment are the highest for this age group.<sup>15</sup> Men were excluded because they may experience depression differently from women<sup>51,52</sup> and were too few in number to analyze separately. Thus, the final sample was restricted to women, most of whom were mothers.

## MEASURES

### Depression

The Composite International Diagnostic Interview Short-Form (CIDI-SF) scale<sup>53</sup> was used to measure the 12-month incidence of a major depressive episode according to American Psychiatric Association diagnostic criteria.<sup>54</sup> Mothers who endorsed 3 or more of 7 possible symptoms of a major depressive episode were classified as depressed.<sup>55</sup> Psychometric research indicates good test-retest and interrater reliability and acceptable diagnostic validity of the CIDI long-form scale.<sup>56,57</sup> The CIDI-SF diagnostic classifications are highly concordant with those obtained via the longer measure.<sup>53</sup>

### Maltreatment

Twelve-month psychological aggression, physical assault, and neglect were assessed on separate Conflict Tactics Scale Parent-Child version measures.<sup>58</sup> Five threatening (eg, to hit or send the child away) and emotionally injurious (eg, calling the child dumb) behaviors were included on the psychological aggression subscale. The 13-item physical assault subscale included items such as shaking, hitting, and beating. Four forms of neglect, lack of supervision, and emotional, medical, and physical neglect were captured on the neglect index. Item responses for the 12-month incidence of each behavior (never, once, twice, 3 to 5, 6 to 10, 11 to 20, or more than 20 times) were assigned the values of 0, 1, 2, 4, 8, 15, and 25, respectively, and summed for each measure. Scores were treated continuously. Internal consistency reliability in this sample was adequate for the psychological aggression scale and poor<sup>59</sup> for the physical assault and neglect measures (baseline Cronbach  $\alpha$  coefficients were .65, .50, and .32, respectively). Evidence in support of the construct validity of each Conflict Tactics Scale Parent-Child version measure has been produced in several samples.<sup>58,60,61</sup>

### Covariates

Symptoms of substance dependence were measured with the CIDI-SF alcohol and drug dependence scales,<sup>53</sup> summed, and treated continuously. The presence of a live-in intimate partner was treated as a binary variable (yes/no) and the number of children in the household (1 through 5 or more) was treated continuously. Employment status was assessed at baseline and at 36 months and treated as an ordinal variable (unemployed, part-time employment, full-time employment).

Economic status was operationalized as the income to needs ratio according to US census criteria<sup>62</sup> and treated continuously. Annual family income was collected in \$5000 intervals, beginning with less than \$5000/y through more than \$50 000/y. Income was recoded to the midpoint for each category, except for the highest. The highest income group was recoded to the size-adjusted median family income or, in a few

**Table 1. Baseline Characteristics of Custodial Mothers, Their Children Aged 0 to 15 Years, and the Index Maltreatment Event**

Characteristic	No. (%) (n=2386) <sup>a,b</sup>
<b>Mother</b>	
Age, y	
15-25	741 (23.9)
26-35	1022 (46.7)
36-45	532 (25.9)
46-55	90 (3.5)
Relation to child	
Biological mother	2293 (96.8)
Relative	38 (1.4)
Adoptive or step mother	55 (1.7)
Race/ethnicity	
White, not Hispanic	1222 (49.3)
Black, not Hispanic	639 (26.8)
Hispanic	374 (17.1)
American Indian, Asian, Pacific Islander, Native Hawaiian, and self-defined other	149 (6.8)
Place of birth	
United States	2174 (90.0)
Outside of the United States	212 (10.0)
Education	
<High school	782 (30.8)
High school or graduate equivalency degree	1090 (46.1)
>High school	508 (23.1)
Prior maltreatment report	
Yes	984 (47.1)
No	1201 (52.9)
Child previously removed from custody	
Yes	313 (9.2)
No	2072 (90.8)

(continued)

instances, to the overall median family income so that every income was more than \$50 000/y.<sup>63</sup> Recoded family income was divided by size-adjusted poverty thresholds<sup>64</sup> to obtain an income to needs ratio for each measurement occasion (2000, 2001-2002, and 2003).

Twelve-month exposure to physical intimate partner violence (IPV) was measured with the 9-item version of the Conflict Tactics Scale.<sup>65</sup> The Conflict Tactics Scale was scored like the Conflict Tactics Scale Parent-Child version and then coded as an ordinal variable (none, minor, and severe violence). When children were younger than 2 years, child behavior problems were assessed with difficult temperament scales developed for the National Longitudinal Survey of Youth.<sup>66</sup> Mothers completed the aggressive and delinquent or destructive behavior scales from the Child Behavior Checklist for children aged 2 to 3 and 4 to 18 years.<sup>67,68</sup> Raw composite scores for child behavior problems were converted to z scores. This allowed for consistent interpretation of within-child change across instruments, despite differences in the composition and length of each instrument.

### STATISTICAL ANALYSIS

Analyses were conducted in SAS 9.2<sup>69</sup> (SAS Inc, Cary, North Carolina) using survey procedures. Sampling weights were used to address unequal probabilities of selection and participation. Taylor expansion method variance estimates accounted for the stratified and clustered survey design as well as the clustering of repeated observations within individuals.<sup>70,71</sup> Data were analyzed according to the fixed-effects approach.<sup>44</sup>

**Table 1. Baseline Characteristics of Custodial Mothers, Their Children Aged 0 to 15 Years, and the Index Maltreatment Event (continued)**

Characteristic	No. (%) (n=2386) <sup>a,b</sup>
<b>Child</b>	
Age, y	
0-1	700 (12.9)
2-3	275 (12.9)
4-5	250 (12.4)
6-10	662 (36.6)
11-15	499 (25.3)
Sex	
Female	1213 (50.1)
Male	1173 (49.9)
<b>Index maltreatment event</b>	
Type of alleged maltreatment <sup>c</sup>	
Physical abuse	693 (32.7)
Sexual abuse	319 (11.2)
Emotional abuse	225 (10.7)
Physical neglect	621 (24.1)
No supervision	843 (36.9)
Other <sup>d</sup>	224 (7.7)
Types of alleged maltreatment, No.	
1	599 (73.9)
2	523 (21.8)
≥3	88 (4.3)
Substantiated, indicated medium/high risk <sup>e</sup>	
Yes	1201 (30.8)
No	1017 (69.2)

Abbreviation: NSCAW, National Survey of Child and Adolescent Well-Being.

<sup>a</sup>Number of participants may not total 2386 per variable owing to missing data.

<sup>b</sup>Weighted proportions.

<sup>c</sup>The total exceeds 100% because some children were alleged to have experienced multiple forms of maltreatment.

<sup>d</sup>Includes sale of a minor's time or behavior, moral, legal, or educational neglect, and abandonment.

<sup>e</sup>Substantiated (founded) or indicated (likely) according to state law or policy<sup>15</sup> by a state child welfare agency or deemed medium- or high-risk by agencies that do not classify reports or investigations as substantiated.

Fixed-effects analyses estimate a fixed effect for every person in the data set and reduce bias in the estimate of an association between an exposure and an outcome by controlling for temporally stable (time-invariant) characteristics, both measured and unmeasured.<sup>44</sup> Time-varying covariates were subject mean-centered so that associations between covariates and maltreatment outcomes were within-person estimates. Regression coefficients are appropriately interpreted as average within-mother associations between change in a covariate and change in an outcome. Mothers who were missing data for time-varying covariates or outcomes were excluded from the study sample. All tests of statistical significance were 2-tailed and relied on an  $\alpha$  of .05.

Although time-varying covariates were correlated, correlation coefficients were smaller than 0.50, indicating that multicollinearity did not substantially affect our ability to examine relationships between depression and maltreatment.<sup>72</sup> The linear regression assumption of normality of the residuals was reasonably met. Sensitivity analyses (not shown) comparing estimates from models with and without children younger than 1 year indicate that including children younger than 1 year in our sample, despite a truncated baseline maltreatment reporting period, did not appreciably alter our results.

**Table 2. Maternal Depression, Maltreating Behavior, and Other Time-Varying Characteristics by Wave in the NSCAW**

Characteristic	Summary Statistic, % <sup>a</sup>		
	Baseline (n=2386)	18 mo (n=2190)	36 mo (n=2099)
Depression			
Yes	28.3	24.6	26.8
No	71.2	75.5	73.2
Mean, wk	12.3	12.1	13.7
Mean psychological aggression	18.8	17.7	17.1
Mean physical assault	8.0	6.6	6.0
Mean neglect	3.4	2.3	3.0
Mean alcohol and/or drug dependency symptoms	0.3	0.2	0.3
Employment status <sup>b</sup>			
Not employed	41.7	NA	43.8
Part time	16.4	NA	13.1
Full time	48.9	NA	43.0
Mean	1.2	1.2	1.2
Income to poverty ratio			
<100	58.3	54.7	51.4
100-200	25.0	30.3	34.5
>200	16.7	15.1	14.0
Live-in intimate partner			
Yes	43.6	47.5	50.2
No	56.4	52.5	49.8
Children in household			
1	23.3	22.7	20.8
2	29.7	27.7	29.7
3	22.2	24.7	23.3
4	14.6	15.6	15.5
>5	10.2	9.4	10.8
Mean	2.6	2.6	2.7
Mean child behavior problems	-0.1	-0.1	0.0
Intimate partner violence <sup>c</sup>			
None	68.7	78.0	84.4
Minor assault	13.2	11.4	8.0
Severe assault	18.1	10.6	7.6

Abbreviations: NA, not available; NSCAW, National Survey of Child and Adolescent Well-Being.

<sup>a</sup>Weighted percentages or means.

<sup>b</sup>Employment status was not measured at 18 months.

<sup>c</sup>Minor physical assault entails at least 1 experience of being thrown, pushed, shoved, grabbed, or slapped in the past year; severe physical assault, at least 1 experience of being kicked, bit, hit with a fist or an object, beaten, choked, threatened or attacked with a weapon in the past year.

## RESULTS

A total of 2683 mothers who retained custody of a child aged 0 to 15 years following a maltreatment investigation, were custodians for at least 1 year prior to NSCAW participation, or were parents of a child younger than 1 year and completed at least 2 surveys were eligible for the current study. Most (90.4%; n=2386) provided complete data for the variables used in this study and thus were included in our sample. Follow-up was 92.4% at 18 months and 89.3% at 36 months.

Our sample was diverse by maternal age, race/ethnicity, and educational attainment, as well as child age and sex (**Table 1**). Neglect was the most frequent form of alleged maltreatment at the event that determined study eligibility. Allegations of physical neglect and/or inadequate supervision were made on behalf of 54.2% of children. Physical abuse was alleged regarding one-third (32.7%) of the sample, while emotional abuse was alleged on behalf of 10.7% of children.

Approximately one-fourth of mothers met symptom criteria for a depressive episode per wave of data collection (**Table 2**). Episodes lasted an average of 12 to 14 weeks. Approximately one-third (35.5%) of mothers experienced onset or remission of depression during the 36-month study; 15.2% experienced depression onset, 12.9% experienced the remission of an episode, and 7.4% experienced both onset and remission. At baseline, mothers reported an average of 18.8 psychologically aggressive acts, 8.0 acts of physical assault, and 3.4 neglectful acts during the prior 12 months. The average number of reported acts of psychological aggression and physical assault declined over time.

Fixed-effects regression results (**Table 3**) indicate that change in depression status was associated with an average change of 3.10 (95% CI, 0.86-5.35) psychologically aggressive acts within a 12-month period (model 1). This association was slightly attenuated (models 2-5) on introduction of controls for household composition, family socioeconomic status, and intimate partner vio-

**Table 3. Fixed-Effects Linear Regression Models of the Relationship Between Changes in Maternal Depression and Maltreating Behavior**

Characteristic	$\beta$ (95% CI) <sup>a</sup>		
	Model 1	Model 2	Model 3
<b>Psychological aggression</b>			
Depression	3.10 <sup>b</sup> (0.86 to 5.35)	2.99 <sup>c</sup> (0.66 to 5.31)	3.02 <sup>c</sup> (0.68 to 5.35)
Alcohol and/or drug dependency symptoms	...	0.49 (-0.87 to 1.85)	0.46 (-0.87 to 1.80)
Live-in intimate partner	...	...	-3.27 <sup>b</sup> (-5.46 to -1.08)
Children in household, No.	...	...	-0.26 (-1.20 to 0.67)
Employment	...	...	...
Poverty ratio	...	...	...
Intimate partner violence	...	...	...
Child problem behavior	...	...	...
<b>Physical assault<sup>a</sup></b>			
Depression	1.29 (-0.01 to 2.59)	1.23 (-0.08 to 2.54)	1.23 (-0.08 to 2.54)
Alcohol and/or drug dependency symptoms	...	0.23 (-0.19 to 0.64)	0.22 (-0.19 to 0.63)
Live-in intimate partner	...	...	-0.75 (-1.83 to 0.33)
Children in household, No.	...	...	-0.08 (-0.57 to 0.40)
Employment	...	...	...
Poverty ratio	...	...	...
Intimate partner violence	...	...	...
Child problem behavior	...	...	...
<b>Neglect<sup>a</sup></b>			
Depression	1.35 <sup>c</sup> (0.02 to 2.69)	1.25 (-0.13 to 2.63)	1.23 (-0.14 to 2.61)
Alcohol and/or drug dependency symptoms	...	0.36 (-0.18 to 0.91)	0.36 (-0.17 to 0.89)
Live-in intimate partner	...	...	-0.003 (-1.34 to 1.33)
Child in household, No.	...	...	-0.01 (-0.60 to 0.59)
Employment	...	...	...
Poverty ratio	...	...	...
Intimate partner violence	...	...	...
Child problem behavior	...	...	...

(continued)

lence. The introduction of child behavior problems in model 6 resulted in a noticeable reduction in the magnitude of the depression regression coefficient, although the association between maternal depression and psychological aggression ( $\beta = 2.28$ ; 95% CI, 0.17-4.38) remained statistically significant. Results from bivariate analyses (not shown) indicate that relations between maternal depression and psychological aggression held in both directions. Mothers who reported onset of depression reported an increase in psychological aggression, while those who experienced remission of a depressive episode reported a reduction in psychological aggression.

Change in depression was not statistically significantly associated with change in physical assault in the unadjusted model (model 1), nor after subsequent adjustment for time-varying covariates (models 2-6). Change in depression was statistically significantly associated with change in neglect in an unadjusted model (model 1); however, this association was attenuated after adjusting for symptoms of alcohol and drug dependence (model 2). Other significant findings are described below.

Change in employment status (none to part-time, part-time to full-time), assessed at baseline and the 36-month follow-up, predicted a decrease of 1.19 (95% CI, -2.29 to -0.08) acts of psychological aggression, while the addition of an intimate partner to the household was associated with 2.40 (95% CI, -4.50 to -0.30) fewer acts of psychological aggression, adjusting for depression and

all other time-varying covariates (model 6). Increased exposure in level (none to minor, minor to severe) of physical intimate partner victimization predicted an average increase of 1.49 (95% CI, 0.66-2.31) acts of physical assault and 0.98 (95% CI, 0.02-1.95) neglectful acts per 12-month period. An increase in child behavior problems was associated with increases in both psychological aggression (4.42 acts; 95% CI, 3.24-5.59) and physical assault (1.79 acts; 95% CI, 0.96-2.61).

#### COMMENT

This study assessed the contribution of maternal depression to the perpetration of 3 types of child maltreatment in a nationally representative sample of families investigated for maltreatment. Our findings suggest that depression is a causal determinant of psychological aggression in high-risk mothers of children aged 0 through 15 years, but not of physical assault or neglect. These findings are partially consistent with published research.

Studies have documented an association between parental depression and psychological aggression in both a general household sample<sup>73</sup> and in higher-risk samples.<sup>22,28</sup> Several studies describe a relationship between maternal depression and physical abuse<sup>20</sup> including spanking,<sup>73</sup> harsh parenting,<sup>28</sup> and the perpetration of any severe physical assault in a period of 12 months.<sup>22,27</sup> Less research has been conducted on determinants of ne-

**Table 3. Fixed-Effects Linear Regression Models of the Relationship Between Changes in Maternal Depression and Maltreating Behavior (continued)**

Characteristic	$\beta$ (95% CI) <sup>a</sup>		
	Model 4	Model 5	Model 6
<b>Psychological aggression</b>			
Depression	3.04 <sup>b</sup> (0.76 to 5.32)	3.08 <sup>c</sup> (0.70 to 5.45)	2.28 <sup>c</sup> (0.17 to 4.38)
Alcohol and/or drug dependency symptoms	0.22 (-1.11 to 1.56)	0.21 (-1.11 to 1.54)	0.17 (-1.25 to 1.59)
Live-in intimate partner	-2.75 <sup>b</sup> (-4.78 to -0.72)	-2.80 <sup>c</sup> (-4.94 to -0.67)	-2.40 <sup>c</sup> (-4.50 to -0.30)
Children in household, No.	-0.43 (-1.44 to 0.58)	-0.40 (-1.39 to 0.59)	-0.40 (-1.42 to 0.63)
Employment	-1.53 <sup>b</sup> (-2.60 to -0.47)	-1.58 <sup>b</sup> (-2.64 to -0.51)	-1.19 <sup>c</sup> (-2.29 to -0.08)
Poverty ratio	-1.27 (-2.68 to 0.13)	-1.28 (-2.67 to 0.11)	-1.00 (-2.42 to 0.42)
Intimate partner violence	...	-0.06 (-1.51 to 1.39)	-0.10 (-1.67 to 1.50)
Child problem behavior	...	...	4.42 <sup>b</sup> (3.24 to 5.59)
<b>Physical assault<sup>a</sup></b>			
Depression	1.16 (-0.14 to 2.47)	0.97 (-0.35 to 2.30)	0.53 (-0.73 to 1.79)
Alcohol and/or drug dependency symptoms	0.16 (-0.29 to 0.60)	0.15 (-0.29 to 0.58)	0.06 (-0.40 to 0.52)
Live-in intimate partner	-0.76 (-1.89 to 0.37)	-0.56 (-1.77 to 0.65)	-0.48 (-1.72 to 0.75)
Children in household, No.	-0.16 (-0.71 to 0.38)	-0.19 (-0.74 to 0.35)	-0.24 (-0.77 to 0.28)
Employment	-0.69 <sup>c</sup> (-1.38 to -0.01)	-0.68 (-1.38 to 0.02)	-0.49 (-1.18 to 0.19)
Poverty ratio	-0.14 (-0.91 to 0.62)	-0.21 (-1.00 to 0.57)	-0.14 (-0.87 to 0.59)
Intimate partner violence	...	1.40 <sup>b</sup> (0.59 to 2.22)	1.49 <sup>b</sup> (0.66 to 2.31)
Child problem behavior	...	...	1.79 <sup>b</sup> (0.96 to 2.61)
<b>Neglect<sup>a</sup></b>			
Depression	1.31 (-0.13 to 2.76)	1.17 (-0.31 to 2.64)	1.01 (-0.54 to 2.56)
Alcohol and/or drug dependency symptoms	0.32 (-0.24 to 0.87)	0.32 (-0.23 to 0.87)	0.28 (-0.30 to 0.85)
Live-in intimate partner	0.09 (-1.36 to 1.54)	0.13 (-1.35 to 1.60)	-0.18 (-1.79 to 1.44)
Child in household, No.	-0.05 (-0.67 to 0.57)	-0.06 (-0.66 to 0.55)	-0.06 (-0.68 to 0.56)
Employment	-0.08 (-0.56 to 0.41)	-0.04 (-0.50 to 0.42)	-0.01 (-0.49 to 0.46)
Poverty ratio	-0.38 (-1.07 to 0.31)	-0.40 (-1.10 to 0.31)	-0.33 (-1.04 to 0.39)
Intimate partner violence	...	0.97 <sup>c</sup> (0.04 to 1.91)	0.98 <sup>c</sup> (0.02 to 1.95)
Child problem behavior	...	...	0.27 (-0.41 to 0.94)

Abbreviations: CI, confidence interval; ellipses, covariates not included in the model.

<sup>a</sup>Model also included a covariate for time.

<sup>b</sup> $P < .01$ .

<sup>c</sup> $P < .05$ .

glect. Depressed parents identified through a general population survey were no more likely to report neglect than nondepressed parents.<sup>20</sup> In contrast, depressed mothers who participated in a cohort study of women with extensive childhood trauma histories were more likely to report any 12-month neglect than mothers with fewer depressive symptoms.<sup>27</sup>

There are several possible explanations for differences between our null physical assault and neglect findings and the significant findings of others. Notably, our repeated measures study was better able to control for bias due to confounding than prior research. Yet, other limitations may have resulted in type II errors (failing to reject the null hypothesis).<sup>74</sup>

Other aspects of mothers' lives were associated with change in child maltreatment in our study, adjusting for depression. A decline in psychological aggression was associated with an increase in the amount of time mothers worked. Some research indicates that employment may provide respite from the stress of parenting and/or may increase the amount of time children spent in structured and safe child care environments that foster social behavior.<sup>75</sup>

The addition of an intimate partner to the household was associated with a decrease in the perpetration of psychological aggression in our study, independent of family economic status and IPV. Lower rates of physical and

psychological aggression toward very young children were reported by low-income mothers in nonviolent relationships compared with single mothers enrolled in a home visitation program.<sup>22</sup> The presence of a nonabusive partner may reduce the likelihood of maltreatment by providing positive relationship models and by reducing strain on mothers.<sup>76</sup>

Several studies have documented the co-occurrence of IPV and child maltreatment,<sup>77</sup> but few have examined the role of IPV in predicting maltreatment. One study of families who participated in a nurse home visiting program found that the presence of IPV during infancy was positively associated with agency-reported maltreatment in the first 5 years of life.<sup>78</sup> Our study may be the first to document an association between change in exposure to IPV and change in physical assault and neglect.

Perceived child behavior problems were positively associated with increases in psychological aggression and physical assault in our study. Relations between child behavior and parenting have been noted by others. In fact, child behavior, parenting, and maternal depression appear to be reciprocally related.<sup>40</sup> Interventions that assist parents in effectively disciplining and positively engaging with children describe improvements in parenting practices, child behavior, and parental mental health.<sup>47,79,80</sup>

Specific strengths of our study merit highlighting. Our study adds to prior study by using a fixed-effects ap-

proach<sup>44</sup> to analyze longitudinal data and by evaluating prospective relationships between depression and 3 separate forms of maltreatment in a nationally representative, high-risk sample. Our focus on maltreatment rather than parenting style or degree of response directs attention to parenting behavior that is socially unacceptable rather than less than optimal. Information about maltreatment and substance use was collected via automated, computerized methods. Stigmatized behavior is more frequently reported when recorded through self-administered automated methods than when collected by an interviewer.<sup>81</sup>

Several limitations warrant consideration. Underreporting of physical assault and neglect in our sample may have reduced our ability to detect an association between change in depression and both types of maltreatment by creating a floor effect.<sup>74</sup> In addition, low reliability, particularly of the assault and neglect measures, reduced the precision of our estimates and our ability to detect statistically significant relations.<sup>82</sup> Low reliability of the neglect measure may indicate that neglect is a multidimensional construct<sup>59,83</sup>; thus, analyses of neglect subtypes may yield different results than those described here. Controlling for conditions that are caused by depression (eg, mediators) would inappropriately reduce our estimate of the strength of associations between maltreatment types and depression; however, controlling for such conditions (eg, substance abuse, child behavior problems) may also (appropriately) attenuate associations because they are confounders. Thus, we opted to include them in our models and to present estimates that are somewhat conservative. Estimates presented in final models may also be too conservative because maternal depression is associated with the overreporting of child behavior problems.<sup>84,85</sup>

Although changes in depression status and psychological aggression occurred during the same 12-month period, we cannot be certain that a change in depression preceded a change in aggression. Unfortunately, NSCAW data (collected at 18-month intervals) would not allow us to use a lagged term to address temporality in a manner that is consistent with our understanding of the lag between mood and behavior. Finally, our findings are generalizable to mothers of children who were the subject of a maltreatment report.

Our findings strongly suggest that reducing maternal depression may reduce children's exposure to psychological aggression, yet approaches to affect such change were not estimated in our study. Moreover, further investigation of the association between maternal depression and physical assault and neglect is needed, given our study limitations. A randomized controlled trial could address many of these limitations and provide stronger evidence regarding a causal link between maternal depression and child maltreatment. Depressed, high-risk mothers who are randomly assigned to receive high-quality depression treatment could be compared with those assigned to standard care on their maltreating behavior.

Our study found that maternal depression and IPV victimization are associated with the perpetration of child maltreatment in families investigated by child protective service agencies. An accurate tool with which to iden-

tify maltreating parents is lacking<sup>17</sup>; however, research indicates that adults can be screened quickly and effectively for depression and IPV in primary care settings.<sup>86-91</sup> Routine screening is recommended by the American Academy of Pediatrics,<sup>92</sup> the American Association of Family Physicians,<sup>93</sup> and the US Preventive Services Task Force.<sup>94</sup> This study contributes additional evidence in support of these recommendations.

**Accepted for Publication:** March 6, 2009.

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**Author Contributions:** Dr Conron had full access to the National Survey of Child and Adolescent Well-being data analyzed in this study and takes responsibility for the integrity of the data and the accuracy of the data analysis. **Study concept and design:** Conron, Gortmaker, and Buka. **Acquisition of data:** Conron and Gortmaker. **Analysis and interpretation of data:** Conron, Gortmaker, Koenen, and Beardslee. **Drafting of the manuscript:** Conron and Beardslee. **Critical revision of the manuscript for important intellectual content:** Conron, Beardslee, Koenen, Buka, and Gortmaker. **Statistical analysis:** Conron and Gortmaker. **Obtained funding:** Conron. **Administrative, technical, and material support:** Beardslee. **Study supervision:** Gortmaker, Koenen, and Buka.

**Financial Disclosure:** None reported.

**Funding/support:** This study was supported by training grant MH15161 from the National Institutes of Health (Dr Conron).

**Disclaimer:** This manuscript includes data from the National Survey of Child and Adolescent Well-Being, which was developed under contract with the Administration on Children, Youth, and Families, US Department of Health and Human Services (ACYF/DHHS). The data were obtained from the National Data Archive on Child Abuse and Neglect. The information and opinions expressed herein reflect solely the position of the authors and do not indicate the support or endorsement of ACYF/DHHS. Dr Conron conducted this work as a graduate student at the Harvard School of Public Health and revised the manuscript at the Family Research Lab, University of New Hampshire.

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