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Importance of Early Neglect for Childhood Aggression

Jonathan B. Kotch, MD, MPH^a, Terri Lewis, PhD^b, Jon M. Hussey, PhD, MPH^a, Diana English, PhD^c, Richard Thompson, PhD^d, Alan J. Litrownik, PhD^e, Desmond K. Runyan, MD, DrPH^f, Shrikant I. Bangdiwala, PhD^b, Benyamin Margolis, MPH, CHES^g, Howard Dubowitz, MD^h

Departments of ^aMaternal and Child Health, ^bBiostatistics, ^cSocial Medicine, and ^dHealth Behavior and Health Education, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina; ^eWashington State Department of Social and Health Services, Seattle, Washington; ^fJuvenile Protective Association, Chicago, Illinois; ^gDepartment of Psychology, San Diego State University, San Diego, California; ^hDepartment of Pediatrics, University of Maryland School of Medicine, Baltimore, Maryland

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What's Known on This Subject

Studies demonstrate that child maltreatment frequently is associated with aggression in children, but small samples and retrospective data limit the extent to which the impact of neglect on later aggression can be compared with that of abuse.

What This Study Adds

This study adds a longitudinal perspective on the relative contributions of neglect and abuse in early childhood to aggressive behavior 2 to 6 years after the maltreatment.

ABSTRACT

OBJECTIVE. The goal was to examine the association between early childhood neglect (birth to age 2 years) and later childhood aggression at ages 4, 6, and 8 years, compared with aggression's associations with early childhood abuse and later abuse and neglect.

METHODS. A prospective cohort of 1318 predominantly at-risk children, recruited from 4 US cities and 1 southern state, were monitored from birth to 8 years of age. Maltreatment was determined through review of local child protective services records. A hierarchical, linear model approach, a special case of general, linear, mixed modeling, was used to predict aggressive behavior scores, as reported by the child's primary caregiver at ages 4, 6, and 8 years.

RESULTS. Only early neglect significantly predicted aggression scores. Early abuse, later abuse, and later neglect were not significantly predictive in a controlled model with all 4 predictors.

CONCLUSION. This longitudinal study suggests that child neglect in the first 2 years of life may be a more-important precursor of childhood aggression than later neglect or physical abuse at any age.

ACCORDING TO DATA from agencies reporting child abuse and neglect allegations in the United States, nearly 900 000 children each year experience maltreatment, and the overwhelming majority of these children experience it in the form of neglect.¹ Of concern is the suggestion that neglect in early childhood may be an important predictor of later aggression.²⁻⁴ The linkage of neglect specifically with aggressive behavior is disputed. Some researchers have been unable to distinguish subtypes of maltreatment.⁵ Others have failed to find a significant association between neglect and juvenile antisocial behavior,⁶ although there have been reports that have found this connection.⁷⁻⁹ Moreover, the classification of the type of maltreatment often is based on retrospective self-reports.

Ecological theory guides research into the causes and consequences of child maltreatment by describing risk and protective factors (according to the individual child's experience) interacting with a series of increasingly broad social domains, such as family, neighborhood, and community.¹⁰ The degree to which negative outcomes may be attributable to maltreatment itself or to the circumstances and experiences associated with maltreatment, such as family structure and low income, remains controversial.¹¹ Similarly, risk factors for child maltreatment, such as maternal depression^{12,13} and neighborhood characteristics,¹⁴ may themselves predict adverse child outcomes such as aggression.^{15,16}

The purpose of the current study was to examine the relationships among child neglect, child abuse, and childhood aggression over time. The longitudinal design of the study allowed separate examinations of the effects of early abuse, early neglect, more-recent abuse, and more-recent neglect on later aggression in childhood, controlling for sociodemographic factors known to be associated with both aggression and maltreatment. Child development theories that emphasize the lasting impact of early childhood experiences such as disruption of parent-child attachment¹⁷ suggest that early maltreat-

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Key Words

child neglect, child abuse, aggression, longitudinal studies

Abbreviations

CBCL—Child Behavior Checklist
CPS—child protective services
GLMM—general, linear, mixed model
LONGSCAN—Longitudinal Studies of Child Abuse and Neglect
MMCS—Modified Maltreatment Classification System

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Address correspondence to Jonathan B. Kotch, MD, MPH, CB 7445, Rosenau Hall, University of North Carolina at Chapel Hill, Chapel Hill, NC 27599-7445. E-mail: jonathan_kotch@unc.edu

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ment may be a stronger predictor of later aggression than later maltreatment. Although there continues to be emphasis on child abuse in the lay and professional media, we hypothesized that early neglect may be as strong a predictor as early abuse.

METHODS

Sample

The present analysis uses data collected from the primary caregivers of children participating in Longitudinal Studies of Child Abuse and Neglect (LONGSCAN), supplemented with maltreatment data from state child protective services (CPS) central registries and local CPS agencies. LONGSCAN is a consortium of 5 studies examining the antecedents and consequences of child maltreatment. A brief description of the 5 samples follows.

The LONGSCAN consortium consists of 4 US urban sites, located in the Northwest, Southwest, Midwest, and East, and 1 statewide site in the South. Although the sites used different criteria for sample selection (described below), all included children either known to have been maltreated or at risk of maltreatment by virtue of medical or socioeconomic risk factors. These sites are linked through a coordinating center and an agreement to share objectives, measures, data collection strategies, and data management. The ability to compare and pool data from these independent samples is a strength of the LONGSCAN design. A more-detailed description of the objectives and design of LONGSCAN is available elsewhere.¹⁸

The Northwest sample ($n = 254$) consisted of children who were reported to CPS for maltreatment before 5 years of age and were judged to be at moderate/high risk for future maltreatment on the basis of a state risk assessment tool. The Southwest sample ($n = 330$) consisted of children who had already been reported and removed from the care of their biological parent(s) because of maltreatment. At the 4-year interview, these children might or might not still have been residing in foster care. The Midwest sample ($n = 245$) included 3 groups of children. Two of the groups consisted of children reported to CPS; 1 of the reported groups was referred to a therapeutic intervention program, and the other received standard care. The third group consisted of nonmaltreated neighborhood children, matched with respect to age, ethnicity, and family socioeconomic status. The East sample ($n = 282$) was recruited from inner-city, pediatric clinics serving low-income families and consisted of 3 groups, that is, (1) children diagnosed as having failure to thrive in the first 2 years of life, (2) children at risk for HIV infection, and (3) a nonmaltreated comparison group with risk factors associated with poverty.

The South sample ($n = 243$) was derived from an earlier study in which a cohort of newborns at risk for adverse health or developmental outcomes and a systematic sampling of matched control subjects were recruited from area hospitals. At-risk determinants included low birth weight, preterm birth, no prenatal care, young maternal age, caregiver with alcohol or substance

abuse problems, and single caregiver with no family support. At 4 years of age, a random sample of children in this original cohort who had been reported to the state central registry on child abuse and neglect and a 2:1 comparison group of unreported children, matched with respect to gender, race, and income, were enrolled in LONGSCAN.¹²

Procedures

At each data collection point, corresponding approximately to child ages 4, 6, and 8 years, the child's primary caregiver (the biological mother in the majority of cases) completed a 2-hour, face-to-face interview with both standardized and consortium-developed measures. At age 4, developmental testing of the child was also conducted. At ages 6 and 8, separate face-to-face interviews were conducted with the caregiver and the child. Trained project staff members conducted all face-to-face interviews. Maltreatment data were based on local CPS records abstracted with identical data collection tools by coders at the 5 sites. Case record review data were entered at each site by using a common data entry system and then were processed at the LONGSCAN coordinating center. Instruments and protocols were approved by the local institutional review boards at each of the 5 sites and at the coordinating center.

Measures

Independent Variable: Maltreatment

The maltreatment status of each child was determined by reviewing local CPS case records of child maltreatment allegations approximately every 2 years, using a project-developed coding sheet. The coding system used to classify maltreatment across all LONGSCAN sites is the Modified Maltreatment Classification Scheme (MMCS).¹⁹ This system is based on the Maltreatment Classification Scheme developed by Barnett et al.²⁰ The MMCS allows for definition of neglect, physical abuse, sexual abuse, and emotional maltreatment with greater precision. The coders at each local site were trained to abstract local case records by LONGSCAN research staff members from the Northwest site and the coordinating center. Coders abstracted actual case records (blinded) until they achieved $\geq 90\%$ reliability in comparison with the data abstracted by the trainers. As a result, all maltreatment reports were recoded across the 5 local LONGSCAN sites by using a single coding system with adequate reliability.

In the MMCS, physical abuse occurs when a caregiver or other responsible adult intentionally inflicts physical injury (of any degree of severity or lasting consequence) on a child for whom he or she is responsible. Injuries occurring in the course of trying to force or to coerce the child to engage in sexual activities (as opposed to injuries inflicted in the course of sexual activity) would be considered physical abuse. Excluded from the physical abuse category are culturally sanctioned physical alterations such as circumcision and ear-piercing, as are threats without physical contact.

Sexual abuse is defined as attempted or actual sexual

contact or interaction of any form between the subject and a caregiver or other responsible adult for purposes of the adult's sexual gratification or financial benefit, including physical injuries that result directly from sexual activity. Making no attempt to prevent exposure of the child to the adult's sexual activity also is considered sexual abuse. Both the MMCS and the Maltreatment Classification System define caregiver or other responsible adult as any family member or friend who has a relationship with the child or is in a position of authority over the child (eg, baby-sitter). Sexual abuse outside the purview of CPS was not assessed.

Physical neglect is composed of 2 subtypes. The first subtype, failure to provide, involves the failure of the caregiver or responsible adult to meet the minimum physical needs of the child. In the case of families in poverty, physical neglect is scored if a child's physical needs are not met because the parents did not exert minimal efforts to take advantage of available community resources, such as food stamps or emergency shelters. The second subtype, lack of supervision, occurs when the caregiver or responsible adult does not take sufficient, developmentally appropriate action to ensure the child's safety inside and outside the home setting. Inadequate supervision of the child, supervision by an unsuitable or unsafe temporary caretaker, and exposure to an unsafe environment are examples of this subtype of neglect.

By using the MMCS, maltreatment status was determined for 4 nonoverlapping time intervals, that is, from birth to the child's second birthday, from age 2 to the fourth birthday, from age 4 to the sixth birthday, and from age 6 to the eighth birthday. In the present study, early neglect was coded if a referral (ie, a report) for any type of neglect in the period from birth to age 2 was found in the CPS records. Early abuse was coded if there was a referral for any physical or sexual abuse in the period from birth to age 2. Later neglect and later abuse were coded if there was a referral within the 2-year period immediately preceding each data collection point (ie, on or near the fourth, sixth, and eighth birthdays). The early abuse and early neglect indicators are time-invariant, that is, the values are equivalent across all of the next 3 time points. The later indicators, of course, may be different for each period.

Neglect and abuse were not mutually exclusive categories. If a subject was reported for both abuse and neglect in the same time period, then the reports were coded "1" for each of the 2 types of maltreatment. In the earliest time period (0–2 years), 198 subjects (15%) had reports of both neglect and abuse. In the later time periods, ~14% of those between 2 and 4 years of age, ~8% of those between 4 and 6 years of age, and ~5% of those between 6 and 8 years of age had reports of both abuse and neglect. Over the 8-year period, 387 (29%) of the 1318 subjects had reports of both abuse types for at least 1 of the 4 time periods.

All CPS reports, whether substantiated or not, were considered indicators of maltreatment. Despite the possibility of false-positive cases, there is strong evidence that many unsubstantiated reports do involve maltreat-

ment.^{21,22} For many academic and childhood psychosocial outcomes, including aggression and delinquency, the consequences of unsubstantiated and substantiated reports do not differ.^{23,24} To the extent that definition of our predictor as all maltreatment reports might introduce cases where no maltreatment actually occurred (false-positive cases), the use of this measure should provide a conservative estimate of the influence of maltreatment on aggressive behavior.

Dependent Variable: Aggression

Evaluation of aggressive behavior, the dependent variable, was based on the perceptions of the child's primary caregiver. The primary caregiver completed the Child Behavior Checklist (CBCL), which is a widely used measure of child behavior problems for ages 4 to 18 that has good reliability, stability, and predictive validity and has been normalized with both nonclinical and clinical samples.²⁵ The CBCL aggression subscale consists of 20 questions about behaviors such as arguing, cruelty to others, destruction of property, disobedience, threatening people, and fighting or physically attacking others. The primary caregiver was asked to rate the child on each behavior (eg, "gets into many fights"), using a 3-point scale coded 0 (not true), 1 (somewhat or sometimes true), or 2 (very true or often true). Ratings were based on current behaviors or those within the past 6 months. Responses were then summed to form an aggression score with a possible range of 0 to 40. We used caregiver-reported CBCL aggression subscale scores from the age 4, 6, and 8 interviews as our outcome measure.

Control Variables

Caregiver Depression

The Center for Epidemiologic Studies Depression Scale was used to measure self-reported depressive symptoms experienced in the past week by the caregiver at the age 4 and 6 interviews.²⁶ The instrument consists of 20 items assessing 6 major manifestations of depression, including depressed mood, feelings of hopelessness and worthlessness, loss of appetite, and sleep disturbance. Responses are coded on a 4-point scale ranging from 0 (rarely or none of the time) to 3 (most or all of the time), resulting in a score with a possible range of 0 to 60. At age 8, the depression subscale of the Brief Symptom Inventory²⁷ was used to assess caregiver depression. This subscale includes 6 items assessing depressive symptoms over the past 7 days. Responses are coded on a 5-point scale ranging from 0 (not at all distressed) to 4 (extremely distressed). Scores at all 3 time points were centered with a mean of 0 and a SD of 1.

Demographic Factors

At each interview, caregivers completed questions on demographic measures including marital status, years of education, and family income. Family income was coded by assigning to each subject a value representing the midpoint of 1 of 11 categories, in \$5000 increments (from \$0–4999 to \$50 000 or more).

Neighborhood Safety

At ages 4 and 8, the Neighborhood Short Form²⁸ was administered. One item (ie, "It's dangerous in this neighborhood") was used in the present study. Responses were coded on a scale of 1 ("very much like our neighborhood") to 4 ("not at all like our neighborhood"). At age 6, the Neighborhood Risk Assessment was administered.²⁹ One item from this measure (ie, "It's safe for my child to play outside in our neighborhood") was used. Responses were coded on a scale of 1 (never true) to 5 (always true). For both measures, higher scores indicated a safer neighborhood. Item scores at all 3 time points were centered with a mean of 0 and a SD of 1.

Additional Control Variables

We also controlled for the child's gender and race/ethnicity. The current sample included 639 boys (48%) and 679 girls (52%). Child race/ethnicity was dichotomized as non-Hispanic white ($n = 345$; 26%) or other ($n = 973$; 74%). Finally, because of potential differences across the sites that were not accounted for by other measures, we followed the procedure of previous studies^{30,31} and included dummy variables to control for site (omitted category: Northwest).

Statistical Analyses

A general, linear, mixed model (GLMM) technique was used for this study because, in the analysis of longitudinal data, repeated observations for the same individual are correlated. This correlation violates the assumption of independence necessary for more-traditional, repeated-measures analyses and leads to bias in regression parameters. Typically, ignoring the correlation of observations leads to smaller SEs and increases type I errors.³² GLMMs are more appropriate than other ordinary least-squares methods for accommodating such correlations. Also, mixed models such as GLMMs are able to accommodate missing data, unbalanced designs, and the integration of fixed and time-varying covariates,³²⁻³⁴ all of which are issues in the current study.

Neglect and abuse were not mutually exclusive categories. If a subject child was reported for both abuse and neglect in the same time period, then the reports were coded for each. The random variables were coded as

dummy variables (neglect: $N = 1$; no neglect: $N = 0$; abuse: $A = 1$; no abuse: $A = 0$). To control for the possible additive effect of experiencing both types of abuse, 2 interaction terms (early abuse \times early neglect and later abuse \times later neglect) were added to the model.

A hierarchical, linear model approach, a special case of GLMM, was used here. All model parameters were estimated by using the PROC MIXED procedure in SAS for Windows 8.02 (SAS Institute, Cary, NC). The model consisted of 12 predictors (child gender, child race/ethnicity, child age, caregiver marital status, caregiver depression, caregiver years of education, family income, neighborhood safety, early neglect, early abuse, later abuse, and later neglect) plus 2 interaction terms (early neglect \times early abuse and later abuse \times later neglect) and 4 dummy codes representing the study sites (the Northwest site was the reference category). The model fitted was of the type $Y = X\beta + Z\gamma$, where β represents the unknown parameters for the fixed effects of the vector of covariate X , and $Z\gamma$ represents the random component of the model. The random component included a random intercept for subject, in addition to the random error component. The variance-covariance for the model was assumed to be block diagonal but unstructured within a block defined by subject. Results present the estimated fixed effects and their significance, as is standard for such analyses.

RESULTS

Of the 1354 LONGSCAN subjects, 1318 had ≥ 1 interview at age 4, 6, or 8 years. Of the 1318 subjects, 1129 had an interview at age 4, 1133 had an interview at age 6, and 1052 had an interview at age 8. Sixty percent of the sample subjects had been reported to social services for abuse, neglect, or abuse and neglect before age 4. Between ages 4 and 6 years, 20.6% of the subjects were reported for maltreatment; between ages 6 and 8 years, 17.2% of the subjects were reported. Sample demographic and descriptive factors are reported for each time point in Table 1. The distribution of abuse and neglect categories is presented in Table 2.

To compare the level of aggression in the current

TABLE 1 Comparison of Sociodemographic Characteristics of the Sample at Ages 4, 6, and 8 Years ($N = 1318$)

Sample Characteristics	Age 4	Age 6	Age 8
Child's race/ethnicity, non-Hispanic white, %	26.8	25.9	25.5
Child's gender, female, %	52.1	51.5	51.9
Caregiver's marital status, single, %	66.9	67.8	65.4
Maltreatment reports, % ^a	60.2	20.6	17.2
Family income, median, \$	12 500	12 500	17 500
Caregiver's education, mean \pm SD, y	11.7 \pm 2.07	11.7 \pm 2.17	11.9 \pm 2.14
Depression score, mean \pm SD ^b	12.5 \pm 10.8	12.0 \pm 10.6	0.3 \pm 0.5
Neighborhood safety score, mean \pm SD ^c	2.9 \pm 1.1	3.7 \pm 1.3	3.1 \pm 1.1

^a Age 4 indicates 0 to 4 years; age 6, 4 to 6 years; age 8, 6 to 8 years.

^b At ages 4 and 6, the Center for Epidemiologic Studies Depression Scale was used to assess caregiver depression (possible range: 0–60). At age 8, the Brief Symptom Inventory Depression Scale was used (possible range: 0–4).

^c At ages 4 and 8, the Neighborhood Short Form was administered (possible range: 0–4). At age 6, the Neighborhood Risk Assessment was used (possible range: 0–5). In all cases, higher scores indicate safer neighborhoods.

TABLE 2 Prevalence of Early and Later Abuse and Neglect According to Time Period (N = 1323)

Type of Maltreatment	Proportion, %			
	0–2 y	2–4 y	4–6 y	6–8 y
Early neglect	38.1			
Early abuse	22.9			
Later neglect		27.4	15.3	11.8
Later abuse		23.6	13.1	10.5

sample with that of children without a history of or risk factors for maltreatment, a review of the literature was conducted. No better normative data for aggression scores than those reported by Achenbach²⁵ for a non-clinical population of children were found. For purposes of comparison, CBCL aggression scores for the study sample are reported for each of the 3 time points in Table 3. The normative data reported by Achenbach²⁵ are also shown. Although statistical comparisons were not possible, mean CBCL aggression subscale scores for the study sample were higher than the mean scores for the sample reported by Achenbach²⁵ at 4 to 11 years of age.

With the use of maximum likelihood as our model estimation method, the overall model fit was good ($\chi^2 = 858.49$; $P < .0001$). Of the control and confounder variables, child gender, child age, caregiver depression, neighborhood safety, and Midwest site were all significant predictors of aggression scores. Specifically, boys had higher aggression scores than girls, younger children had higher scores than older children, and more caregiver depressive symptoms were associated with higher aggression scores. Safer neighborhoods were associated with lower aggression scores, and the Midwest site had lower aggression scores, compared with the Northwest site.

With respect to the maltreatment variables of interest, only early neglect predicted aggression scores significantly ($t = 2.80$; $P < .01$). Early abuse, later abuse, and later neglect were not significantly predictive, and neither were the interaction terms controlling for the potential additive effect of having been reported for both abuse and neglect (Table 4). Finally, we used a fully controlled model with interactions terms for age at each interview (4, 6, and 8 years) \times early neglect, to examine whether the impact of early neglect was being driven by a specific visit effect; there were no significant interactions.

DISCUSSION

Despite the fact that neglect is the single most frequent type of maltreatment, it is less frequently the subject of studies, compared with other maltreatment types.³⁵ This

may be partly attributable to the mistaken belief that physical or sexual abuse is more serious than neglect. As a longitudinal study, LONGSCAN offers a rare opportunity to observe the long-term effects of maltreatment according to timing and type of maltreatment. As this study demonstrates, neglect may have profound and long-lasting effects on the child, particularly if that neglect occurs early in the child's development. It would be premature, however, to conclude that the impact of neglect on subsequent aggression is greater than that of abuse, given the possibility that, even in this at-risk sample with a high prevalence of maltreatment, some false-negative cases may remain undetected and many social and environmental risks that might contribute directly to the development of aggression remain unaccounted for in our study.

Our findings are consistent with our understanding of the importance of exposure to maltreatment during the early stages of child development. Dubowitz et al³⁶ found a significant relationship between psychological neglect and both internalizing and externalizing behaviors at 3 years of age. Although early maltreatment has been associated with a host of negative outcomes in later childhood, including aggressive and delinquent behavior^{11,37,38} and even adult criminal and antisocial behavior,^{2,39} Thornberry et al⁹ failed to find an effect of maltreatment (including both neglect and abuse) occurring only in early childhood on behavior in early adolescence. They did, however, find an impact of childhood-only neglect. As they stated, "Thus it appears that the general impact of childhood-only maltreatment on early adolescent outcomes . . . is produced primarily by childhood neglect, rather than childhood physical abuse."⁹

Many future studies are suggested by this analysis. Neglect does not often occur in isolation. Even in a longitudinal study with >1300 subjects, testing the effects of combinations of neglect with other types of maltreatment is challenging. In addition to aggression, it is important to study other childhood social, emotional, behavioral, cognitive, and health outcomes, to determine the possible distinct effects of different types of maltreatment. Although this study examined primarily risk factors, knowing the adverse consequences of neglect should make it possible for future studies to examine protective factors as well. Such studies would need to monitor subjects into adolescence and beyond, to determine the later outcomes of neglect. Perhaps most difficult would be studies of whether service interventions could prevent children who were neglected in their early years from becoming aggressive school-aged children.

Several limitations with respect to the generalizability

TABLE 3 Comparison of CBCL Aggression Subscale Raw Scores for Study Sample and Normative Sample

	Score, Mean \pm SD				
	Age 4	Age 6	Age 8	Across Time	Normative Sample (Ages 4–11) ^a
Male	11.3 \pm 7.5	11.4 \pm 7.5	10.7 \pm 7.3	11.2 \pm 7.5	8.2 \pm 5.8
Female	10.7 \pm 6.9	10.2 \pm 6.8	9.4 \pm 7.1	10.1 \pm 6.9	7.0 \pm 5.2

^a Data reported by Achenbach.²⁵

TABLE 4 Influence of Early and Later Maltreatment on Childhood Aggression at Ages 4, 6, and 8 Years (N = 1318)

Predictor	Estimate, Parameter ± SE	t	P
Early neglect	1.29 ± 0.46	2.80	<.01
Early abuse	0.66 ± 0.68	0.97	.33
Later neglect	0.14 ± 0.34	0.42	.68
Later abuse	0.53 ± 0.39	1.34	.18

Model $\chi^2 = 858.49$ ($P < .0001$). The model includes child's gender, child's age, child's race/ethnicity, caregiver's marital status, caregiver's education, household income, caregiver depression, neighborhood safety, early neglect \times early abuse, later neglect \times later abuse, and study site.

and interpretation of our results should be noted. First, the subjects were not drawn from a representative probability sample. Therefore the findings cannot be generalized to all US children from birth to 8 years of age. However, this sample does represent a population of children at elevated risk for or exposed to maltreatment, allowing examination of the impact of neglect alone, particularly early neglect, on subsequent aggressive behavior. Second, despite the high prevalence of maltreatment in our sample, the possibility of false-negative cases cannot be ruled out, and the effect that such an omission might have on the findings is not known. Third, site is a potential confounder because of study recruitment strategies and possible geographic influences. We attempted to control for this influence by including site in the model. The significant effect for the Midwest site (relative to the Northwest site) is evidence that site is associated with aggression scores in the current study. Nevertheless, the significant effect of early neglect was detected.

One potential confounder for which we were not able to control was change in caregiver over time. In our sample, 71% of subjects had the same caregiver across the 8 years of the study reported here. Although there is no reason to expect, a priori, that changes in caregiver would be differentially related to neglect and later aggression on one hand and abuse and later aggression on the other, this possibility should be considered in future work. Finally, caregiver reports of children's behavior may be influenced by the adult's own psychological functioning.⁴⁰ However, in the case of depressed maternal caregivers (who are disproportionately represented in our sample), this is less likely for child externalizing versus internalizing behaviors.⁴¹

Although this is a longitudinal study, the nature of the selected statistical analysis technique does not allow us to rule out the possibility that aggressive children elicit neglectful parenting. However, it is a much more probable scenario that child neglect in the early years elicits subsequent aggressive behaviors in school-aged children. Despite these limitations, this study clearly demonstrates that researchers, service providers, and policymakers should take early childhood neglect more seriously.

CONCLUSIONS

Youth violence is an important public health concern.⁴² Recent observations from 5 countries confirm the devel-

opmental trajectory from childhood physical aggression to adolescent violent and nonviolent delinquency.⁴³ Although rates of juvenile violence in the United States have decreased in recent years, the rates of violence among high school students are still very high.⁴⁴ The most-recent data from the Youth Risk Behavior Surveillance System suggest that one third of high-school students engage in physical fights, 1 in 5 carries a weapon, and 1 in 20 misses school time because of concerns about safety.⁴² Early aggressive and delinquent behavior predicts youth violence, which in turn strongly predicts adult criminal and antisocial behavior.⁴⁵ Therefore, solving the problem of early neglect has the potential for immediate, intermediate, and long-term benefits. Although many approaches to the prevention of youth violence have been developed,⁴⁶ the impact of neglect on childhood aggression, and indirectly on youth violence, has largely gone unstudied. This study demonstrates the importance of exposure to and timing of neglect in the development of early aggressive behaviors and suggests that early neglect may be a more-important precursor of youth violence than is physical abuse.

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REFERENCES

- Administration for Children, Youth, and Families. *Child Maltreatment 2004*. Washington, DC: US Government Printing Office; 2007
- Widom CS. Childhood victimization: early adversity, later psychopathology. *Natl Inst Justice J*. 2000;242:2-9. Available at: www.ncjrs.gov/pdffiles1/jr000242b.pdf. Accessed February 5, 2008
- Manly JT, Kim JE, Rogosch FA, Cicchetti D. Dimensions of child maltreatment and children's adjustment: contributions of developmental timing and subtype. *Dev Psychopathol*. 2001;13(4):759-782
- Hildyard KL, Wolfe DA. Child neglect: developmental issues and outcomes. *Child Abuse Negl*. 2002;26(6-7):679-695
- Smith D, Thornberry TP. The relationship between childhood maltreatment and adolescent involvement in delinquency. *Criminology*. 1995;33(4):451-481
- Zingraff M, Leiter J, Myers K, Johnson M. Child maltreatment and youthful problem behavior. *Criminology*. 1993;31(2):173-202
- Hussey JM, Chang JJ, Kotch JB. Child maltreatment in the United States: prevalence, risk factors, and adolescent health consequences. *Pediatrics*. 2006;118(3):933-942
- Knutson JF, DeGarmo DS, Reid JB. Social disadvantage and neglectful parenting as precursors to the development of antisocial and aggressive child behavior: testing a theoretical model. *Aggress Behav*. 2004;30(3):187-205
- Thornberry TP, Ireland TO, Smith CA. The importance of timing: the varying impact of childhood and adolescent maltreatment on multiple problem outcomes. *Dev Psychopathol*. 2001;13(4):957-979
- Garbarino J. The human ecology of child maltreatment: a conceptual model for research. *J Marriage Fam*. 1977;39(4):721-731
- Heck C, Walsh A. The effects of maltreatment and family

- structure on minor and serious delinquency. *Int J Offend Ther Comp Criminol.* 2000;44(2):178–193
12. Kotch JB, Browne DC, Ringwalt CL, et al. Risk of child abuse or neglect in cohort low-income children. *Child Abuse Negl.* 1995;19(9):1115–1130
 13. Kotch JB, Browne DC, Dufort V, Winsor J, Catellier D. Predicting child maltreatment in the first 4 years of life from characteristics assessed in the neonatal period. *Child Abuse Negl.* 1999;23(4):305–319
 14. Coulton CJ, Korbin J, Su M, Chow J. Community level factors and child maltreatment rates. *Child Dev.* 1995;66(5):1262–1276
 15. Guerra NG, Huesmann LR, Spindler A. Community violence exposure, social cognition, and aggression among urban elementary school children. *Child Dev.* 2003;74(5):1561–1576
 16. Ohannessian CM, Hesselbrock VM, Kramer J, et al. The relationship between parental psychopathology and adolescent psychopathology: an examination of gender patterns. *J Emot Behav Disord.* 2005;13(2):67–76
 17. Dodge KA, Pettit GS, Bates JE. How the experience of early physical abuse leads children to become chronically aggressive. In: Cicchetti D, Toth SL, eds. *Developmental Perspectives on Trauma: Theory, Research, and Intervention.* Rochester, NY: Boydell and Brewer; 1997:263–288
 18. Runyan DK, Curtis PA, Hunter WM, et al. LONGSCAN: a consortium for longitudinal studies of maltreatment and the life course of children. *Aggress Viol Behav.* 1998;3(3):275–285
 19. English DJ, Bangdiwala SI, Runyan DK. The dimensions of maltreatment: introduction. *Child Abuse Negl.* 2005;29(5):441–460
 20. Barnett D, Manly JT, Cicchetti D. Defining child maltreatment: the interface between policy and research. In: Cicchetti D, Toth SL, eds. *Child Abuse, Child Development, and Social Policy.* Norwood, NJ: Ablex; 1993:7–74
 21. Drake B. Unraveling “unsubstantiated.” *Child Maltreat.* 1996;1(3):261–271
 22. Giovannoni J. Substantiated and unsubstantiated reports of child maltreatment. *Child Youth Serv Rev.* 1989;11(4):299–318
 23. Hussey JM, Marshall JM, English D, et al. Defining maltreatment according to substantiation: distinction without a difference? *Child Abuse Negl.* 2005;29(5):279–292
 24. Leiter J, Myers KA, Zingraff MT. Substantiated and unsubstantiated cases of child maltreatment: Do their consequences differ? *Soc Work Res.* 1994;18(2):67–82
 25. Achenbach TM. *Manual for the Child Behavior Checklist/4–18 and 1991 Profile.* 2nd ed. Burlington, VT: LEA Associates; 1991
 26. Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. *J Appl Psychol Measure.* 1977;1(3):385–401
 27. Derogatis LR. *Brief Symptom Inventory.* Baltimore, MD: Clinical Psychometric Research; 1975
 28. Hunter WM, Cox CE, Teagle S, et al. *Measures for Assessment of Functioning and Outcomes in Longitudinal Research on Child Abuse, Vol 1: Early Childhood.* Chapel Hill, NC: University of North Carolina at Chapel Hill; 2003. Available at: www.iprc.unc.edu/longscan/pages/measures/index.htm. Accessed February 5, 2008
 29. Hunter WM, Cox CE, Teagle S, et al. *Measures for Assessment of Functioning and Outcomes in Longitudinal Research on Child Abuse, Vol 2: Middle Childhood.* Chapel Hill, NC: University of North Carolina at Chapel Hill; 2003. Available at: www.iprc.unc.edu/longscan/pages/measures/index.htm. Accessed February 5, 2008
 30. Chase-Lansdale PL, Gordon RA, Brooks-Gunn J, Klebanov PK. Neighborhood and family influences on the intellectual and behavioral competence of preschool and early school-age children. In: Brooks-Gunn J, Duncan J, Aber JL, eds. *Neighborhood Poverty: Context and Consequences for Children.* New York, NY: Russell Sage Foundation; 1997:79–119
 31. Klebanov PK, Brooks-Gunn J, Duncan J. Does neighborhood and family poverty affect mother’s parenting, mental health, and social support? *J Marriage Fam.* 1994;56(2):441–455
 32. Edwards LJ. Modern statistical techniques for the analysis of longitudinal data in biomedical research. *Pediatr Pulmonol.* 2000;30(4):330–344
 33. Laird NM, Ware JH. Random-effects models for longitudinal data. *Biometrics.* 1982;38(4):963–974
 34. Singer JD, Willett JB. *Applied Longitudinal Data Analysis: Modeling Change and Even Occurrence.* New York, NY: Oxford University Press; 2003
 35. Dubowitz H. Neglecting the neglect of neglect. *J Interpers Violence.* 1994;9(4):556–560
 36. Dubowitz H, Papas MA, Black MM, Starr RH Jr. Child neglect: outcomes in high-risk urban preschoolers. *Pediatrics.* 2002;109(6):1100–1107
 37. Bank L, Burraston B. Abusive home environments as predictors of poor adjustment during adolescence and early adulthood. *J Community Psychol.* 2001;29(3):195–217
 38. Bolger KE, Patterson CJ. Developmental pathways from child maltreatment to peer rejection. *Child Dev.* 2001;72(2):549–568
 39. Widom CS. Child abuse, neglect, and violent criminal behavior. *Criminology.* 1989;27(2):251–271
 40. Youngstrom E, Loeber R, Stouthamer-Loeber M. Patterns and correlates of agreement between parent, teacher, and male adolescent ratings of externalizing and internalizing problems. *J Consult Clin Psychol.* 2000;68(6):1038–1050
 41. Berg-Nielsen TS, Vika A, Dahl AA. When adolescents disagree with their mothers: CBCL-YSR discrepancies related to maternal depression and adolescent self-esteem. *Child Care Health Dev.* 2003;29(3):207–213
 42. Office of the Surgeon General. *Youth Violence: A Report of the Surgeon General.* Rockville, MD: US Department of Health and Human Services; 2001
 43. Brody LM, Nagin DS, Tremblay RE, et al. Developmental trajectories of childhood disruptive behaviors and adolescent delinquency: a six-site, cross-national study. *Dev Psychol.* 2003;39(2):222–245
 44. Brener N, Lowry R, Barrios L, Simon T, Eaton D. Violence-related behaviors among high school students: United States, 1991–2003. *JAMA.* 2004;292(10):1168–1169
 45. Huesmann LR, Eron LD, Dubow EF. Childhood predictors of adult criminality: are all risk factors reflected in childhood aggressiveness? *Crim Behav Ment Health.* 2002;12(3):185–208
 46. Centers for Disease Control and Prevention. School health guidelines to prevent unintentional injuries and violence. *MMWR Recomm Rep.* 2001;50(RR-22):1–73

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