

Preventing Child Abuse and Neglect With a Program of Nurse Home Visitation

The Limiting Effects of Domestic Violence

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THE PREVENTION OF CHILD ABUSE and neglect is an urgent public health concern. Annually, about 1 million abused children—15 of every 1000 children—are identified in the United States.¹ Home visitation has been widely promoted in recent years as a promising approach to preventing health and developmental problems among children, and thousands of home visitation programs have been started during the past decade.² The role of visitation in preventing child abuse and neglect perhaps has received the most attention. This emphasis stems in part from the magnitude of this social problem and the limited success of prevention efforts in the past. Policy makers and child advocates have actively promoted home-visit services^{3,4} despite limited evidence supporting their effectiveness in reducing child maltreatment.⁵

Much of the enthusiasm for home visitation as a tool to prevent child abuse

For editorial comment see p 1430.

Context Home visitation to families with young children has been promoted as an effective way to prevent child maltreatment, but few studies have examined the conditions under which such programs meet this goal.

Objective To investigate whether the presence of domestic violence limits the effects of nurse home visitation interventions in reducing substantiated reports of child abuse and neglect.

Design Fifteen-year follow-up study of a randomized trial.

Setting Semirural community in upstate New York.

Participants Of 400 socially disadvantaged pregnant women with no previous live births enrolled consecutively between April 1978 and September 1980, 324 mothers and their children participated in the follow-up study.

Interventions Families were randomly assigned to receive routine perinatal care (control group; n=184 participated in follow-up), routine care plus nurse home visits during pregnancy only (n=100), or routine care plus nurse home visits during pregnancy and through the child's second birthday (n=116).

Main Outcome Measures Number of substantiated reports over the entire 15-year period involving the study child as subject regardless of the identity of the perpetrator or involving the mother as perpetrator regardless of the identity of the child abstracted from state records and analyzed by treatment group and level of domestic violence in the home as measured by the Conflict Tactics Scale.

Results Families receiving home visitation during pregnancy and infancy had significantly fewer child maltreatment reports involving the mother as perpetrator ($P=.01$) or the study child as subject ($P=.04$) than families not receiving home visitation. The number of maltreatment reports for mothers who received home visitation during pregnancy only was not different from the control group. For mothers who received visits through the child's second birthday, the treatment effect decreased as the level of domestic violence increased. Of women who reported 28 or fewer incidents of domestic violence (79% of sample), home-visited mothers had significantly fewer child maltreatment reports during the 15-year period than mothers not receiving the longer-term intervention ($P=.01$). However, this intervention did not significantly reduce child maltreatment among mothers reporting more than 28 incidents of domestic violence (21% of sample).

Conclusions The presence of domestic violence may limit the effectiveness of interventions to reduce incidence of child abuse and neglect.

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stems from the early findings of a randomized trial conducted more than 20 years ago in Elmira, NY. Home visitation by nurses prenatally and for 2 years

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postnatally resulted in a significant reduction in the rate of verified Child Protective Services (CPS) cases among a subsample of poor, unmarried teenaged mothers when the children were aged 2 years.⁶ Four percent of the nurse-visited families had a verified maltreatment report before the child's second birthday, in contrast to 19% in a comparison group receiving routine perinatal care. Support continued for home visitation despite the fact that differences in child maltreatment were no longer significant by the time the children in the Elmira trial reached age 4 years,⁷ perhaps because of increased surveillance of the families by the nurses.⁸

A recent review offers ambiguous support for the relation between home visitation and reductions in child maltreatment.² The findings from several large-scale home-visitation efforts have shown disappointing short-term results in reducing family violence and child maltreatment.^{4,9} A 15-year follow-up study of the Elmira trial families, however, provided the first evidence from a randomized trial for the long-term effects of home visitation on reducing child maltreatment.¹⁰ Results from the follow-up showed that nurse-visited families had half as many child maltreatment reports as families in the comparison group.

In addition to assessing the impact of home-visitation services on child maltreatment, it is also important to specify for whom and under what conditions these services are effective. Preventive interventions often find that treatment effects for certain outcomes vary across subgroups of study participants.^{11,12} In this study, we examine how domestic violence limits the effectiveness of the home-visitation program in preventing maltreatment. There are several reasons why domestic violence might interfere with the success of a home-visitation intervention. Research suggests that children in households with domestic violence may be at an increased risk for child maltreatment.¹³⁻¹⁶ Although some child maltreatment may be caused directly by the male perpetrators of domestic violence, other incidents may re-

sult from the effects of domestic violence on the mothers' caregiving capacities (eg, through injury, mental distress, and restricted mobility). Data¹⁷ also suggest that mothers who are in violent relationships often act violently themselves, either as initiators of the violence or in self-defense. Such reciprocally violent relationships may place children at even greater risk as violence spreads throughout the household. Children witnessing domestic violence may also exhibit more internalizing and externalizing problems,^{18,19} which, in turn, may make them more difficult to parent. We predicted that the intervention would be less effective in reducing child maltreatment in the presence of domestic violence.

METHODS

Details of the design of the original intervention can be found in earlier articles.^{6,10,20} A summary of the design is given here.

Setting and Participants

The original study was conducted in Elmira, a small, semirural community in upstate New York with a population of 40 000. Pregnant women were recruited from a free antepartum clinic sponsored by the county health department and from the offices of private obstetricians. From April 1978 through September 1980, 500 consecutive eligible women were invited to participate. Women were actively recruited for the study if they had no previous live births, registered in the study prior to the 25th week of gestation, and were either young (<19 years at registration), unmarried, or of low socioeconomic status (Medicaid status or no private insurance). Exactly 400 of the 500 eligible women enrolled in the study. Eighty-five percent of the final sample had at least 1 of the 3 risk characteristics used for recruitment: 47% were younger than age 19 years, 62% were unmarried, and 61% came from households classified as of low socioeconomic status.

There were no differences in the age, education, or marital status of those

women who chose to enroll vs those who declined, except that 80% of the whites agreed to participate vs 96% of the nonwhites (almost all African-Americans). After completing the informed consent and baseline interviews, women were stratified by sociodemographic characteristics and randomized to 1 of 4 treatment groups.

Treatment Groups

Families in treatment group 1 (n=94) were provided with sensory and developmental screening for the study child at ages 12 and 24 months. Based on these screenings, the children were referred for further clinical evaluation and treatment when needed. Families in treatment group 2 (n=90) received the same screening services offered to those in treatment 1, plus free transportation for prenatal and well-child care through the child's second birthday. Because there were no differences between those in the 2 treatment groups in use of prenatal and well-child care (both groups had high rates of completed appointments), they were combined to form a single comparison group. Families in treatment group 3 (n=100) were provided with the screening and transportation services offered to treatment 2, but were also assigned a nurse who visited them during pregnancy. Families in treatment group 4 (n=116) were provided the same services as those in treatment group 3 except that the nurse continued to visit through the child's second birthday.

During home visits, the nurses promoted 3 aspects of maternal functioning: health-related behaviors during pregnancy and the early years of the child's life, the care parents provide to their children, and maternal life-course development (family planning, educational achievement, and participation in the work force). Visits were held once every other week during pregnancy, once a week for the first 6 weeks postpartum, and then on a diminishing schedule until the children reached age 2 years. Further details on the intervention can be found in earlier publications.^{6,10,20,21} Nurses completed an average of 9 (range,

0-16) visits during the mother's pregnancy and 23 (range, 0-59) visits from the child's birth to second birthday.

Overview of 15-Year Follow-up Study

Of the 400 original mothers and their children, in 49 mother-child pairs either the child ($n=26$) or mother ($n=2$) had died, the child had been adopted ($n=15$), or the parents had requested no additional participation ($n=6$). This left 351 eligible mother-child pairs for the follow-up study. Assessments were completed for 324 of these pairs, representing 81% of those women who were originally randomized and 92% of those eligible for follow-up. The number of completed interviews did not differ by treatment group. Interviews were conducted with the mothers, adolescents, and custodial parents of the adolescents (if the biological mother no longer had custody). Mothers were offered \$75 and children \$25 for completion of the 15-year assessments. Data gatherers were blinded to treatment assignment. Social service, school, and criminal justice records provided additional sources of data. Written consent for all study procedures was obtained from the mothers and children. All research procedures were reviewed and approved by the institutional review boards of Cornell University and the University of Rochester.

Assessments

Assessment procedures are described in previous publications.^{6,7,22} Registration information collected prior to randomization included assessments of the women's sociodemographic and personality characteristics, health-related behaviors, and health conditions. Women's household socioeconomic status was estimated with the Hollingshead 4-factor method (August Hollingshead, PhD, unpublished data, 1976). Families were classified into lower (levels III and IV) and higher household economic (levels I and II) status.

At the 15-year follow-up, mothers were interviewed using a life-history calendar designed to help them recall ma-

jeor life events (including births of subsequent children, marriages and partnerships, education, employment, moves, and housing arrangements). Women were also asked to estimate the total number of months that they received Aid to Families with Dependent Children, Medicaid benefits, and food stamps.

Mothers reported their exposure to domestic violence using the violence subscales of the Conflict Tactics Scale.²³ For the purpose of these analyses, we used a measure that consisted of the total number of times the mother reported having experienced any form of partner-perpetrated violence since the birth of the study child. Variables were also constructed reflecting frequency of major and minor violence as defined by Straus.²⁴ Minor violence included throwing items, pushing, and slapping. Major violence included kicking, biting, hitting with a hand or an object, beating, choking, threatening with a knife or gun, or use of a knife or gun.

Mothers provided consent for the research staff to review CPS records. Because program effects were hypothesized to be concentrated on the mother and her first-born child, only reports involving either the mother as perpetrator or the study child as subject were coded. Substantiated reports were abstracted to ascertain key features of the maltreatment incident. All New York State CPS records were searched, as well as those of most other states in which families resided during the 15-year period. Out-of-state CPS record reviews were not as complete owing to varying state policies on expunging records and releasing case-level information. Nevertheless, our search covered an average of 13.4 years of the 15-year period. There were no treatment differences in the amount of time searched.

The primary outcome variables for this analysis were the number of substantiated reports over the entire 15-year period involving the study child regardless of the identity of the perpetrator or involving the mother as per-

petrator regardless of the identity of the child. These 2 outcomes are not independent. We present both, not as distinct findings, but as alternative ways of understanding maltreatment. Finally, we constructed separate measures distinguishing type of maltreatment reports involving neglect only and reports including abuse only. There were not enough abuse cases to examine sexual and physical abuse separately.

Methods of Analysis

Analyses were conducted on all cases in which data were available, irrespective of degree of program participation. The model included a $3 \times 2 \times 2$ factorial structure: treatment (groups 1 and 2 vs 3 vs 4), maternal marital status (married vs unmarried at study registration), and social class (Hollingshead levels III or IV vs I or II at registration) and all interactions among these classification factors. It also included the covariates maternal age and educational level at registration and level of domestic violence in the family (number of incidents of violence) measured over the 15-year study period.

Regressions of maltreatment on violence were specified separately by levels of treatment (ie, the model included the interaction of treatment with violence). This model is an extension of that presented in our earlier analysis of abuse and neglect.¹⁰ Regressions of violence specified separately by marital status and social class, in addition to treatment, were also examined. These regressions were essentially homogeneous, and for reasons of parsimony, we present only the interactions of violence with treatment. Homogeneity of regressions was also examined for age and education.²⁵

Race of the mother and sex of the child were additional classification factors examined in deriving the final model. We also examined several other covariates for possible inclusion in the model, such as father employment status at study registration, but did not include these in the final model because they had no unique relationship to the outcomes.

Table 1. Adjusted Rates of Child Abuse and Neglect*

Treatment Group	Incidence†	Log Incidence†	Log Incidence Difference	P Value‡
CPS Reports Involving Mother as a Perpetrator, No.				
T1 and T2 (comparison)	0.65	-0.44	0.81	.01
T4 (intervention)	0.32	-1.26		
CPS Reports Involving Study Child, No.				
T1 and T2 (comparison)	0.73	-0.33	0.59	.04
T4 (intervention)	0.44	-0.93		

*CPS indicates Child Protective Services; T1, treatment group 1; T2, treatment group 2; and T4, treatment group 4. See "Treatment Groups" subsection for definition of treatment groups. Treatment group 3 is omitted from table because it was not found to differ from the control group. Rates are adjusted for socioeconomic status, marital status, maternal age, and maternal education. All tests were conducted with a Poisson log-linear model corrected for overdispersion.

†Incidence represents the mean number of infrequently occurring events within the stated period. Individual cases may have values greater than 1, although the range is small.

‡P value is for log incidence difference between T1 and T2 vs T4.

The abuse and neglect outcomes are in the form of count data. Results are reported as incidence and log incidence. We examined the distribution of the outcomes and, as in our earlier research,¹⁰ used a Poisson log-linear model, which best represents these data. Variables with a Poisson distribution have variance equal to the mean. In Poisson log-linear models, this assumption is frequently not met. When the variance is larger than the mean, the data are said to be overdispersed. Correction for overdispersion by scaling the SEs from overstating significance in statistical tests.^{26,27} All tests were corrected for overdispersion.

In the linear model in which tests of mean differences depend on the value of a covariate (ie, when regressions are nonhomogeneous), the situation can be shown pictorially by graphing the estimated regression lines for groups being compared. With the effects of other covariates and the classification effects subsumed in the intercept of the equations, the vertical distance between the regression lines represents the estimated mean difference at a given covariate value on the abscissa. A test of the mean difference can be carried out for any single specific value. Alternatively, a simultaneous region of significance over which the means differ statistically can be computed. Because the region provides information about a continuum of covariate values, the use of simultaneous statistical inference is required.²⁸⁻³⁰ In an approach similar to

that taken by Olds et al,⁶ we have extended the methods for simultaneous regions of significance to the generalized case, with log-link functions and Poisson error.

RESULTS

Treatment Effects on Child Abuse and Neglect

As previously reported, there were no differences at registration in background characteristics of those assigned to the treatment and control conditions.¹⁰

TABLE 1 shows the incidence rates for each of the maltreatment outcomes for the entire sample, without adjusting for violence and its interactions. Consistent with our earlier report,¹⁰ there were significantly fewer child maltreatment reports involving the mother as perpetrator ($P=.01$) or involving the study child ($P=.04$) for families receiving home visitations during pregnancy and infancy vs families not receiving home visitation. For both outcomes, the number of maltreatment reports for the group receiving home visitation only during pregnancy (treatment group 3) fell between the other groups and was not significantly different from the comparison group. Therefore, the remaining analyses focus on contrasts from the overall model involving treatment groups 1 and 2 vs treatment group 4.

Treatment Effects and Domestic Violence

Almost half (48%) of the mothers in this sample reported some form of domes-

tic violence since the birth of the study child (range, 0-225 incidents). For all women in the sample, the mean number of incidents over the 15 years was 22.2 (median, 1.0). For those women reporting any domestic violence, the mean number of incidents was 43.1 (median, 11.7). Home visitation had no impact on the incidence of domestic violence.

Prior to estimating the interaction between treatment group and domestic violence, we examined the co-occurrence of domestic violence and child maltreatment. Because the intervention affected the incidence of child maltreatment, the best estimate of the underlying level of co-occurrence in this population is obtained for families in the control group. For these women, 22.7% experienced domestic violence in the past 15 years and were also in families with at least 1 confirmed child maltreatment report. Although we found that the number of domestic violence incidents was positively associated with child maltreatment reports (FIGURE), this effect was not statistically significant in the models we estimated.

TABLE 2 summarizes the results of a model that includes the interaction of treatment with domestic violence for 13 outcome variables. The interaction is shown as the difference in the regressions of maltreatment on domestic violence for treatment groups 1 and 2 vs treatment group 4. For each of the 4 maltreatment outcomes listed in Table 2, there was a significant difference in the regressions on domestic violence across treatment conditions ($P=.04-.001$). To illustrate this interaction, the Figure shows separate estimated regression lines for these 2 treatment groups for maltreatment involving the study child. The treatment effect decreases as the level of domestic violence increases. There were significantly fewer cases of child maltreatment in the home-visited group among mothers who reported 28 or fewer incidents of violence over the 15-year period. Of the 112 women who reported at least 1 incident of domestic violence, 71 (63.4%) had 28 or fewer

incidents. Treatment effects were non-significant for mothers reporting more than 28 incidents of domestic violence over 15 years (21% of the entire sample of mothers in treatment groups 1, 2, and 4, and 36.4% of those who had reported at least 1 domestic violence incident).

Further Specification of the Limiting Effects of Domestic Violence

We examined the robustness of the interaction effect, tested a number of alternative explanations, and investigated possible underlying mechanisms.

We examined whether the effects of domestic violence varied as a function of its severity. Separate models were tested using measures of minor and major domestic violence as defined in the "Assessments" subsection. In each model, the interaction effect remained significant ($P=.01$ for both), indicating that the limiting effect of domestic violence was not restricted to the most severe forms of violence.

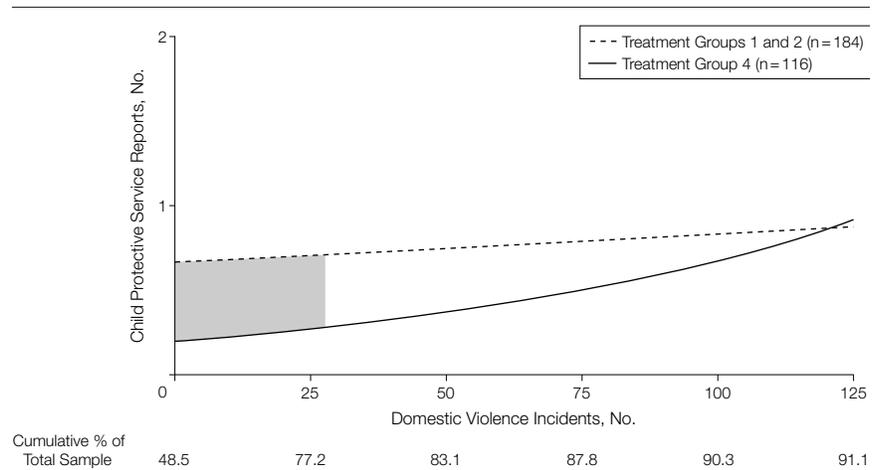
Finding a significant interaction effect when the maltreatment outcome focused on reports involving only mothers as perpetrators rules out the possibility that the effects observed were the result of the same partners committing violence against both the mothers and the children. We also examined whether the same effect held across types of maltreatment by estimating models in which the dependent variable was restricted to cases of neglect only, and cases where physical or sexual abuse (but no neglect) occurred. As shown in Table 2, domestic violence significantly moderated treatment effects for both sets of outcomes.

We also determined whether type of treatment interacted with domestic violence when predicting outcomes other than child maltreatment. We estimated models by using dependent variables previously associated with significant treatment effects in the follow-up study.^{10,20} These included life-course outcomes for the mother, such as number of subsequent children, months on welfare, impairments due to substance use,

and number of arrests, as well as life-course outcomes for the study children, such as number of runaway episodes and number of arrests or convictions. As shown in Table 2, there was little evidence that the presence of domestic violence had an impact on treatment effects for any other maternal or child outcomes.

We next examined whether women experiencing domestic violence may have been less engaged with the intervention, which, in turn, could have led to a diminished program effect. To the contrary, we found that for the women visited during pregnancy and their child's infancy, there was a small and nonsignificant positive correlation be-

Figure. Adjusted Number of Maltreatment Reports Involving Study Children by Treatment Group and Level of Domestic Violence



For definition of treatment groups see "Treatment Groups" subsection. Treatment groups 1 and 2 were the comparison group and treatment group 4, the intervention group. Figure shows domestic violence values, as calculated on Conflict Tactics Scale Violence subscales,²³ from 0 to 125, representing more than 90% of cases. Shading indicates $P<.05$ simultaneous region of significant treatment difference for maltreatment.

Table 2. Treatment Differences in Regressions on Domestic Violence for Maltreatment, Maternal Life-Course, and Child Life-Course Outcomes*

	β †	χ^2	P Value
Maltreatment Variables			
Mother as perpetrator	-0.01	6.74	.01
Child as victim	-0.001	7.12	.01
Neglect without abuse	-0.01	4.12	.04
Abuse without neglect	-0.02	10.57	.001
Maternal Life-Course Variables			
Months on AFDC	-0.002	0.88	.35
Number of arrests	-0.001	0.04	.83
Number of subsequent children	-0.0001	0.004	.95
Substance use impairments‡	0.006	2.46	.12
Child Life-Course Variables			
Number of runaway episodes	0.006	1.67	.20
Number of arrests	-0.001	0.10	.75
Number of convictions	-0.006	2.52	.11
Number of sex partners	-0.004	1.20	.27
Number of days drank alcohol	0.005	2.10	.15

*AFDC indicates Aid to Families with Dependent Children. Rates adjusted for socioeconomic status, marital status, maternal age, and maternal education. All tests were conducted with a Poisson log-linear model corrected for overdispersion.

† β indicates estimated differences in regressions between treatment groups 1 and 2 and treatment group 4.

‡One outlier was removed for the analysis of this variable.

tween domestic violence and number of prenatal and postnatal nurse visits ($r=0.13$), indicating that the presence of domestic violence was associated with slightly more, rather than fewer, nurse visits.

Finally, we examined possible mechanisms that may underlie the interaction effect. The approach was to identify variables representing changes that occurred as a result of the intervention and that might help to explain why domestic violence limited the effectiveness of the home-visitation program in preventing maltreatment. These are the same maternal life-course outcomes shown in Table 2. Adding these variables to the model for maltreatment that contained the interaction with violence did not significantly reduce the differences in the regressions. As such, these maternal life-course variables do not explain the observed interaction effects.

COMMENT

Our findings show that domestic violence represents an important part of the context for understanding the conditions under which a home-visitation intervention prevented child maltreatment. The interaction effect appears to be robust across alternative measures of both domestic violence and child maltreatment. It does not appear to reflect less engagement in the intervention on the part of women reporting domestic violence, nor does it reflect the perpetration of domestic violence and child maltreatment by the same individuals. The impact of the intervention on other maternal life-course and child outcomes was not affected in the same way by the level of domestic violence.

The data available to us did not yield further insight into the mechanisms that may explain the moderating effects of domestic violence. It is likely that domestic violence sets in motion a number of processes that compromise the parenting of the mother or other caretakers. Some may involve the mother's physical or psychological health at the time she is caring for her children. Domestic violence may also result in a

more chaotic or a less predictable environment for children, placing them at increased risk. Future research will be needed to clarify these alternative mechanisms.

There are important limitations of the present study. The intervention occurred during the late 1970s and early 1980s in a semirural New York State community. Care must be taken in generalizing our results to current interventions in other communities and with different populations. We enrolled a high-risk sample that may have experienced higher lifetime rates of domestic violence than samples drawn from lower-risk or more heterogeneous populations. For example, the National Violence Against Women Survey³¹ of a nationally representative sample of 8000 women used a modified version of the Conflict Tactics Scale and found that 22.1% of the women reported intimate partner violence at some time during their adult lives, about half the rate we have reported. Furthermore, the increased awareness in recent years of domestic violence as a social problem and the increased availability of services for battered women and their children may alter the relationships we have observed in our trial.

This report illustrates 1 element of a more general strategy for improving health and human services. By identifying groups of individuals for whom the program fails to affect targeted outcomes, approaches can be devised that may strengthen services. In the current case, we have learned that this program failed to prevent child abuse and neglect for 21% of the sample who experienced relatively higher levels of domestic violence. While issues of domestic violence have been addressed more systematically as the program evolved during the years, the current findings have led to the incorporation of even more explicit methods of addressing domestic violence^{32,33} and partner relationships³⁴ in the most recent generation of the program protocols. The promotion of partner communication is designed to strengthen the mother-partner relationship, while a do-

mestic violence assessment and education program is designed to address domestic violence effectively if it emerges. Both of these strategies have been tested previously in separate controlled studies.^{35,36} Whether such modifications will strengthen the impact of the program on child abuse and neglect will not be known until future trials of this program are conducted. Meanwhile, careful analyses that examine groups for which the program is more and less effective will enable policy makers to focus scarce resources on those who benefit the most and encourage the continuous search for more effective ways of serving those who fail to respond as expected.

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The doctor may . . . learn more about the illness from the way the patient tells the story than from the story itself.

—James B. Herrick (1861-1954)