



Violent developments: disruptive kids grow into their behavior.(Cover story)

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Henry was headed for serious trouble. The 15-year-old provoked an endless series of fights at school and frequently bullied gifts. Teachers regularly suspended him for his classroom disruptions. Older students taunted Henry in the hallways by calling him a sexual pervert or jeered him for having been held back in kindergarten. At home, his father browbeat and denigrated the boy, while his mother cried and muttered about how sick Henry had become.

Henry liked violent video games. He downloaded information from a Web site on how to make pipe bombs and drew pictures of gory deaths of people who mistreated him. The boy openly expressed jealousy of the attention lavished on the youths in Columbine, Colo., who in 1999 fatally shot 12 of their classmates and a teacher and then committed suicide.

In 2001, Henry's life took a fortunate turn. At his high school principal's insistence, he and his parents sought psychotherapy from Stuart W. Twemlow of the Menninger Clinic in Houston. In individual and family sessions, psychiatrist Twemlow zeroed in on the boy's fury at his parents and his tendency at school to view himself as a passive victim who needed to strike back at evil tormenters.

Henry's feelings of rage abated as he grasped that his father struggled with his own deep-seated problems. Henry began taking martial arts training, as suggested by Twemlow, and attending a new school that had a healthier social environment. His grades improved. He started dating.

Henry's story highlights a theme that is attracting increasing scientific attention: Like all children, chronic troublemakers and hellraisers respond to a shifting mix of social and biological influences as they grow. Some developmental roads are relentlessly toward brutality and tragedy. Others, like Henry's, plunge into a dark place before heading into the light of adjustment.

Developmentally minded researchers are now beginning to map out violence-prone paths in hopes of creating better family and school interventions. New evidence indicates that a gene variant inherited by some people influences brain development in ways that foster impulsive violence, but only in combination with environmental hardships. Other studies explore how family and peer interactions build on a child's makeup to promote delinquency. Separate work examines ways to counteract the malign effects of bullying rituals and other types of coercion in schools.

"Violence is such a complicated issue," Twemlow says. "There's always a set of preconditions to violent behavior and never just one cause."

SIGNATURE BRAINS Andreas Meyer-Lindenberg says that he knows what a genetic risk for impulsive violence looks like in the brain. Ironically, he and his colleagues at the National Institute of Mental Health in Bethesda, Md., traced a portrait of rash aggression in the brains of placid people free of emotional problems, brain disorders, substance abuse, and arrest records.

Meyer-Lindenberg, a neuroscientist, directed studies of 142 white adults who had inherited one of two common versions of a gene that triggers production of an enzyme called monoamine oxidase A (MAOA). That enzyme controls the supply of an important brain chemical. One of the gene variants fields weak MAOA activity in the brain, resulting in elevated concentrations of serotonin.

Too much of that chemical messenger upsets the regulation of emotions and impulses.

The other gene variant sparks intense MAOA activity, leading to serotonin concentrations at the low end of the normal range.

Several teams have already reported that children who endure severe abuse and also possess the weak-MAOA gene variant commit violent and delinquent acts later in life far more often than do abused kids who carry the strong-MAOA gene variant (SN: 8/3/02, p. 68).

In Meyer-Lindenberg's study, the 57 men and women with the MAOA-light gene displayed a set of neural characteristics that appear to weaken a person's ability to hold emotions and aggressive urges in check. Brain scans of these participants revealed unusually small inner-brain structures involved in emotion regulation. This effect was stronger in the 27

men than in the 30 women.

The same men and women displayed intense activity-in two emotion-related structures, the amygdala and the hippocampus, when they looked at emotional facial expressions and recalled emotional experiences; they had sparse activity in impulse-control parts of the frontal brain during a computer task that required self-control.

In contrast, volunteers with the strong-MAOA gene displayed less intense responses to emotional input and more activity related to impulse control. These brain responses indicate greater control of emotions and impulses, the scientists report in the April 18 Proceedings of the National Academy of Sciences.

Noting that each of the study participants was law-abiding, the Meyer-Lindenberg team proposes that the weak-MAOA gene variant contributes only slightly to the brew of ingredients that fosters impulsive violence.

Meyer-Lindenberg's finding of genetically influenced brain differences "gives rise to the possibility that [the weak-MAOA variant] contributes to a vulnerable neural signature that could turn nasty given adverse environmental circumstances," remarks neuroscientist Essi Viding of University College, London.

MAOA-gene--mediated brain disparities in nonviolent people "provide clear evidence against genetic determinism of violent behavior," adds psychologist Terrie Moffitt of the Institute of Psychiatry in London. In 2002, Moffitt and her colleagues first reported elevated rates of violence and lawbreaking among people with the weak-MAOA gene who had been abused as children.

Child-development researchers are also exploring the interplay of individual and environmental factors. Consider the work of psychologist Kenneth A. Dodge of Duke University in Durham, N.C. He directs a study of psychological and academic adjustment in 585 boys and girls from three midwestern communities. Participants have been tracked from ages 4 to 21, so far.

Dodge's study focuses on reward sensitivity, a measure of a person's need for immediate positive feedback. Impulsiveness contributes to this trait. Less than half of the participants were considered high in reward sensitivity.

But an interesting twist emerges at age 21, Dodge says. By this age, those young people who grew up with emotionally cold, punitive parents frequently had turned to violence, crime, and substance abuse if, as 16-year-olds, they also exhibited high reward sensitivity. This pattern was especially strong among boys.

The researchers scored teenagers on reward sensitivity according to how they gambled in a laboratory task. Those deemed high in reward sensitivity lost a small pot of money in a card rigged by the experimenters so that a string of initial wins gave way to a series of losses. "For these kids, the rush of winning exceeds the pain of losing," Dodge says.

In contrast, the teens who opted out of the card game while they still had some money left were categorized as low in reward sensitivity. These kids showed considerable resilience in the face of harsh parenting and usually didn't have behavioral problems.

DYNAMIC DELINQUENTS For the past 25 years, psychologist Gerald R. Patterson of the Oregon Social Learning Center in Eugene and his colleagues have noticed that some parents and children bring out the worst in each other. Their daily interactions consist of the parents demanding compliance with some rule or request, the child refusing to comply, and the parents eventually giving in. Long-term studies indicate that these coercive interactions foster aggression in young and old alike.

Such interactions are best understood as dynamic systems that tend toward stable patterns but that can change in response to pressure applied at key times, contend Patterson and psychologist Isabela Granic of the University of Toronto. Dynamic-systems principles have already been used to examine how children learn to reach, walk, and otherwise control their bodies (SN: 3/20/99, p. 184). In the January Psychological Review, Granic and Patterson described recent insights into the development of violent and delinquent behavior gleaned from long-term tracking of child-parent interactions.

The research reveals that coercive relations in families with violent children come in two varieties: mutual hostility and permissiveness. Granic directed a study of children deemed to have serious problems with self-control, some of whom were sometimes withdrawn or depressed.

Each of the 33 children and his or her mother came to a research lab and discussed a family problem for 4 minutes. Then, a knock on the door signaled that they had 2 minutes to wrap up and "end on a good note." The deadline was designed to push each pair into its routine style of confronting stress.

At that point, hostility typically escalated between mothers and those kids whom the researchers had identified as generally behaving in impulsive ways. In contrast, mothers of kids who sometimes lost control but at other times withdrew or seemed depressed usually kept peace by acceding to a final barrage of demands and whines to agree with the child's

position.

Both patterns represented interactions that had become hard-to-break, aggression-promoting habits, the researchers contend.

Within their peer groups, some adolescent boys amplify their delinquent tendencies through fevered, one-on-one exchanges. Granic and Thomas J. Dishion of the University of Oregon in Eugene found that, during videotaped talks between 14-year-old best friends, some excitedly exchanged stories of increasingly deviant misadventures in a kind of antisocial one-upmanship, while others discussed any misdeeds briefly, if at all. Boys who engaged in the fevered escalating exchanges displayed the highest rates of arrests, school expulsions, and other delinquent activity 3 years later.

Other studies find that children's early behavior troubles often reflect rigid interactions at home, as exemplified by a mother and a child expressing only one type of emotion when discussing problems. That correlation held even when the single emotion was affection.

Children from rigid parent-child relationships become markedly more aggressive at transitional points in their development, such as entry into day care or the onset of puberty, Granic says. Evidence from dynamic-systems research suggests that programs offering basic parenting skills work best when administered while participants' children are in such developmental transitions, she adds.

BULLY BE GONE Coercive interactions occur not just in families but also in schools and other institutions, Twemlow contends. As Henry's case illustrates, a three-way tango of bully, victim, and one or more bystanders can begin at home and continue at a child's school, where students, teachers, and administrators join the destructive dance.

Henry's move to a school that actively discourages bullying had a huge impact on him, Twemlow says.

The psychiatrist and his colleagues at the Menninger Clinic have devised a series of interventions that they call the Peaceful Schools Project. Project activities aim to develop students' capacity to perceive and reflect on their emotional reactions and those of others. This skill makes it possible for them to negotiate solutions rather than to fall back on violent rituals.

Practical classroom changes get the ball rolling. For instance, counselors work with teachers to develop discipline plans in which all children in a class talk to problem students and work out agreements to keep the class running smoothly. Project officials identify children and adults who have the social skills to serve as mentors, discouraging hallway bullying and playground confrontations. Students learn simple self-defense techniques in special physical education periods.

Violent behavior, bullying episodes, and classroom disruptions declined substantially in nine Midwestern middle schools that participated in the Peaceful Schools Project for 2 years, Twemlow and his colleagues reported in the fall 2005 Bulletin of the Menninger Clinic.

The project isn't designed to erase competition and ambition from schools, Twemlow notes. The objective is to imbue kids with enough emotional literacy to foster resilience, even as family, neighborhood, and cultural sources continue to throw them violent curveballs.

That's a longstanding theme of successful psychotherapy as well. "In the end, the goal is finding out the truth about yourself so that you can better control yourself," Twemlow says.

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