

JOURNAL HIGHLIGHTS

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Addressing Early Childhood Adversity

Support for intervening early in the lives of vulnerable children has come increasingly from our knowledge of brain development, genetics, and the toxic effects of early stress and maltreatment. Advances in a wide range of biological, behavioral, and social sciences are expanding our understanding of how early child maltreatment, environmental influences, and genetic predispositions affect lifelong physical and mental health. This has increased our interest in reducing these risks for all children and in early identification of children and families who would benefit from special programs such as early childhood education and home-visitation programs. Brownell et al. designed a screening process for newborns to predict family risk for out-of-home placement. This article reports on whether all families with newborns were screened, the screening tool's predictive validity for identifying risk of out-of-home placement as a proxy for maltreatment, and which items were most predictive. Using all infants born in Manitoba, Canada, from 2000 to 2002, the authors linked four population-based data sets (newborn screening data on biological, psychological, and social risks, population registry data on demographics, hospital discharge data on newborn birth records, and data on children entering out-of-home care) through age 4 years. They noted that 18.4% were not screened and 3.0% were placed in out-of-home care at least once during the study period. Infants screening "at risk" were 15 times more likely to enter out-of-home care than were those screening "not at risk." Sensitivity and specificity of the screen were 77.6% and 83.3%, respectively. The screening tool demonstrated moderate predictive validity for identifying children at risk for entering care in the first years of life. However, screening efforts to identify vulnerable families missed a substantial portion of families needing support.

Home visitation is increasingly recognized for its potential to foster early child development and competent parenting as well as to reduce risk for child abuse and neglect and other poor outcomes for vulnerable families. Azzi-Lessing provides a discussion of several aspects of home-visitation programs that warrant further development and evaluation, including the powerful role of context in determining program outcomes as well as the impact of other factors, such as service dosage, levels of family engagement, and characteristics of home visitors. The importance of more accurately understanding and measuring risk and engaging family members beyond the mother-child dyad is also discussed. Recommendations are made for making improvements in all of these areas in order to strengthen home-visitation programs and produce better outcomes for the children and

families they serve. Aspects of the Nurse Family Partnership and Early Head Start, two widely replicated and rigorously evaluated programs, are highlighted to demonstrate how the issues discussed here are likely to affect service delivery and program outcomes. There are multiple challenges inherent in replicating and evaluating home-visitation programs, and programs that are truly responsive to the needs of a wide array of families with young children are examined.

In a policy statement and supporting technical report, the American Academy of Pediatrics (AAP) presents an integrated "ecobiodevelopmental" framework to assist in translating dramatic advances in developmental science into improved health across the life span. Pediatricians are now being armed with new information about the adverse effects of toxic stress such as maltreatment on brain development as well as a deeper understanding of the early life origins of many adult diseases. Pediatric providers should now complement the early identification of developmental concerns with a greater focus on those interventions and community investments that reduce external threats to healthy brain growth. The AAP endorses a leadership role for the entire pediatric community—one that mobilizes the scientific expertise of both basic and clinical researchers, the family-centered care of the pediatric medical home, and the public influence of AAP and its state chapters. As an organization, the AAP is committed to leveraging science to inform the development of innovative strategies to reduce the precipitants of toxic stress in young children and to mitigate their negative effects on the course of development and health across the life span.

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Biologic Changes Associated with Trauma

Although current evidence is replete with data that support linkages between exposure to violence or abuse and the subsequent development of medical illnesses, the exact underlying mechanisms of these relationships are poorly understood. Physiologic changes occurring in violence- or abuse-exposed individuals point to potentially common biological pathways connecting traumatic exposures with medical outcomes. Keeshin, Cronholm, and Strong (2012) reviewed the long-term physiologic changes in abuse and violence-exposed populations and their associated medical illnesses. They examined the current data that support the presence of specific neurobiochemical changes associated with exposure to violence and abuse, the biological pathways that have the potential to lead to the development of future illness, and the common physiologic mechanisms that may moderate the severity, phenomenology, or clinical course of medical illnesses in individuals with histories of exposure to violence or abuse. They concluded that additional work is needed to advance our emerging understanding of the biological mechanisms connecting exposure to violence and abuse with negative health outcomes.

One mechanism that has been postulated is posttraumatic stress. Posttraumatic stress disorder (PTSD) is associated with increased risk for age-related diseases and early mortality, and an accelerated rate of biological aging could contribute to this increased risk. Telomeres on human chromosomes shorten as we get older, and their length has been associated with premature aging and disease. O'Donovan et al. (2011) assessed leukocyte telomere length as an emerging marker of biological age in men and women with and without PTSD and examined childhood trauma as a risk factor for both PTSD and short leukocyte telomere length. Participants included 43 adults with chronic PTSD and 47 control subjects (none with multiple categories of childhood trauma). Structured clinical interviews were conducted to assess PTSD and other psychiatric disorders and childhood trauma exposure, and leukocyte telomere length LTL was measured with a quantitative polymerase chain reaction method. Participants with PTSD had shorter age-adjusted leukocyte telomere length than did control subjects and exposure to childhood trauma was also associated with short leukocyte telomere length. Childhood trauma seemed to account for the PTSD group difference. The authors concluded that childhood trauma is associated with short leukocyte telomere length in individuals with PTSD and that chronic exposure to the psychobiological sequelae of childhood trauma could increase risk for PTSD and short leukocyte telomere length, suggesting the lasting psychological impact of exposure to trauma in childhood might be accompanied by equally enduring changes at the molecular level.

Shaley et al. (2012) examined telomere erosion in relation to children's exposure to violence, which also has known long-term

consequences for well-being and is a major public health and social welfare problem. In the first prospective-longitudinal study with repeated telomere measurements in children while they experienced stress, they tested the hypothesis that childhood violence exposure would accelerate telomere erosion from age 5 to age 10 years. Violence was assessed as exposure to maternal domestic violence, frequent bullying victimization, and physical maltreatment by an adult. Participants were 236 children recruited from the Environmental-Risk Longitudinal Twin Study, a nationally representative 1994–1995 birth cohort. Each child's mean relative telomere length was measured simultaneously in baseline and follow-up DNA samples. Compared with their counterparts, the children who experienced two or more kinds of violence exposure showed significantly more telomere erosion between baseline and follow-up measurements, even after adjusting for gender, socioeconomic status, and body mass index. They concluded that this finding provides support for a mechanism linking cumulative childhood stress to telomere maintenance at a young age with potential impact for life-long health.

In an additional study, low-socioeconomic status (SES) was studied to assess whether there was any association with accelerated biological aging because prior findings relating SES with telomere length have been inconsistent. Steptoe et al. (2011) tested the hypotheses that shorter telomere length and telomerase activity would be related more to education than to current indicators of socioeconomic circumstances. Healthy men and women ages 53–76 years from the Whitehall II epidemiological cohort provided blood samples from which telomere length was assessed in more than 400 individuals. Educational attainment was classified into four levels, while household income and grade of employment were measured as indicators of current socioeconomic circumstances. Age, gender, blood pressure, glycosylated hemoglobin, high-density lipoprotein cholesterol, smoking, body mass index, and physical activity were included as covariates. They found that lower educational attainment was associated with shorter telomere length after controlling statistically for biological and behavioral covariates. Neither household income nor employment grade was related to telomere length. The association between telomere length and education remained significant after adjusting for current socioeconomic circumstances. In men, highest levels of telomerase activity were found in the lowest education group. They concluded that low SES defined in terms of education but not current socioeconomic circumstances is associated with shortened telomeres. Education may promote problem-solving skills leading to reduced biological stress reactivity with favorable consequences for biological aging.

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Trends in Child Maltreatment Epidemiology

Several recent trends have been noted in the epidemiology of child maltreatment and the potential effects of the national economic recession on injuries and reports of child abuse and neglect. To assess trends in children's exposure to abuse, violence, and crime victimizations, Finkelhor et al. (2010) analyzed two cross-sectional national telephone surveys using identical questions in 2003 and 2008 to measure the experiences of children aged 2 to 17 years (2,030 children in 2003 and 4,046 children in 2008). Using responses to the *Juvenile Victimization Questionnaire*, they found that physical assaults, sexual assaults, and peer and sibling victimizations, including physical bullying, were reported significantly less often in 2008 than in 2003. There were also significant declines in psychological and emotional abuse by caregivers, exposure to community violence, and the crime of theft. Physical abuse and neglect by caregivers did not decline, and witnessing the abuse of a sibling increased. They concluded that these declines parallel evidence from other sources, including police data, child welfare data, and the National Crime Victimization Survey, and suggested that there were reductions in various types of childhood victimization in recent years.

Berger et al. (2011) evaluated the rate of abusive head trauma (AHT) in three regions of the United States before and during the economic recession to assess whether there was a relationship between the rate of AHT and county-level unemployment rates. They collected clinical data for AHT cases diagnosed in children younger than 5 years from January 1, 2004, until June 30, 2009, by hospital-based child protection teams within three geographic regions. They defined the recession as December 1, 2007, through June 30, 2009. Quarterly unemployment rates were collected for every county in which an AHT case occurred. They found that during the 5 1/2-year study period, a total of 422 children were diagnosed with AHT in a 74-county region, and the overall rate of AHT increased from 8.9 in 100,000 before to 14.7 in 100,000 during the recession. There was no difference in the

clinical characteristics of subjects in the prerecession versus recession periods and no relationship between the rate of AHT and county-level unemployment rates. They concluded that the rate of AHT increased significantly during the recession and that this finding was consistent with our understanding of the effect of stress on violence. Given the high morbidity and mortality rates for children with AHT, they also concluded that prevention efforts might need to be increased significantly during times of economic hardship.

Leventhal, Martin, and Gaither (2012) used the 2006 Kids' Inpatient Database to estimate the incidence of hospitalizations due to serious physical abuse among children <18 years of age. Abuse was defined by using *International Classification of Diseases, Ninth Revision, Clinical Modification* codes for injuries (800–959) and for physical abuse (995.50, 995.54, 995.55, or 995.59), selected assault codes (E960–966, 968), or child battering (E967). They examined demographic characteristics, mean costs, and length of stay in three groups of hospitalized children: abusive injuries, nonabusive injuries, and all other reasons for hospitalization. Incidence was calculated using the weighted number of cases of physical abuse and the number of children at risk based on 2006 intercensal data.

They found that the weighted number of cases due to abuse was 4,569 and the incidence was 6.2 per 100,000 children <18 years of age. The incidence was highest in children <1 year of age (58.2 per 100,000) and even higher in infants covered by Medicaid (133.1 per 100,000). Overall, there were 300 children who died in the hospital due to physical abuse. They concluded that data from the 2006 Kids' Inpatient Database on hospitalizations due to serious physical abuse can be used to track trends over time and the effects of prevention programs on serious physical abuse.

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Maltreatment and Unintentional Child Deaths

Vital statistics, medical examiner and police reports, and CPS reports often inaccurately underascertain maltreatment mortality, especially when there is an absence of physical findings directly related to an abusive act. Several investigators have begun to note

a potential relationship between child maltreatment and later accidental injury and have also highlighted the difficulty in differentiating neglect from unintentional or accidental deaths. Parks et al. (2011) examined unintentional injury deaths among children with and without a history of child maltreatment. Using data from reviews of 1,192 unintentional injury deaths occurring among children in Texas during 2005–2007, they examined differences in child demographic characteristics, injury mechanism, and supervisor status at time of death between children with and without maltreatment history by using descriptive statistics. Separate analyses compared characteristics of asphyxia, drowning, and poisoning deaths. They found that in 10% of the unintentional injury deaths reviewed, the child had a history of maltreatment. The prevalence of a history of maltreatment was highest among blacks and lowest among whites. Prevalence was also high among infants and low among older youth ages 10–14 years. Among deaths where there was no maltreatment history, 54% were due to motor vehicle-related incidents, whereas among deaths of children with maltreatment history, 51% were caused by drowning, asphyxia, and poisoning. Supervisors of child who died with a history of maltreatment were significantly more likely to have been alcohol impaired (6.9% vs. 1.6%) or asleep (12.1% vs. 6.6%) at the time of the death. Differences between cases with and without maltreatment history were also observed in infant sleep surface in suffocation deaths, location and barrier type in drowning deaths, and substance type in poisoning deaths. They concluded that the mechanisms and circumstances surrounding unintentional injury deaths among children with a history of maltreatment differ from those without a history of maltreatment. They noted that this underscores the need for appropriate interventions to prevent injuries in families with a history of maltreatment.

Putnam-Hornstein (2011) reported a population-based study of early childhood injury mortality following a nonfatal allegation of maltreatment. She used a unique data set constructed by establishing child-level linkages between vital birth records, administrative child protective services records, and vital death records. These linked data reflected over 4.3 million children born in California between 1999 and 2006 and provided a longitudinal record of maltreatment allegations and death. Children reported for nonfatal maltreatment subsequently faced a heightened risk of unintentional and intentional injury mortality during the first 5 years of life (after adjusting for risk factors at birth). Children with a prior allegation of maltreatment were noted as dying from intentional injuries at a rate that was 5.9 times greater than unreported children and twice the rate as from unintentional injuries. She also noted that a prior allegation to CPS proved to be the strongest independent risk factor for injury mortality before the age of 5 years.

Schnitzer, Covington, and Kruse (2011) reported that most unintentional injury deaths among young children result from inadequate supervision or failure by caregivers to protect the child from potential hazards. They note that while determining whether inadequate supervision or failure to protect could be classified as child neglect, a component of child death review (CDR) in most states, establishing that an unintentional injury death was neglect-related can be challenging because differing definitions, lack of standards regarding supervision, and changing norms make consensus difficult. In this study, CDR team members were surveyed and asked to classify 20 vignettes presented in 10 pairs that described the circumstances of unintentional injury deaths among children. Vignette pairs differed by an attribute that might affect classification, such as poverty or intent. Categories for classifying vignettes were that the caregiver was not responsible/not neglect related, that there was some caregiver responsibility/some-what neglect related, or that the caregiver was responsible/case definitely neglect related. CDR team members (287) from five states completed surveys, and respondents assigned the child's caregiver at least some responsibility for the death in 18 vignettes (90%). A majority of respondents classified the caregiver as definitely responsible for the child's death in 8 vignettes (40%). This study found that the attributes that influence CDR team members' decisions are supervision, intent, failure to use safety devices, and a pattern of previous neglectful behavior. The authors suggest these findings offer insight for incorporating injury prevention into CDR more effectively.

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