

Biosocial and Other Contemporary Perspectives

Interaction is Key

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Learning Objectives

5.1 What role do genetics and heritability play in contemporary explanations for crime?

5.2 How does brain dysfunction relate to criminality?

5.3 How do body chemistry theories—including those involving diet, blood sugar levels, environmental contaminants, and hormones—explain crime?

5.4 What are biosocial theories, and what role does the gender ratio

5.4 What are biosocial theories, and what role does the gender ratio problem play in contemporary criminology?

5.5 What are the policy implications of modern biological theories of crime?

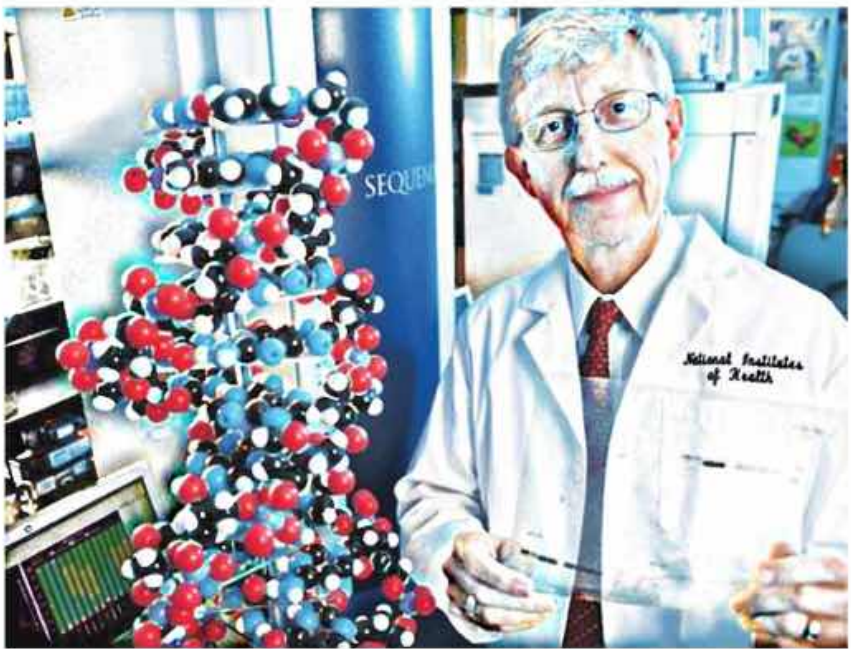
5.6 What are some criticisms of biological and biosocial theories?

Introduction

In 2013, Connecticut Chief Medical Examiner, H. Wayne Carver, ordered the testing of Newton, Connecticut, school shooter Adam Lanza's DNA in an effort to determine "if he possessed any genetic abnormalities that could have led to his violent behavior."²⁶⁴ In issuing that order, Carver was relying on new technologies that have recently been developed to map and explore the biological mechanisms that underlie human behavior. The results of the tests were inconclusive.

One of the most important recent efforts in understanding human nature is the Human Genome Project (HGP), an international research program designed to construct detailed maps of the human genome. The HGP began in the United States in 1990 through a joint effort of the Department of Energy and the National Institutes of Health. It had as its goal the determination of the complete chemical sequence of human DNA. Researchers participating in the project worked together to localize the nearly 100,000 genes within the human genome and to determine the sequences of the 3 billion chemical base pairs that make up human DNA. The HGP was officially declared completed on April 14, 2003²⁶⁵—almost exactly 50 years after James Watson and Francis Crick published their historic findings on the double helix, three-dimensional structure of DNA.²⁶⁶

The HGP marked the beginning of a new era of research into human biology and recast understandings of human nature, disease, cognition, and behavior. Because the HGP offered radical new insights into fundamental human qualities, we see it as the point of demarcation between earlier biological theories of criminality and those that have been recently developed.



Dr. Francis Collins, former Director of the Human Genome Project and current Director of the National Institutes of Health. The National Center for Human Genome Research at the National Institutes of Health supported the international Human Genome Project, a research program that determined the complete nucleotide sequence of human DNA. What ethical, legal, and social implications are inherent in such a project?
Michael Ventura/Alamy Stock Photo

The human genome refers to a complete copy of the entire set of human gene instructions.²⁶⁷ genes are made of DNA and carry coded instructions for making everything the body needs.

chromosomes are bundles of genes.²⁶⁸ After completion of the HGP, which resulted in the sequencing of the entire genome sequence of a “reference human genome,” the focus of genomics research turned to finding individual differences or variants from that reference sequence. Ongoing research projects include the HapMap Project and the Encyclopedia of DNA Elements (ENCODE), which became operational in 2007. The second phase of ENCODE, the 1,000 Genomes Project, has only recently begun.²⁶⁹

The use of genetic knowledge developed by the HGP is likely to have momentous implications for both individuals and society. Many of the questions criminologists have raised about the role of genetics in criminal behavior may be answered by the results of research begun by the HGP.²⁷⁰ In the area of crime-control policy, HGP-related information is expected to support the development of public policy options related to crime prevention and the treatment of offenders.

Learn more about the federal government's involvement in genetic research from the National Human Genome Research Institute (NHGRI) at <https://www.genome.gov/Issues> and learn more about human DNA research from the international HapMap Project at <https://www.genome.gov/10001688>. NHGRI also sponsors a YouTube channel, called GenomeTV, at <https://www.youtube.com/user/GenomeTV>.

Check Your Understanding: The Human Genome Project

Select each of the rows below to learn more about the Human Genome Project (HGP).

Whose DNA was used in the HGP?

Reveal Answer ▼

Was the HGP an American project?

Reveal Answer ▼

Has the HGP identified genes for violence or aggression?

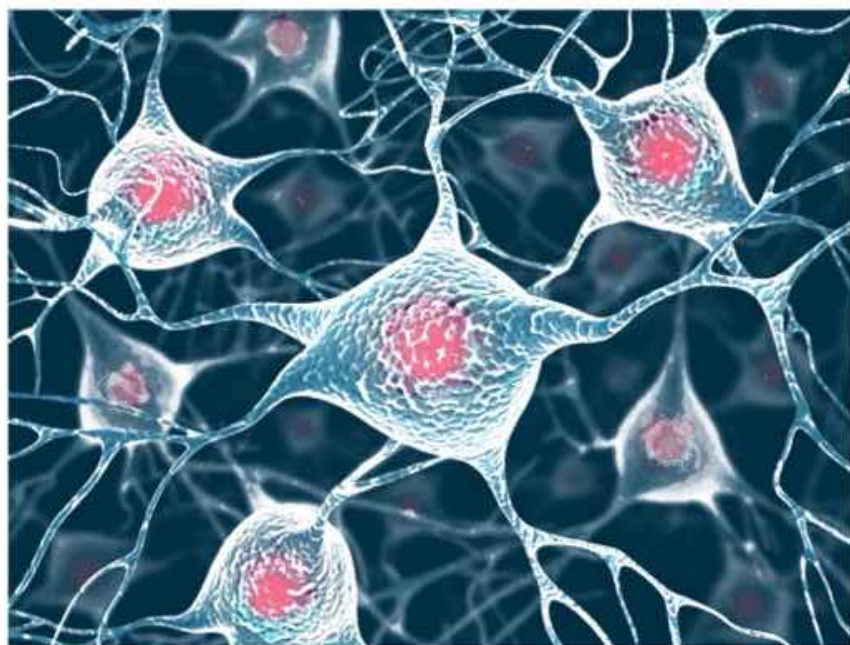
Reveal Answer ▼

Theory versus Reality

The Future of Neuroscience

During the Obama administration a new U.S.-led initiative modeled after the Human Genome Project was launched.ⁱ Known as the Brain Activity Map, the initiative seeks to learn specific details down to a molecular level about how regions and cells in the brain interconnect and function, and how the brain processes information.ⁱⁱ "There's this enormous mystery, waiting to be unlocked," Obama said in announcing the project.ⁱⁱⁱ

The project, which is anticipated to last decades, will involve federal agencies, private foundations, and teams of neuroscientists and nanoscientists working together to advance knowledge of the brain's billions of neurons in an effort to gain greater insights into perception, actions, and consciousness.^{iv} Similar projects are underway in Europe and elsewhere. Europe's Human Brain Project, an extension of the Blue Brain Project at Switzerland's École Polytechnique Fédérale de Lausanne, started a year ago. According to documents released by the project, "It will bring together everything we know and everything we can learn about the inner workings of the brain's molecules, cells and circuits, collect the knowledge in massive databases and use it to build biologically detailed simulations of the complete human brain."^v



Neurons in a human brain, shown here magnified hundreds of times. How might the Brain Mapping Project described here be applicable to criminology?
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Genetics and Crime

5.1 What role do genetics and heritability play in contemporary explanations for crime?

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Is There a Crime Gene?



In 1993, only three years after the launch of the HGP, Dutch criminologists caught worldwide attention with their claim that they had uncovered a specific gene with links to criminal behavior. Researcher **H. Hilger Ropers**, geneticist **Han Brunner**, and collaborators studied what media sources called “the Netherlands’ most dysfunctional family.” Although members of the unnamed family displayed IQs in the near-normal range, they seemed unable to control their impulses and often ended up being arrested for violations of the criminal law. The arrests, however, were always of men. Tracing the family back five generations, Brunner found 14 men whom he classified as genetically driven to criminality, but none of the women in the family displayed criminal tendencies, although they were said to have often been victimized by their crime-prone male siblings.

The MAO-A Enzyme

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In 2002, **Avshalom Caspi** and **Terrie E. Moffitt** and their colleagues offered a model of *gene–environment interaction* that recognized that childhood maltreatment appears to be a “universal risk factor for antisocial behavior” in adulthood. Previous research had demonstrated that children who experience abuse—especially those exposed to erratic, coercive, and punitive parenting—frequently develop conduct disorders and display antisocial personality symptoms, and they are known to be at greater risk of becoming violent adult offenders than are children who do not experience such maltreatment.²⁷³ Earlier research had also shown that the younger the children are when they experience maltreatment, the more likely they are to display such problems in later life.

Using data from the Dunedin Multidisciplinary Health and Development Study—a longitudinal study of 1,037 children born in the maternity hospital in Dunedin, New Zealand, between April 1, 1972, and March 31, 1973—Caspi and Moffitt noted that not all maltreated children grow up to become criminal,²⁷⁴ but they hypothesized that the development of antisocial behavior is mediated by an interaction between a gene responsible for the production of the enzyme MAO-A and an environment variable (maltreatment). Researchers demonstrated a significant biosocial interaction between MAO-A and early child abuse, leading to violence later in life.²⁷⁵ Their findings showed that maltreatment “has lasting neurochemical correlates in human children” and that deficient MAO-A activity may cause “neural hyperreactivity” in children in response to threats. The researchers concluded that “childhood maltreatment predisposes most strongly to adult violence among children whose MAO-A is insufficient to constrain maltreatment-induced changes to neurotransmitter systems.”²⁷⁶ Maltreated children with high MAO-A activity did not develop antisocial behavior. The finding was supported by two separate Swedish studies published in 2007

A activity may cause "neural hyperreactivity" in children in response to threats. The researchers concluded that "childhood maltreatment predisposes most strongly to adult violence among children whose MAO-A is insufficient to constrain maltreatment-induced changes to neurotransmitter systems."²⁷⁶ Maltreated children with high MAO-A activity did not develop antisocial behavior. The finding was supported by two separate Swedish studies published in 2007. Finally, a 2018 article demonstrated that victims of child abuse had more methyl groups around certain receptor genes. It was suggested that these epigenetic changes altered emotions later in life, and may have undermined future social interaction.²⁷⁷

A 2008 analysis of data from the National Longitudinal Study of Adolescent Health (also known as Add Health) by **Kevin M. Beaver** of Florida State University and associates found that low MAO-A activity can interact with neuropsychological deficits (defined in this study as poor scores on verbal skills tests) to produce low self-control and delinquency. Hence, according to Beaver, data analysis findings "are supportive of an interdisciplinary scientific approach to the study of crime and delinquency, which views antisocial behavior as a multifactorial phenotype that is the result of genetic factors, neural substrates, and environmental factors working independently and synergistically."²⁷⁸ In other words, in at least some cases, genetic predispositions plus interaction with the surrounding social and physical environments combine to produce delinquency.

Continued focus on the gene related to MAO-A production led to the announced finding of a "warrior gene," and in 2010 National Geographic Television produced a show entitled "Inside the Warrior Gene" that featured men who felt that their lives were controlled by a deep-seated and constant anger that might be ascribed to such a biological condition.²⁷⁹ Variants of the gene were found in boys more likely to engage in violence, to use weapons, and to join gangs. In 2018, it was announced that the MAO-A gene is linked to aggressive behavior through its ability to oxidize (and render inert) serotonin, norepinephrine, and epinephrine.²⁸⁰

Other Genetic Factors

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In 2007, researchers at the University of Texas Southwestern Medical Center discovered that mice carrying certain mutations in what is called the clock gene exhibited manic behaviors, such as recklessness and hyperactivity, and also displayed a preference for addictive substances, such as cocaine, but that treatment with the antipsychotic medicine lithium caused them to behave normally.²⁸¹ In 2018, research funded by the National Institute of Mental Health, using data from a four-generation family, discovered a potential role for five genes and their related variants in the onset and development of bipolar disorder.²⁸²

In 2008, researchers with the National Institute on Drug Abuse announced that “as much as half of an individual’s risk of becoming addicted to nicotine, alcohol, or other drugs depends on his or her genes.”²⁸³ The researchers stated, “Pinning down the biological basis for this risk is an important avenue of research for scientists trying to solve the problem of drug abuse.”

In 2011, making a genetic argument for at least some forms of callous-unemotional behavior, **Nathalie Fontaine** of Indiana University and colleagues reported that heritability (which is a statistical construct that estimates the amount of variation in the traits of a population that is attributable to genetic factors) leads to persistently high levels of such behavior among twin boys.²⁸⁴ The data on which Fontaine reported were derived from the United Kingdom’s ongoing Twin Early Development Study (TEDS), which uses information gathered from over 15,000 families to explore how people change through childhood and adolescence.²⁸⁵ A similar study, conducted at about the same time, examined differences in self-control between male and female twins. The study authors concluded that “there ~~are genetic differences in~~ self-control that are

self-control between male and female twins. The study authors concluded that “there are genetic differences in self-control that are operating across the sexes in adolescence and adulthood.”²⁸⁶ The results of the study showed that “the same genetic factors influence levels of self-control in males and females,” meaning that the “genetic influences on self-control are not gender-specific.”

Some of the studies discussed here may appear to point to criminal genes that, once inherited, inevitably produce antisocial behavior. Such a conclusion, however, is not warranted. As we shall see later in this chapter, genes may simply influence the way in which people respond to their surroundings. As one researcher puts it, “genes and environments operating in tandem [are] required to produce significant antisocial behavior.”²⁸⁷ Hence, so-called criminal genes may be nothing more than genetic predispositions to respond in certain ways to a criminogenic environment. Biosocial criminologists have created a simple formula, expressed as **GxE**, to highlight the fact that neither genes nor the environment is sufficient by itself to explain antisocial behavior, but that it is the interaction between the two that determines what happens in most circumstances.

The study of the chemical reactions that occur within a genome, and which switch parts of the genome on or off at strategic times and locations, is referred to as **epigenetics**. Epigenetics is informed by the principle that “the genome dynamically responds to the environment. Stress, diet, behavior, toxins, and other factors activate chemical switches that regulate **gene expression**.”²⁸⁸ When genes are “expressed,” they are used as blueprints for making proteins. The term *epigenetics*, however, means something quite different. It refers to the way in which our genes interact with the surrounding environment and to produce changes in ourselves and in our behavior. In 2017, for example, **Richard E. Tremblay**, whose work is also described in **Chapter 3**, was awarded the prestigious Stockholm Prize in Criminology for showing that “the predictors of early and persistent violence are epigenetic as well as genetic.”²⁸⁹ Significantly, Tremblay, who studied cohorts of young children in Montreal and elsewhere, found that birth trauma is a reliable predictor of early childhood violence and of continued violence later in life. Tremblay noted that the peak age for violent behavior is not

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Future Directions in the Study of Genes and Crime

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The HGP, the Brain Activity Mapping project, and studies like those cited here notwithstanding, behavioral geneticists examining the crime problem face some daunting issues: coming up with a generally acceptable definition of criminality, determining how best to measure criminality once it has been defined, separating the influences of the social and physical environments from genetic influences on behavior, and distinguishing among the multiple and potentially interrelated influences of many genes. In the final analysis, the explanatory power of heritability appears to be limited by the fact that it may apply only to specific environments that existed at the time of a given study. For example, red roses grown under optimal conditions will likely all be similar in size, shape, and color, but grow the same roses in a desert or put food coloring in their water, and their appearance is likely to change substantially. As one noted geneticist says, "If the population or the environment changes, the heritability most likely will change as well. Most important, heritability statements provide no basis for predictions about the expression of the trait in question in any given individual."

²⁹⁰ In other words, even red roses watered with blue food coloring are unlikely to end up being red.

New understandings about how genes operate also seem to call into question previous notions that genes are strong determinants of human behavior. Researchers in the field of neurobiology, for example, have found 17 genes, known as CREB genes, that are switched on and off in response to environmental influences. The CREB genes lay down neural pathways in the brain and form the basis of memory; the act of learning turns the CREB genes on and is made possible by them.²⁹¹ Hence, the CREB genes respond to human experience rather than determine it. One writer explains it this way: "These genes are at the mercy of our behavior, not the other way around."²⁹² The FOXP2 gene on chromosome 7 allows the

Wilson and Herrnstein cited several constitutional factors that they believed made important and undeniable contributions to criminal behavior:⁴¹⁵

- **Gender.** "Crime has been predominantly male behavior."
- **Age.** "In general, the tendency to break the law declines throughout life."
- **Body type.** "A disproportionate number of criminals have a mesomorphic build."
- **Intelligence.** Criminality is said to be clearly and consistently associated with low intelligence.
- **Personality.** Criminals are typically aggressive, impulsive, and cruel.

Although personality, behavioral problems, and intelligence may be related to and at least partially determined by environment, the authors said that "each involves some genetic inheritance." Wilson and Herrnstein recognized social factors in the development of personality but suggested that constitutional factors predispose a person to specific types of behavior and that societal *reactions* to such predispositions may determine, to a large degree, the form of continued behavior.

In the 1990s, **Anthony Walsh** of Boise State University, who is one of today's best known proponents of biosocial criminology, continued the movement toward recognizing biology's contributions to understanding criminal behavior. Walsh emphasized the importance of the *interaction* between biology and the environment in the formation of behavioral responses to given situations. "Biological factors do not operate in an environmental vacuum," said Walsh, "nor do environmental factors operate in a biological vacuum, and we must cease formulating our theories as if they do."⁴¹⁶

Walsh became one of the founders of contemporary biosocial criminology—a scientific endeavor that attempts to take all that is known about the biological underpinnings of human behavior and to

on to future generations making it more difficult for stressed individuals to parent well once they have their own children.²⁹⁵

At least one recent study has found that methylation of the oxytocin receptor gene can produce callous and unemotional states in human beings.²⁹⁶ Another study found that the same organic process can lead to distrust and conflict between groups.²⁹⁷ Finally, in important research recently presented at a meeting of the Society for Neuroscience, studies confirmed that memories could be passed from one generation of mice to another independent of animal interaction, learning, or socialization. One study, for example, showed that mice inherit specific smell memories from their fathers—even when the offspring have never previously experienced that smell, nor had even met their fathers.²⁹⁸ Another study showed that female mice trained to avoid an aversive stimulus passed that behavior on to their offspring, even though those offspring were produced long after the stimulus had ended. This phenomenon, in which memories pass between generations, is also thought to affect humans. It is known as **genetic memory**, and may influence phobias, anxiety, and personal characteristics.

In sum, it is important to recognize that genes are both the cause and the consequence of actions—and that they do not so much *determine* human action as *enable* it. Nonetheless, as one researcher puts it, "Single genes can have quite large effects, though, when they are paired with criminogenic environments."²⁹⁹

You might want to visit the U.S. Department of Energy's Human Genome Program site at <https://www.genome.gov/10001772>. You can read about how DNA and genetics might influence human behavior at <https://www.scientificamerican.com/article.cfm?id=partial-to-crime> and <https://phenomena.nationalgeographic.com/2014/06/04/my-dna-made-me-do-it-how-behavioral-genetics-is-influencing-the-justice-system> and https://www.edge.org/3rd_culture/ridley03/ridley_print.html.

Biosocial Criminology

5.4 What are biosocial theories, and what role does the gender ratio problem play in contemporary criminology?

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What Is Biosocial Criminology?



In the mid-1980s, criminologist **James Q. Wilson** and psychologist **Richard J. Herrnstein** teamed up to write *Crime and Human Nature*, a book-length treatise that restated and refined many of the arguments proposed by biological criminologists over the preceding century.⁴¹² Part of their purpose was to reopen discussion of biological causes of crime. "We want to show," Herrnstein said, "that the pendulum is beginning to swing away from a totally sociological explanation of crime."⁴¹³ Their avowed goal was "not to state a case just for genetic factors, but to state a comprehensive theory of crime that draws together all the different factors that cause criminal behavior."⁴¹⁴

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Walsh became one of the founders of contemporary biosocial criminology—a scientific endeavor that attempts to take all that is known about the biological underpinnings of human behavior and to use that knowledge to assess how human biology interacts with the surrounding physical, cultural, and social environments in producing a criminal event. Biosocial criminology is not so much a theory about crime as it is a perspective on criminality that recognizes the importance of the interaction between biology and the surrounding physical and social environments.

Walsh observes that biosocial perspectives are theories of criminality, not crime.⁴¹⁷ He goes on to explain that crime is a “legal label” that is placed on specific behaviors that violate the criminal law. Criminality, on the other hand, says Walsh, “is a property of individuals, a continuous trait that is itself an amalgam of other continuous traits, and thus belongs to a more inclusive kind of criminology.”⁴¹⁸ According to Walsh, criminality can be seen as the willingness to violate individual rights and social norms, whether or not such behavior is against the law. Criminality, says Walsh, consists of “a relative lack of empathy, conscience, self-control, and fear, as well as self-centeredness, and a penchant for risky behavior.”⁴¹⁹ Seen this way, biosocial explanations of criminality are more likely to be couched in terms of a propensity for violence, aggression, deceit, recklessness, fearlessness, and so on, and features of the surrounding environment determine how such propensities are expressed.

Behavioral science expert Diana Fishbein of the Research Triangle Institute (RTI) puts it this way: “[N]umerous behavioral science subdisciplines, including molecular and behavioral genetics, neurobiology, physiology, psychology, cognitive neuroscience, endocrinology, and forensic psychiatry, provide substantial evidence” that certain traits possessed by individuals lead to increased risk for antisocial behavior.⁴²⁰

Fishbein notes that “the vast range of studies from these disciplines on vulnerability to antisocial personality disorder, violence, and drug abuse ... reveal a pattern that may characterize vulnerable individuals.” These patterns, which include individual biological

abuse ... reveal a pattern that may characterize vulnerable individuals." These patterns, which include individual biological differences in heart rate, hormone levels, and EEG recordings, demonstrate that "vulnerability to antisocial behavior is partially a function of genetic and biological makeup" that is expressed, says Fishbein, "during childhood as particular behavioral, cognitive, and psychological traits, such as impulsivity, attention deficits, aggressiveness, and conduct disorder."

Echoing Walsh, Fishbein notes that "biological differences do not function in a vacuum to increase risk." Instead, she writes that biological factors interact dynamically with many social and environmental conditions "to contribute to or protect from social dysfunction." It is this emphasis on *interaction* between biology and the environment—especially culture and the social environment—that differentiates biosocial criminology from other biological perspectives on crime.

Researchers are beginning to understand just how complex the relationship between biology, behavior, and the social environment can be. Biosocial criminology attempts to recognize this complexity by embracing the role of a multitude of factors leading to criminality (Figure 5-3) and including the interaction of those factors with the surrounding environment.

Check Your Understanding

Figure 5-3: Selected Biological Factors Recognized by Biosocial Theory



Gender Differences in Criminality

Audio

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A number of contemporary writers argue that criminologists must recognize that “the male is much more criminalistic than the female.”

⁴²¹ With the exception of crimes such as prostitution and shoplifting, the number of crimes committed by men far exceeds the number of crimes committed by women in almost all categories, and when women commit crimes, they are far more likely to assume the role of followers than leaders. ⁴²² Leading biosocial researcher Kevin Beaver explains it this way: “In virtually every study ever conducted, males are much more likely than females to engage in violence, aggression, and serious crimes. As the seriousness of the offense/behavior increases, the gender gap also tends to increase, such that the most violent criminal acts are almost exclusively a male phenomenon.” Beaver calls the differences between female and male rates of offending the *gender gap*. He and other writers also refer to it as the gender ratio problem and call for its explanation. ⁴²³

The data on the extent of male–female criminality in the United States show surprising regularity over time: The proportion of homicides committed by men versus women has remained more or less constant for decades—with about 96% of all murders committed by men. Similarly, the proportion of men murdered by men versus the proportion of women murdered by women has been consistent, indicating a much greater propensity for men to murder one another.

If culture exercises the major role in determining criminality, as many social scientists today believe, then we would expect to see recognizable increases in the degree and nature of female criminality over time, especially as changes in socialization practices, cultural roles, and other ethnographic patterns increase the opportunity for women to commit what had previously been regarded as traditionally male offenses. With the exception of a few crimes, such as

embezzlement, drug abuse, and liquor-law violations, such has not been the case. Although women comprise 51% of the population of the United States, they are arrested for about 20% of all violent crimes and almost 36% of property crimes⁴²⁴—a proportion that has remained surprisingly constant since the FBI began gathering crime data nearly a century ago—in spite of all the cultural changes creating new possibilities for women to commit crimes. These gender differences can also be seen in cross-cultural studies (Figure 5-4).



Women's boxing champion, Chungneljang Mary Kom Hmangte of India, after winning a quarter-finals match in the 2012 Olympic Games. Women's boxing, a relatively new sport, reflects women's changing social roles. Male–female differences in criminality, however, seem to display considerable regularity over time. Does this mean that men and women have inherently different behavioral tendencies?
Newscom

Check Your Understanding: Male-Female Criminality

Select each of the rows below to learn more about the distribution of arrests in the U.S. by gender, according to the

Check Your Understanding: Male-Female Criminality

Select each of the rows below to learn more about the distribution of arrests in the U.S. by gender, according to the Uniform Crime Reports.

Arrests for Murder and Nonnegligent Manslaughter

Arrests for Robbery

Arrests for Aggravated Assault

Arrests for Motor Vehicle Theft

Arrests for Larceny-Theft

Such findings contrast with the suggestions of authors like **Freda Adler**, who, in her classic 1975 book *Sisters in Crime*, proposed that as women entered nontraditional occupations and roles, there "would be a movement toward parity with men in the commission of crime in terms of both incidence and type."⁴²⁵ **Darrell J. Steffensmeier**, who studied changes in women's criminality following publication of Adler's book, found ~~almost no evidence to support~~ the belief that a

studied changes in women's criminality following publication of Adler's book, found almost no evidence to support the belief that a new female criminal is emerging or that female criminality is undergoing the kind of increase Adler expected.⁴²⁶ The lack of contemporary validation for Adler's thesis suggests that something else is occurring, that some element other than cultural inhibition or equality of opportunity is preventing women from taking their place alongside men as equals in crime.

Penn State criminologist **Thomas Bernard** and colleagues Jeffrey Snipes and Alexander Gerould have advanced the proposition that "the issue of why always and everywhere males commit more criminal acts than females is the 'single most important fact that criminology theories must be able to explain.'"⁴²⁷ Biosocial criminologists suggest that the organic correlates of gender provide the needed explanation. Walsh, for example, says that the gender ratio problem is only a problem "if we are constrained to operate under sociology's strict environmentalist paradigm, which is suspicious of psychological or biological factors that differentiate among individuals and categories of individuals..."⁴²⁸ If we admit, Walsh writes, that "there is something about gender per se" that is responsible for the observed differences, the problem is resolved.⁴²⁹

One of the primary contemporary paradigms useful in understanding gender differences in criminality is the concept of sexual selection. Sexual selection, which is a form of natural selection that influences an individual's ability to find or choose a mate, derives from Charles Darwin's theory of evolution.⁴³⁰ While Darwin was most concerned with explaining how the process of natural selection (survival of the fittest) determines trait differences between species, the concept of sexual selection seeks to explain male female differences within species. Contemporary writers, for example, claim that the important roles of child bearing, child protection, and child rearing created evolutionary pressures for females to become sensitive to immediate environmental stimuli—or what is happening in their immediate vicinity. Such awareness, they claim, provided the ability to identify threats and to shield their offspring from danger. Consequently, because of evolutionary forces, females today may be more sensitive than men to many environmental stimuli are more easily aroused,

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None of this, of course, denies the fact that genetically based behavioral differences between men and women are moderated by aspects of the social environment, including socialization, the learning of culturally prescribed roles, and the expectations of others. Still, as Walsh puts it, criminological theories that continue to deny the important role of biology and gender differences in criminality are akin to the “drunk who knew he hadn’t lost his keys under the lamppost, but perversely continued looking there anyway because that’s where the light is.” In sum, Walsh concludes, “we must realize that gender socialization rests on the solid bedrock of sex-differentiated biology forged by countless thousands of years of contrasting sexual selection pressures.”⁴³³

Audio

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Theory in Perspective

Modern Biological Theories

Modern biological theories of criminality stress the interaction between biological influences and the surrounding social and physical environments. Unlike earlier biological theories, modern biosocial perspectives recognize the role of the environment in shaping both biological processes and behavioral propensities that are related to those processes.

Genetics and Heritability

Genetic characteristics and variations in human chromosomes are thought to play a role in aggression and crime causation. Although contemporary criminologists do not believe that there is one single and identifiable "criminal gene," they do believe that individuals who are genetically predisposed to certain types of behavior may become aggressive or criminal through interaction with the surrounding physical and social environments. Sex-linked chromosomes have special explanatory power by virtue of the fact that the majority of violent offenders are male.

Period: 1965 to the present

Theorists: Patricia A. Jacobs, Nathalie Fontaine, H. Hilger Ropers, Han Brunner, Adrian Raine, Darrell J. Steffensmeier, Thomas Bernard, Richard Tremblay

Concepts: genes, genome, chromosomes, heritability, GxE, epigenetics, gene expression

Brain Dysfunction

Organic problems with the brain may lead to behavioral anomalies, including crime and deviance.

Period: 1990s to the present

Theorists: Adrian Raine and others

Concepts: neurocriminology, frontal brain hypothesis, prefrontal cortex dysfunction, neuroplasticity, embedding

Body Chemistry Theories

Body Chemistry Theories

Violent or disruptive behavior can sometimes be linked to nutrition, vitamin deficiencies, and other conditions that affect the body. Studies of eating habits, endocrinology, and environmental contaminants have all contributed to advances in understanding such behavior.

Period: 1940s to the present

Theorists: Adrian Raine, Stephen Schoenthaler, Alexander G. Schauss, David Fergusson

Concepts: hypoglycemia, frontal brain hypothesis, psychobiotics, environmental pollution, toxic metals, vitamins, food allergies, environmental pollution, prenatal exposure to toxins, galvanic skin response (GSR)

Hormones, Enzymes, and Criminality

These biological theories explain violent or disruptive and criminal behavior by identifying hormonal influences on human cognition and action.

Period: 1940s to the present

Theorists: Alan Booth, D. Wayne Osgood, Paul C. Bernhardt, Kevin Beaver, Anthony Walsh, Lee Ellis

Concepts: testosterone, evolutionary perspective, evolutionary neuroandrogenic theory (ENA), serotonin, premenstrual syndrome (PMS), hormones (testosterone, cortisol, norepinephrine), neurotransmitters (dopamine), monoamine oxidase A (MAO-A)

Biosocial Criminology

This theoretical perspective sees the interaction between biology and the physical and social environments as key to understanding human behavior, including criminality.

Period: 1987 to the present

Theorists: James Q. Wilson, Richard J. Herrnstein, Hans J. Eysenck, Anthony Walsh, Avshalom Caspi, Terrie E. Moffitt, Kevin M. Beaver,



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Concepts: biosocial perspectives incorporate many of the concepts previously listed in this box, including genetics, the gender ratio problem, heritability, hormones, brain dysfunction, body chemistry, natural and sexual selection. Neuroplasticity, genetic memory, and epigenetics are additional associated concepts. The most important contribution from this perspective, however, comes in recognizing the influence of biological factors as they are mediated through the physical and social environments in producing criminal behavior. Biosocial criminologists use the simple formula GxE to represent that interaction.

Survey

Hormones and Crime

Policy Implications of Biological Theories

5.5 What are the policy implications of modern biological theories of crime?

Audio

Listen to the Audio



Listen to audio

In 1992, the term *standard social science model* (SSSM) was introduced to the general public by Jerome H. Barkow and his colleagues in the edited volume *The Adapted Mind*.⁴³⁹ The SSSM—which assumes that human beings come into this world like blank slates and acquire almost all of their values, behavioral patterns, and modes of thought through socialization into their surrounding cultures—was identified as the perspective that had characterized much social scientific thought during the twentieth century. According to Barkow, the SSSM provided the underpinnings for the work of many famous sociologists, social psychologists, and social anthropologists of the 1900s, including anthropologists Margaret Mead and Leslie White and sociologist Ellsworth Faris.

Only in the last decade or two has the SSSM largely given way to broader perspectives that include an examination of the role of biology and genetic influences on human behavior. In a more recent book, *The Blank Slate: The Modern Denial of Human Nature*,⁴⁴⁰ MIT cognitive scientist Steven Pinker told readers that today's social scientists still continue to ignore unjustly the biological basis of human behavior, replacing it instead with three myths: (1) the blank slate, (2) the Noble Savage, and (3) the Ghost in the Machine. The blank slate myth (mentioned above) holds that the human mind has no innate traits and that the human personality is fully malleable by society. The Noble Savage myth says that human nature is essentially good; and the Ghost in the Machine myth holds that each person has an individual soul-like quality that allows him or her to make choices that can be completely independent of any biological predispositions. These three myths, according to Pinker, comprise

make choices that can be completely independent of any biological predispositions. These three myths, according to Pinker, comprise the SSSM of the modern era and have led to misguided social and political policies, but it is only when the impact of biology on human behavior is fully recognized that effective social policies—including those aimed at controlling crime—can be developed.

In 1997, in an attempt to bring biological theorizing into the criminological mainstream, Lee Ellis and Anthony Walsh expanded on the theme of genetic predispositions, noting that “in the case of behavior, nearly all of the effects of genes are quite indirect because they are mediated through complex chains of events occurring in the brain. This means that there are almost certainly no genes for something as complex as criminal behavior. Nevertheless, many genes may affect brain functioning in ways that either increase or reduce the chances of individuals learning various complex behavior patterns, including behavior patterns that happen to be so offensive to others that criminal sanctions have been instituted to minimize their recurrence.”⁴⁴¹ More than a decade later, Terrie Moffitt, through a meta-analysis of more than 100 studies of genetic influences on antisocial behavior, was able to conclude that “genes influence 40% to 50% of population variation in antisocial behavior.”⁴⁴²

Point/Counterpoint: Biosocial Theory

The following videos provide a pro- or con- stance on a controversial issue. Listen to the speaker’s opinion on the issues and then decide which point of view is best supported by the evidence.

Watch

Point/Counterpoint: Biosocial Theory Overview



Critiques of Biological and Biosocial Theories

5.6 What are some of the criticisms of biological and biosocial theories?

Audio

Listen to the Audio



Listen to audio

This chapter discusses a variety of biological and biosocial approaches to explaining crime, including those related to genetics, brain dysfunction, body chemistry, and contemporary understandings of evolutionary theory. Many such perspectives have been criticized because they fail to predict criminality accurately while purporting to understand its causes. For example, if a particular defect in the brain is associated with a greater tendency toward law violation, then why would such theories fail to predict which individuals with those deficits will offend and which will obey the law? The same questions could be asked about genetic attributes and differences in body chemistry. Many of the critiques identified in regard to chemical precursors can be applied to perspectives involving hormones and criminal behavior. Hormones, after all, are chemicals that are made by the body (or are sometimes injected into the bloodstream). As is the case with chemical precursors, hormones apparently don't affect everyone the same way. Not all men with high testosterone levels, for example, are violent or aggressive.

Biosocial theories, for their part, can be criticized in a number of ways.⁴⁴³ Some critics claim, for example, that biosocial research is fraught with methodological problems because studies in the area have often been based on small, nonrepresentative samples.⁴⁴⁴ Also, most research in the area of biosocial theory has been done on offenders who have been placed in clinical treatment settings, making it impossible to tell if study findings are relevant only to convicted criminals in correctional facilities or to the criminal population as a whole. Findings from such studies are difficult to generalize to other settings, and it may be difficult to draw definitive

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Other critics note that biosocial theories fail to explain regional and temporal variations in crime rates. Biosocial theories, for example, do not seem to explain adequately why one country has higher rates of violent crime than others, or why one region of a city has different rates of property crime. Similarly, biosocial theories cannot totally account for changes in crime rates over time or among different age groups within the same population.

Biological theories that focus on environmental and chemical precursors to crime cannot explain why certain kinds of crime are more likely to occur in certain parts of the country, in particular types of communities, and among members of specific subcultures rather than in others. Such differences imply that much more is at work than chemicals themselves and suggest that cultural differences play a significant role in criminality.

Critics also claim that theories involving chemical precursors cannot account for changes in crime rates over time. Crime rates have trended substantially downward over the past two or three decades, during the same time period that exposure to chemical substances of all types throughout the general population has expanded.

Some biosocial criminologists have been accused of racial and class bias for failing to explain why a disproportionate number of certain kinds of crime are committed by poor people and by racial and ethnic minorities.⁴⁴⁵ Critics say that it would be more useful to focus on social settings rather than on biological variables to explain such differences and that characteristics of the social environment—including racism, oppression, discrimination, and economic strain—are more effective at explaining differences in criminality between racial and ethnic groups and social classes. These critics also note that some people may try to use biosocial perspectives to support their own biases and to justify continued social inequality.

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Criminal Profiles

Jodi Arias—The Petite Killer

How could a petite, soft-spoken woman who had no record of past violence shoot her former lover in the face, slit his throat from ear to ear, and stab him 27 times?

Jodi Arias first denied any role in the 2008 killing and then confessed, claiming she did it in self-defense. At the end of a four-month trial, however, a jury found her guilty of first-degree murder, deciding the killing was so brutal that it could merit the death penalty.

The victim, Travis Alexander, was a leader of the Mormon Church in the Phoenix area who hid his steamy sexual relationship with Arias even from friends. Arias's trial was attended by many and was punctuated with photos of the couple engaging in several different sex acts; a 30-minute tape of phone sex between them; and photos of them both naked, apparently just moments before the murder was committed.ⁱ

The prosecution portrayed Arias as an obsessed stalker who went out of control when Alexander wanted to date other women. Before the murder, witnesses said she slashed his tires, looked into his windows, and hacked into his Facebook account.ⁱⁱ

However, an examination of Arias's past revealed little evidence of the sex-crazed stalker that seemed to emerge after she met Alexander. She claimed her parents had beaten her, but she had no problems with previous boyfriends, at work, or with friends. She had no arrests, convictions, or other legal issues.



Arias grew up in the small town of Yreka, California. "She was a sweet girl, you know, the kind of girl that you just always wanted to be around," her best friend told the Headline News Network. She "definitely wasn't" promiscuous, she added.ⁱⁱⁱ

The obsessive, on-again, off-again relationship between Arias and Alexander ended up in murder. They met in Las Vegas in September 2006 at a conference for Prepaid Legal Services, a nationwide company where they both worked. They were both single and about the same age. In addition to being a company salesperson, Alexander worked as a motivational speaker. Arias had recently discovered the Mormon faith. Two months later, Alexander baptized her into the faith and they had sex afterward.^{iv}

Alexander's image as a devout Mormon virgin, which he projected to friends, clashed with the erotic adventures he had with Arias. A friend who lived with Alexander testified he did not know he was having sex, saying it could have led to excommunication from the church. Arias's defense attorney said Arias was "his dirty little secret."^v The prosecution speculated that Arias took pictures of Alexander in sex acts to blackmail him if he tried to leave her.

The couple carried on a long-distance romance between her home in California and his in Mesa, Arizona. They broke up in June 2007 but continued to see each other for sex. Arias moved to Mesa that summer, waiting tables and cleaning Alexander's home for income, then moved back to California in the spring of 2008.

"I want you to understand how evil I think you are," Alexander wrote her in an e-mail a week before he died.^{vi} He had invited another woman to go to Cancun, Mexico, with him. In early June, Arias drove to Mesa, arriving at Alexander's home at 4 a.m., and killed him later that day.

Friends found Alexander's mangled body slouched in his shower. Arias's palm print was found in blood at the scene, along with nude photos of them from the day of the killing. When she was later arrested, Arias denied any involvement and blamed it on masked intruders. It was two years later that she first admitted to killing Alexander, saying he became violent after she dropped his new camera, which she was using to take pictures of their sex play.

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At the trial, Arias showed little emotion when asked about the killing. The jurors didn't accept Arias's plea of self-defense and wrote to her: "After all the lies you have told, why should we believe you now?" During a later sentencing phase, two sets of jurors were unable to agree upon a death sentence, and Arias is now serving life in prison without the possibility of parole.

The case of Jodi Arias raises some interesting questions. Among them are the following:

1. How could a woman who had no record of past violence commit such a gruesome murder?

2. What aspects of Arias and Alexander's relationship led to the killing?