

# The Violence of the Lambs

Researchers view violence as a complex interplay of social and biological risk factors, some of which may show up in infancy

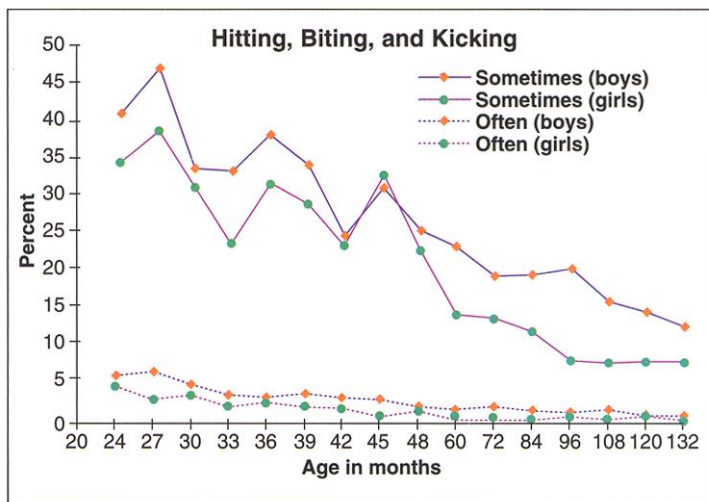
Signs that "Steve" was headed for big trouble were there from very early on if anyone had cared to read them. Born to an alcoholic teen mother who raised him with an abusive alcoholic stepfather, Steve was hyperactive, irritable, and disobedient as a toddler, according to his mother.

Steve, first interviewed by researchers at the age of 13, is a member of a university-run longitudinal study investigating how delinquent behavior develops in boys. After dropping out of school at age 14, Steve spent his teen years fighting, stealing, taking drugs, and beating up girlfriends. His mother, according to the researcher who interviewed her, "did not seem to be aware of the son's behavioral problems." School counseling, a probation officer, and meetings with child protective services failed to forestall disaster: At 19, several weeks after his last interview with researchers, Steve visited a girlfriend who had recently dumped him, found her with another man, and shot him to death. The same day he tried to kill himself. Now he's serving a life sentence without parole.

Scientists are now refining their views about what sets people like Steve on a path toward violence. Until a decade or so ago, most social scientists thought violent individuals were almost invariably the products of an abusive environment. Recent findings, however, reveal that violent tendencies often show up in infancy, suggesting prenatal roots. Researchers are increasingly coming to view violence as the end result of multiple risk factors that may include a biological vulnerability—either genetic or created in the prenatal environment—that can be brought out or reinforced by the social environment.

In Steve's case, he had just about every risk factor in the book. His hyperactive behavior also contributed to his inability to concentrate at school; he quickly fell behind, becoming alienated from peers who might have given him some of the social structure

he lacked at home. He became increasingly emotionally disturbed—angry, confused, prone to fantasies, and self-destructive. His deviant behaviors and emotions were reinforced by hanging around with others who engaged in the same behaviors.



**Getting an early start.** Violence comes naturally to babies, but after age 2 most children learn how to express themselves or settle disputes in other ways.

**"Babies do not kill each other, because we do not give them access to guns."**

—Richard Tremblay

Chronically violent children such as Steve are rare: Experts guess fewer than 2% of boys and far fewer girls. And most violent children do not become violent adults. But "in the majority of the most seriously violent cases, the behavioral problems go back to early childhood years," says psychologist Rolf Loeber of the University of Pittsburgh.

## Recipe for violence

Scientists have long known that damage to certain brain regions can result in violent behavior. The classic case is Phineas Gage, a railroad worker who survived a horrific accident in 1848 when a charge he was setting exploded prematurely, sending an iron tamping bar through his forehead. Although it destroyed a large chunk of his frontal lobe, the accident left Gage's motor and cognitive functioning unimpaired. However, it transformed him from a polite, model employee into a vio-

lent, irresponsible man (*Science*, 20 May 1994, p. 1102).

Most violent individuals have no obvious brain damage. But twin and adoption studies over the past 2 decades have shown that genes influence many traits associated with chronically violent behavior. Impulsivity is one. Another is oppositional temperament—angry, vindictive, resistant to control, deliberately annoying, and blaming others. Callousness, or lack of empathy, is a trait that often shows up in very young children as cruelty to animals. The studies suggest that about half the variation in these propensities can be chalked up to genes, says psychologist David Rowe of the University of Arizona, Tucson. Attention deficit hyperactivity disorder (ADHD) exacerbates these tendencies. Low IQ is another important risk factor.

Most violent youths do not become murderers like Steve, but they often share elements of his story. "One thing seems to hold up no matter what" throughout various longitudinal studies, says Harvard psychiatrist Enrico Mezzacappa: "Aggression is a fairly stable phenomenon." Children who become chronically violent adults generally are difficult from early childhood. And without early intervention on multiple fronts, their antisocial tendencies are likely to be reinforced in a downward spiral of confusion, alienation, and rage. But just which early risk factors are most powerful, and how they interact, is proving very tough to sort out.

One ongoing study that focuses on social and environmental risk factors is a project run by Alan Sroufe's group at the University of Minnesota, Twin Cities, exploring the development of violent delinquent behavior. His group has been following 185 "high-risk" impoverished children for 23 years, starting from before birth when mothers were patients at a public health clinic. His colleague Byron Egeland says their research points to bad parenting as the single most important risk factor for violence, and that "[innate] temperament doesn't play that big a role." Hyperactive, violent children, he says, "are out of control because they never developed emotional [control] and self-regulation."

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Usually, he says, that's because they lack "a good relationship with a caregiver" and, later on, are influenced by deviant peers. Those who had formed good attachments with their mothers (as observed in lab situations) were significantly less likely to get arrested for assault before age 17.

Support for this connection comes from psychologist Richard Tremblay of the University of Montreal, whose group has followed 1000 Montreal boys since 1984 when they were 6, at which time about a third were identified as physically aggressive. Most of the boys had calmed down by age 12, but 4% continued to be chronically violent into their teens. Tremblay and psychologist Daniel Nagin of Carnegie Mellon University in Pittsburgh found two risk factors in this group: Their mothers were generally less educated, and they had delivered their sons at an earlier age. Tremblay thinks this is indicative of mothers who "lack the capacity to effectively socialize a difficult child." Such mothers are often depressed and easily feel overwhelmed by their new responsibilities.

But unlike Sroufe, Tremblay says such long-term studies cannot reveal which factors originally set in motion destructive behavior patterns. A child may be violent and irresponsible because his mother or closest caregiver treated him badly, or because he inherited characteristics such as impulsivity and low IQ. In either case, the child may be evoking angry and frustrated reactions from his parents—responses that only drive him further astray.

#### In cold blood

One researcher who is using a psychophysiological approach to try to tease out some of the basic ingredients for violent behavior is Adrian Raine of the University of Southern California in Los Angeles, whose group is following nearly 1800 children in Mauritius. In 1997, the team reported that children with low heart rates at age 3 were more likely to be physically aggressive at age 11. In another study, boys who had had lower skin conductance (a measure of sweating) and slower brain waves were more likely than others to be later arrested for felonies.

Raine suspects that what he's seeing is a biological "marker" for a propensity for violence: low autonomic arousal or a sluggish nervous system. This, he says, makes people less anxious and inhibited and raises their threshold for arousal—which, he

speculates, means that they have to go to great lengths to feel stimulated. If a person is impulsive and callous as well, it's a poisonous combination. University of Pittsburgh psychologist Dan Shaw cites as an extreme manifestation of low arousability serial murderer Gary Gilmore, a classic psychopath who would get his kicks in prison by sticking his finger in a live electrical socket.

Raine's findings are controversial, and Loeber says they are difficult to interpret, because there has been "no integration" of such findings with factors such as upbringing, school performance, and influence by peers. Nonetheless, David Farrington of the Institute of Criminology in Cambridge, England, believes that in both cold-blooded predators such as Gilmore, as well as more hot-blooded "reactive" types such as Steve, there is some kind of dysregulation in the central nervous system.

Mezzacappa agrees. In a vulnerable individual, early abuse and neglect can alter the stress response—thus activating "the predisposing biological substrates for being emotionally reactive [and impulsive]," he says. If the



**Ain't misbehaving.** Antidepressants and behavior modification, says Susan Andrews, have quelled her son's violent impulses.

stress is severe enough, circuits get overloaded and shut down—which may lead to Gilmore-style "emotional blunting," Mezzacappa believes.

#### Reaching out

The implications of these studies for preventing the young Steves of the world from growing into violent adults are principles parents and teachers have always known: People need both consistent love and consis-

tent discipline to grow up as well-socialized human beings. But just how that happens is still not clear, says Tremblay. He points out that if you forget about the consequences of aggression and just look at the behavior itself, the most violent age of all is 2. "Babies do not kill each other, because we do not give them access to knives and guns," he says. "The question ... we've been trying to answer for the past 30 years is how do children learn to aggress. [But] that's the wrong question. The right question is how do they learn not to aggress."

There are some, such as Joshua Andrews, who need special help in learning not to aggress. By the time Joshua had reached the age of 2, says his mother, Susan Andrews, he would bolt out of the house and into traffic. He kicked and head-butted relatives and friends. He poked the family hamster with a

pencil and tried to strangle it. He threw regular temper tantrums and would stage toy-throwing frenzies. "At one point he was hurting himself—banging his head against a wall, pinching himself," not to mention leaping off the refrigerator, says Andrews. Showering Joshua with love, she says, made little difference: By age 3, his behavior got him

kicked out of his preschool. Later that year, he got a triple diagnosis—ADHD, impulse control disorder, and oppositional disorder. After several months of failed therapy, Andrews found a psychiatrist, Mezzacappa, who was able to throw Joshua a lifeline—a combination of medication and psychotherapy—that might just have rescued him from really hurting himself or someone else.

Mezzacappa put the boy on two antidepressants, Wellbutrin and Trazodone, which operate on different brain chemicals known to be related to attention, impulsivity, and violence. The medication is combined with a rigorous regimen of therapy, a special program at school, and behavior modification at home. "I'm very strict," says Andrews. Although she gives him plenty of affection, "the softer, kinder approach didn't work with him." She makes it very clear what the consequences of hitting or other bad behavior will be—such as "time out" or a period of toy or TV deprivation. Now, thanks to medication, he will sit still long enough to let someone read to him, and he's learned counting and the alphabet. "There's no doubt in my mind that without a proactive mother and extensive therapy Joshua would turn into a violent delinquent," says Mezzacappa. But now, says Andrews, "I have no doubt he'll grow up to be a normal, healthy little boy." Joshua is one of the lucky ones.

—CONSTANCE HOLDEN

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—Susan Andrews