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Prologue: More and more evidence seems to suggest that successful efforts to curb violent behavior should begin early in a child’s life. It also may be possible to determine early on what predisposes a person to become violent. To that end, the Harvard School of Public Health has embarked on a ten-year study to “try to pinpoint what steers inner-city children toward crime,” according to The Wall Street Journal (5 June 1992). In this paper Stephen Buka and study director Felton Earls enumerate some of the factors that may be steps along early pathways toward delinquency and violence, focusing on children before they reach school age. They assert, “Our society has not yet committed itself to supporting families during this critical development period” in a child’s life, during which many of a child’s attitudes and habits begin to form. They believe that violent behavior “results from a complex interplay of multiple factors cascading over multiple points in the life course.” Understanding this interplay involves studying a moving picture rather than a snapshot, they believe. Proven early intervention strategies to reduce delinquency and violence exist and should be expanded nationwide. Buka received a doctorate in epidemiology from the Harvard School of Public Health and is an assistant professor in the Department of Maternal and Child Health of the Harvard School of Public Health. Earls is professor of human behavior and development at the Harvard School of Public Health and professor of child psychiatry at the Harvard Medical School. He received his medical degree from Howard University in Washington, D.C., with specialties in pediatrics and psychiatry. He was a member of the National Research Council Panel on the Understanding and Control of Violent Behavior.
Abstract: The past several decades have resulted in an explosion of knowledge about the development of young children, knowledge that is often underused in the policy-making process. This paper reviews established risk factors for later delinquency and violence that are present prior to school age. The results suggest that established population-based efforts in education and health should be expanded, in anticipation of reducing violent behavior. More intensive intervention efforts that provide a continuum of services for children and families during a vulnerable development period also are warranted. New research directions also are described.

As policymakers, scientists, and citizens wrestle with how to control and prevent the high levels and increasing seriousness of violence, there is growing interest in policies directed toward young children and their families. From the policy realm, these sentiments have been championed by Attorney General Janet Reno, through frequent assertions that “the most formative time of a person’s life is in the age of zero to three when they learn the concept of reward and develop the sense of a conscience and punishment.”  

Similarly, the first recommendation of a recent blue-ribbon scientific panel on the Understanding and Control of Violent Behavior was “intervening in the biological and psychosocial development of individuals’ potentials for violent behavior.”

Public interest in early childhood intervention strategies is reflected through current support for federal initiatives such as Project Head Start, legislative control of media violence, and similar efforts.

Collectively, these strategies do not constitute a sufficiently strong safety net for the many families that need greater support. Society still regards the family as primarily responsible for the care and education of young children. No institution equivalent to public schools exists to assume the care and educational functions of children before they reach school age. Thus we rightfully employ the term preschool to categorize a group of children who are before the age at which society accepts responsibility for their education, welfare, and healthy development.

Roots in Head Start program. As did the War on Poverty before it, the “war on violence” has called on the science of child development for solutions and strategies to problems and conditions that surface during adolescence and young adulthood. In the 1960s policymakers concerned with economic and educational disadvantages among minority groups introduced Project Head Start and other programs directed at children in their first five years of life. The initial Head Start planning committee set five goals: improving the child’s physical health and abilities; encouraging self-confidence and self-discipline; establishing patterns and expectations of success; increasing the child’s capacity to relate positively to others; and developing a responsible attitude toward society. Yet nothing in the history of early education remotely implied that preschools could achieve such ambitious goals. In the 1960s the field of child development had simply
not conducted the basic research and development work necessary to recommend national policies that could be firmly based on scientific evidence. If Head Start proved to be a success, it was not because of its strong empirical foundation.

Thirty years later police, justice officials, and health professionals concerned with elevated rates of adolescent and adult violence once again have turned a hopeful eye to policies directed at early childhood. Fortunately, the scientific community now has more to offer. Stimulated in large part by the Head Start experience, the past generation of child development research has produced a wealth of relevant applied research and development. Professional journals and societies now focus on topics such as the effects on subsequent cognitive and emotional development of early day care, support and training of parents, television viewing, early education, and child abuse. Similarly, the methods and content of much of the basic science of child development have contributed new evidence that can inform public policy debates better than was possible in the 1960s.

In this paper we examine the recent scientific literature, with the aims of (1) identifying what is known about the early determinants of violence; (2) identifying potential causes of violence for future investigation and possible policy development; and (3) suggesting public policy strategies. We limit ourselves to factors that are present before a child reaches school age (from conception through age six). Our rationale for the focus on early childhood is not that we believe that interventions in this period offer a panacea to control violence but rather that it is a period during which the central nervous system changes rapidly and profoundly and during which the attitudes and habits of children are formed. Our society has not yet committed itself to supporting families during this critical development period.

Establishing causation. This task of translating scientific studies and evidence about young children into public policies aimed toward adolescents and young adults is far from straightforward. First, possibly more than in any other realm of policy debate, personal experiences, beliefs, and biases strongly influence the translation process. Unlike policies for most areas of scientific and technological development, we all have personal philosophies and theories about child development. Second, although much more research and evidence now exists on the early precursors of violence, there still is considerable uncertainty about the causes and prevention of violence. The task of establishing causal factors from the myriad of research on violent behavior is complex and unfinished.

Violent behavior results from a complex interplay of multiple factors cascading over multiple points in the life course, factors that involve physical and emotional development, family influences, peers, and society. Identifying single or key causal elements in this process even immediately
before an act of violence occurs is difficult and demands intensive research and analysis. Predicting these outcomes and identifying causes from early childhood, years before the violence occurs, becomes even more daunting. This is complicated by the fact that scientists in this field rarely are able to use experiments to determine causality. Ethical, financial, and practical constraints restrict our capacity to manipulate presumed causal factors and record the results. We cannot randomly subject young children to physical abuse and neglect and wait ten years to see if they become violent.

Epidemiology, sociology, and other forms of observational science have struggled with this question of how to distinguish causes from noncausal associations without the benefit of experimentation. Austin Bradford Hill identifies nine standards as criteria for causal inference; of these, five are particularly relevant for the current exercise: (1) temporality; (2) strength of association; (3) consistency; (4) dose-response; and (5) plausibility. Temporality refers to the requirement that the cause precede the effect in time, a condition that is satisfied by prospective longitudinal studies but not necessarily by retrospective or cross-sectional investigations. Strength of association suggests that strong associations are more likely than weak associations to be causal. Consistency refers to the belief that repeated observation of an association in different populations under different circumstances reflects an authentic causal relationship. Causation also is reflected by a dose-response relationship, in which, for example, the observation that risk of cognitive impairment rises with increasing blood lead levels adds to our belief that lead consumption causes cognitive damage. Plausibility strictly refers to the biologic plausibility of the hypothesis but is used here to refer to the absence of confounding by a third factor. For example, living in deteriorating buildings may be associated with cognitive impairment but does not cause it. A third Variable-digesting lead chips on the building floor-accounts for the observed association between housing and cognitive impairment.

Familiarity with these standards not only advances good science but also welcomes meaningful policy debate. Public policy should rise from a solid foundation of the early causal processes leading to and away from the development of violent behavior. Policy based on simple associations alone will be merely a house of cards, destined for collapse and disappointment. With these caveats we are prepared to approach the growing body of research on early child development and violence with a well-trained eye, vigilant for causes and potential causes and undistracted by mere shadows and associations. Our torches are directed on three signposts that can guide us to effective policy recommendations: (1) causes, not correlates; (2) pathways, not predictors; and (3) interventions based on established fact, not on best intentions.
Early Predictors of Delinquency and Violence

Several related behaviors are subsumed under the heading “delinquency and violence.” The most general class of behavior is characterized by defiance and destructiveness. This behavior is commonly termed antisocial and in psychiatric parlance can be sufficiently troublesome to warrant a diagnosis of conduct disorder.\(^{13}\) Often this antisocial behavior involves legal problems for which police arrest, court actions, and a variety of negative sanctions might be invoked. Once recognized by the juvenile or criminal justice system, this behavior is considered delinquent. Violence, which by definition results in some form of injury if not death, embodies the most serious manifestation of antisocial behavior. It is worth stressing that not all persons who behave violently have a background of persistent antisocial behavior, and violence need not represent the ultimate expression of an antisocial career. As discussed below, a variety of developmental pathways can lead a person toward interpersonal violence. However, we would expect that most persons who commit criminally violent acts have a background of antisocial behavior serious enough to warrant the attention of school, medical, or criminal justice authorities.

Several recent literature reviews have summarized the risk factors for adolescent violence and delinquency.\(^{14}\) Most of these have come from studies of school-age children; far fewer have included children younger than age eight. This research has focused mostly on characteristics of the individual child and family, rather than on the settings in which they develop (day care, preschool, neighborhood, and community). Exhibit 1 lists those conditions, which are features either of a child’s development or of the family environment, that have largely been established in the scientific literature as risk factors for later delinquent behavior.

### Characteristics of Children

**Behavior problems.** The single strongest individual-level predictor of violence in adolescence and adulthood is antisocial behavior (aggression, stealing, lying, dishonesty, and so on) during late childhood and early adolescence.\(^{15}\) In particular, aggressive behavior during childhood has been found to be related to adult violence.\(^{16}\)

Few studies have examined preschool conduct problems and violent behavior in adolescence or beyond. Jennifer White and colleagues reported that of a host of measures of physical health, cognitive and motor abilities, language development, and behavior, preschool behavior problems measured at ages three and five were the best predictors of persistent antisocial outcomes in early adolescence.\(^{17}\) Similarly, Naomi Richman and colleagues
Exhibit 1
Early Predictors Of Delinquency And Violence

<table>
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<tr>
<th>Characteristics of children</th>
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<tr>
<td>Antisocial behavior/behavior problems</td>
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<tr>
<td>Low IQ (especially low verbal ability)</td>
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<tr>
<td>Attention deficit hyperactivity disorder</td>
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<tr>
<td>Learning disability</td>
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<tr>
<td>Poor motor-skill development</td>
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<tr>
<td>Prenatal and perinatal complications</td>
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<tr>
<td>Minor physical anomalies</td>
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<td>Head injury</td>
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<th>Characteristics of the family</th>
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<tr>
<td>Parenting practices</td>
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<tr>
<td>- Lack of parental supervision</td>
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<td>- Parental rejection</td>
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<tr>
<td>- Lack of parental involvement</td>
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<td>- Poor parental disciplinary practices</td>
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<tr>
<td>Family criminal behavior</td>
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<tr>
<td>Child abuse/neglect</td>
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<tr>
<td>Poor marital relations</td>
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<tr>
<td>Parental absence due to divorce or separation</td>
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<tr>
<td>Large family size</td>
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found a significant association between early behavior disturbances (ages three and four) and antisocial behavior at age eight.\(^{18}\) Further support comes from retrospective studies that show a long history of behavior problems in school-age children with conduct disorders.\(^{19}\)

Although early antisocial behavior is the strongest established predictor of delinquency, the majority of children exhibiting that behavior do not become delinquent.\(^{20}\) Epidemiological studies of preschool children reveal a high prevalence of behavior problems in the general population.\(^{21}\) Yet follow-up studies indicate that as many as 40 percent of the children so identified in the preschool period are not disturbed at school age.\(^{22}\) Other factors are influential in leading some, but not most, children with early behavior problems toward later delinquency and violence.

**Low cognitive ability.** Many studies have shown low IQ, especially when attributed to poor verbal ability, and poor academic performance among young school-age children to be predictive of subsequent delinquency.\(^{23}\) This association between cognitive ability and future antisocial behavior also has been demonstrated in preschool-age children. Irving Schonfeld and colleagues found that low intelligence measured at age four increased the risk of later conduct disorder.\(^{24}\) Many other examples exist in the literature.\(^{25}\)

**Attention deficit and hyperactivity.** Attention deficit hyperactivity disorder (ADHD), which often can be identified as early as the preschool
years, is highly correlated with antisocial behavior and conduct disorders.\textsuperscript{26} Furthermore, the attention deficits thought to be associated with hyperactivity are characteristic of delinquents. Several long-term follow-up studies of hyperactive children as well as family history studies suggest that this link may be of causal significance.\textsuperscript{27} Gabrielle Weiss found that hyperactive children referred to clinics in early childhood were at increased risk for delinquency.\textsuperscript{28} Also, White and colleagues found that externalizing behavior (which includes hyperactivity) at age three is predictive of antisocial behavior at age eleven and to a more modest extent is predictive of adolescent delinquency.\textsuperscript{29}

**Learning disability.** Officially recorded delinquency rates are higher for adolescents with learning disabilities, and these youths are disproportionately represented in the delinquent population.\textsuperscript{30} Learning disabilities, especially reading disability, are associated with conduct disorder.\textsuperscript{31} Several longitudinal studies have shown that children with learning disabilities are at increased risk for delinquency.\textsuperscript{32}

**Poor motor-skill development.** White and colleagues also found a relationship between poor motor skills at age five and antisocial outcomes at age eleven and delinquency at age fifteen.\textsuperscript{33} They attribute this to the fact that poor motor-skill development may be an early indication of ADHD.

**Prenatal and perinatal complications.** Several studies have reported that complications during pregnancy and childbirth are predictive of delinquency; others have not replicated this finding.\textsuperscript{34} This inconsistency may stem from recent research indicating that prenatal and perinatal complications may be linked to violent, but not necessarily to nonviolent, criminal behavior.\textsuperscript{35} In any case, the relationship appears to be influenced by other mediating factors.\textsuperscript{36} For example, data from a Danish birth cohort indicate that prenatal/perinatal factors were related to violent behavior at age twenty-one only for children raised in unstable homes or for offspring of parents with a psychiatric history.\textsuperscript{37} Furthermore, considerable evidence associates prenatal/perinatal complications with central nervous system dysfunction, including impaired intelligence and attention-deficit disorder, which in turn has been linked to later antisocial and delinquent behavior.\textsuperscript{38}

**Minor physical anomalies.** Minor malformations in external physical characteristics, such as malformed, low-set, or asymmetrical ears and curved fingers, have been termed minor physical anomalies and have been shown to be present in hyperactive and nonhyperactive children who subsequently become engaged in criminal activity and chronic violent offending.\textsuperscript{39} Analyses have suggested that minor physical anomalies are associated with later violence only for children raised in unstable, nonintact families; the risk associated with such anomalies is minimized for children raised in stable family environments.\textsuperscript{40}
Head injuries. There is some evidence suggesting a possible link between early head injuries and future delinquency. Dorothy Lewis and colleagues compared the medical histories of incarcerated and nonincarcerated delinquents. This study showed that perinatal complications and prior head injury were most predictive of membership in the incarcerated group, which had more offenses and a greater proportion of violent offenses. The significant difference between the groups in head injuries was evident even for injuries occurring before age two. Deborah Denno found further support for an association between early head injury and violence: Three of twenty-eight violent and chronic criminals whose cases she studied had sustained a head injury between the ages of four and eight, whereas none of the noncriminal controls had a record of head injury.

Characteristics Of The Family

Parenting practices. Many parenting practices have been studied as antecedents to delinquency. Although definitions vary from study to study, in broad terms, lack of supervision, parental rejection, lack of parental involvement, lack of positive parenting, and poor disciplinary practices have been identified as predictors of future delinquency. A causal relationship has not yet been demonstrated between these parenting practices and delinquency, but compared to other family-level factors, parenting practices are the most powerful predictors of later delinquency. Composite measures of parenting skills are better predictors of delinquency than are measures of individual skills.

Some studies that look at this relationship distinguish between overt antisocial behavior such as aggression or person-oriented crimes and covert behavior such as stealing, lying, and property-oriented crimes. There is some evidence to support the proposition that children demonstrating overt antisocial behavior are more likely to have had restrictive, punitive, and rejecting parents than are those demonstrating covert behavior. Furthermore, David Farrington found that violent offenders often experienced poor child-rearing methods and lack of supervision during childhood.

Most of these studies have focused on school-age children, and very little is known about the impact of parenting practices in early childhood on future delinquency. However, there is some indirect evidence in support of such a relationship. Izzy Kelvin and colleagues found that poor physical care of children between birth and age five predicted later delinquency and adult criminality. Measures of parental emotional distress at age four also have been found to be a contributing factor in the development of conduct disorder. For example, Richman and colleagues found that children at ages three and four whose mothers reported high depression scores were
more likely to demonstrate antisocial behavior at age eight.\textsuperscript{50} This relationship was more strongly established in boys than in girls. The finding that boys are more vulnerable than girls to the effects of poor parenting practices is evident in the preschool period as well.\textsuperscript{51} It appears that a propensity to react to adverse environmental circumstances by developing defiant behavior is more striking in boys even of preschool age.

Although it might be expected that parenting practices would change as a child grows up, some characteristics remain stable over time.\textsuperscript{52} Richman and colleagues found little change from ages three and four to age eight in the proportion of depressed mothers and mothers lacking in warmth or highly critical of their children.\textsuperscript{53} The inference yet to be confirmed is that poor parenting during early childhood heralds poor parenting in later childhood; alternatively, is it the consistency of this experience that predicts delinquency?

**Family criminal record.** Criminal behavior of parents is another consistent factor related to delinquent behavior in children and adolescents.\textsuperscript{54} Second only to the presence of conduct problems during childhood, having an antisocial parent is the next best predictor of adult antisocial personality.\textsuperscript{55} The association between parental criminality and delinquency is especially strong when the parent is a repeat offender and when parental criminal activity occurred during the child-rearing period.\textsuperscript{56} However, the relationship is still present when a father’s criminal activity occurred before his child’s birth.\textsuperscript{57} This is particularly relevant because it means that even at birth, children at risk of antisocial behavior and delinquency can be identified.\textsuperscript{58} Known criminal activity by siblings before a child reaches age eight also has been found to be predictive of future delinquency.\textsuperscript{59}

**Child abuse and neglect.** Despite certain methodological weaknesses and a wide range of definitions of child abuse, the weight of the evidence indicates a strong relationship between child maltreatment and later delinquency, including violent behavior.\textsuperscript{60} In a review of studies on the relationship of child abuse and neglect and subsequent violence, James Carbarino and Margaret Plantz concluded that a relationship did exist.\textsuperscript{61} A subsequent review by Cathy Widom questioned the magnitude of these findings, suggesting that only a weak relationship existed.\textsuperscript{62} However, when Widom addressed many of the methodological weaknesses in the studies included in her review, the position that abuse and neglect increase the risk for arrests for violence as adults was supported.\textsuperscript{63} In another case-control study Lewis and colleagues found both that early abuse/family violence was associated with adult violence and that abuse combined with intrinsic risk factors (cognitive, psychiatric, and neurological impairments) was most predictive of subsequent violent behavior.\textsuperscript{64}

**Family discord/poor marital relations.** Family discord, as measured in
numerous ways such as parental conflict, divorce and separation, or frequent arguments or shouting, has been shown to be related to delinquency. Although often derived from cross-sectional studies, evidence for the causal significance of these factors comes from replications in longitudinal studies. Of twenty-two analyses reviewed by Rolf Loeber and Magda Stouthamer-Loeber, seventeen found a significant association between marital discord and child delinquency and aggression. As with studies of preschool children, findings of these studies of older children strengthen the evidence that boys exhibit greater susceptibility than girls to the effects of adverse family environments. Furthermore, studies of violent offenders have shown that these persons tend, among other things, to have been exposed to parental disharmony likely to lead to divorce or separation.

A study by Michael Rutter strengthens the argument for a causal link between family discord and later delinquency. It shows that in families in which parents divorced or separated, the prevalence of antisocial behavior was twice as great in children whose families remained discordant even following the divorce or separation compared with those whose families became harmonious. Richman and colleagues found some evidence to indicate that children as early as ages three and four living amidst disharmonious family relationships developed antisocial behavior problems by age eight, although this relationship held only when family discord factors were included as part of a composite “index of family adversity” score. Parental absence. Parental absence may have a slight link to later delinquency. Loeber and Stouthamer-Loeber reported that thirty-three of forty analyses found a significant relationship between parental absence and delinquency. However, the relationship is found inconsistently and is weaker than for many of the factors discussed above. David Farrington and Donald West did not find that prolonged separation from parents improved prediction of delinquency. However, Denno found that foster-home placement at age seven and an absent father at birth and age seven were strong-to-moderate predictors of delinquency for girls but not for boys, although foster-care placement was somewhat predictive for boys. Bill Henry and colleagues reported that of nine family variables that differentiated antisocial children from other children, the number of changes in a child’s primary caretaker up to age thirteen and parental disagreement about discipline at age five were the two most important factors. Some studies show that separation from parents may have a stronger effect on delinquency when the separation occurs at an early age, while others show that separation at an early age has no relationship to delinquency.

Rutter suggests that parental conflict is a more relevant variable and is a mediating factor in the association between parental absence and delinquency. This contention is supported by several findings. First, parental
absence due to death or hospitalization is not significantly associated with delinquency. Furthermore, the risk of delinquency is also elevated in conflict-ridden homes that remain intact.

Large family size. Although the association of family size with other socioeconomic, biologic, and family factors still needs to be clarified, some studies show a relationship between delinquency in boys and large family size. Farrington and West reported a 57.3 percent increase in the chance of delinquency if a child had more than three siblings before age ten. Specific to violence, June Andrew reported that the most violent offenders tended to come from large, intact families, and Farrington showed that large family size was one of several factors related to childhood aggression and adult violence. There is some support for the notion that exposure to a delinquent sibling, which itself is a risk factor, may be a mediating factor in the association between large family size and delinquency, as might income level and poor housing, but further research is necessary before these issues can be clarified.

Summary of established predictors. The established factors in delinquency and violent behavior include the background factors of early misconduct and familial criminal behavior and three broad categories of risk factors: (1) child health and neurological status; (2) early academic skills and success; and (3) family functioning/parenting style. Although most investigations have considered one factor at a time, the likelihood is that later violent behavior depends on the particular loading of these risk factors and/or the interaction of some combination of these with situations and settings that promote (or fail to inhibit) harmful interpersonal encounters.

To the list of established risk factors we should add a growing number of plausible conditions that so far have not been established as risk factors by scientific standards. These include exposure to toxic substances (including lead), particular aspects of cognitive development (such as language ability or memory) that might account for indicators of school failure, temperamental qualities of the young child that may underlie certain extreme forms of early misconduct, several psychological processes such as exposure to violence in the community and in the media, self-efficacy and moral development, and settings and contexts that promote violent behavior. Once all of these single factors are accounted for, the next step is to divide them into stronger and weaker determinants. However, to accomplish this will require more investigation. Good evidence exists that the impact of these conditions will be influenced by a child’s gender and socialization practices and that these distinctions differ by culture and class. We have not said much about the influence of community and neighborhood contexts on how families with preschool children function, nor about the direct impact of these contexts on young children themselves, because this
is an area in which scientific knowledge is grossly inadequate. Too much of the science of developmental psychology has been completed in limited and economically supportive contexts.

Public Policy Implications

This review of the scientific literature on known and potential early predictors of delinquency and violence reveals three critical lessons for public policy: (1) There are established early risk factors for later criminality and violence; (2) the established predictors indicate links in a developmental sequence, rather than single causes, leading to violence and delinquency; and (3) knowledge is most wanting in estimating the magnitude of risk resulting from each factor, understanding that these estimates are influenced by a child’s gender and the context in which they occur.

Predictive conditions. Certain conditions during the first five years of life are predictive of later criminality and violence. The dramatic advance in longitudinal studies during the past thirty years has identified the conditions in Exhibit 1 as worthwhile targets for public policy. Simultaneously, applied work in public health, education, psychiatry, and other disciplines has developed and demonstrated effective strategies to prevent these conditions. This follows the shift in public health to a more balanced perspective in which chronic and infectious disorders of childhood are combined with the “new morbidities” of behavior problems, learning disability, school failure, suicide, and the like. Some clearly effective prevention approaches resulting from this era of demonstration research include delivery of adequate prenatal care to prevent prenatal/perinatal complications and minor physical anomalies; lead screening and abatement to prevent neurological damage leading to lower IQs and academic difficulties; nutrition programs to prevent birth complications, cognitive delay, and poor motor-skill development; home visiting outreach programs to prevent child abuse and neglect; and parental education programs to improve parenting skills. Such public health efforts not only prevent adverse conditions early in life, but the current review suggests that they also should deliver long-term societal benefits in the form of reduced rates of delinquency and violence.

Pathways, not portraits. The available evidence suggests the need to establish pathways leading to delinquency and violence rather than to rely on simple portraits. Most of the research in this field has progressed by examining snapshots of risk factors or conditions taken at various points in childhood and comparing these to another snapshot in adulthood (whether the individual has become violent or not). Instead of a series of snapshots, the literature is beginning to reveal the moving pictures that reflect life stories and the cascading sequence of causes of violence. Two such moving
pictures, pathways, or trajectories are suggested by the lists of factors in Exhibit 1. One begins with a poor pregnancy history, reflected in physical anomalies evident in the young child and later expressed as problems with attention, learning, cognitive functioning, and early behavior. A second suggests a pathway that begins with parental criminality, poor or inconsistent parenting practices, and potential abuse and neglect. Many other such sequences could be arranged from these snapshots. All are speculative and need scientific confirmation. But the contention that violent behavior in adolescence and adulthood results from multifactor pathways rather than from single causes is both reasonable and supported by the available data.

This sensible assessment of the complexity and variety of forms of human development also must be reflected in public policies erected to protect and promote the traversing of socially competent and nonviolent pathways of young children's lives. Just as there appear to be no single events or conditions that are highly predictive of later violence, there is little ground to believe that a single focused intervention at a specific time in a child's life should have long-term protective benefits. Immunizations in early childhood may forever inoculate a child from viral infections, but there is no single-shot preventive agent to keep a child from developing into a violent and aggressive adolescent. However, neither are we forced to be constantly vigilant of all youth and poised to intervene in many ways at many times. There is evidence to suggest that early intervention efforts followed by limited "booster sessions" as needed throughout childhood and adolescence will serve to both set and maintain positive pathways of cognitive and social development. Home visiting, parental education and training programs, therapeutic day care, and preschool education activities for high-risk families are all promising early steps. What is missing are outreach methods to deliver these services to those in greatest need and continuing surveillance and delivery models to provide aftercare "booster" services as needed. Two promising models are the Head Start Transition Project, which was designed to provide a transition from Head Start into public schools and to help sustain the short-term gains of early education services; and comprehensive child development centers.

Social settings. Understanding the social settings in which these early events or pathways occur is critical in anticipating and preventing their impact in later life. Consider, for instance, the findings that children born after pregnancy complications or with minor physical anomalies are more likely to become delinquent and violent only if born into families with criminal or mentally ill parents; or that children with learning disabilities are more likely to become delinquent if living in poor neighborhoods; or that boys who experience poor parenting early in life are more likely than girls to become violent. Many decades of research have not yet discovered
universal or absolute causes of or pathways to violent behavior. Sufficient resources (nutritional, emotional, financial, and others) ameliorate the impact of known risk factors; inadequate resources amplify them.

This finding highlights the greatest challenge for the public policy arena: Effective preventive efforts in the realm of behavioral and social development must be tailored to local settings and individual contexts. The past generation of demonstration research in the social sciences has delivered some clear messages as to the characteristics of successful social programs. \(^{86}\) Programs that work are typically comprehensive and broad, not narrow; are flexible for the needs of individual families, not rigidly proscribed; involve both parents and children, not one or the other; and provide continuity of intervention, not a single episode. The key question is how to accomplish nationwide objectives of violence prevention through programs that are tailored and administered locally.

### Conclusions

Although major research gaps remain, we know enough to act responsibly and intelligently. At the same time, we must recognize the limits of current understanding of human development and not hold undue expectations. Public policies and interventions can and should proceed, accompanied by a commitment to support the research needed to address the many remaining issues necessary to determine the most effective use of public funds. One aim of this paper has been to better inform policymakers about the types of evidence required to establish knowledge about the causation of violence and to evaluate both existing evidence and new findings that will be published over the next decade.

The pace of discovery in developmental psychology has accelerated such that we have a much better understanding of early behavioral development than ever before. Through the accomplishments of this discipline—many of which have been achieved in laboratory and clinical settings—we now can examine causal mechanisms in a variety of community settings. This certainly will stimulate growth in knowledge by permitting us to evaluate how the wider social context either exacerbates risks already present in a family situation or in a child’s physical development, or protects a child with a propensity to become intractably defiant, alienated, and potentially violent. Armed with this more complete information about early human development, we will be much closer to being able to conceptualize the root causes of violence. It is worth some measure of reassurance to be able to contend that we are well on the path toward reaching this degree of sophistication in our science.

At the same time, it is imperative to have policies that can address
immediate needs. Both short- and long-term strategies hold promise for countering such vexing problems as violence. For the short term we have argued that the evidence from psychology, psychiatry, and criminology converges persuasively with findings from health and education. We need to establish institutions and programs for preschool children that address the range of known factors in Exhibit 1. To accomplish this requires a system for infants and preschool children analogous to public schools for children in middle childhood.

The confluence of biological, behavioral, and emotional development is so crucial during early child development that environments created to promote the well-being of children and to decrease risks of delinquency require broad-based services that combine physical and mental health care and early education. The benefits of such services, so admirably demonstrated in experiments such as the Infant Health and Development Program, should be made universal. Only when such a comprehensive buttress of protection for children’s early development is established can interventions targeting the highest-risk families and children be delivered in a cost-effective fashion.

Some targeting likely will be necessary for families and children at highest risk if we are to successfully prevent violence. An appropriate analogy is the layering of special education services as a supplement to, rarely as a replacement for, regular schooling. The establishment of a universal system to protect preschool children will clear the way for the speedy application of scientific advancements likely to surface over the next few years. These will inform us for whom targeting is necessary and the types of supplemental or substitutional programs required to make a positive impact on their development.

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