

Introduction

In November 2009, evidence from functional magnetic resonance imaging (fMRI), a technology used to approximate brain functioning, was presented for the first time in a criminal court case. The defendant, Brian Dugan, was already serving two life sentences for murders he committed in the 1980s, and was now on trial for an earlier murder in which he had kidnapped a 10-year-old girl, raped her in the back seat of his car, and beat her to death. Brain imaging evidence was used to argue that Dugan, a highly psychopathic individual, demonstrated deficits in brain functioning that contributed to his extremely violent behavior, and therefore he should not be sentenced to death.

The case incited much debate, not only about what this type of brain imaging evidence can and cannot tell us about an individual, but also regarding the general idea that psychopaths, who are able to distinguish between right and wrong, may be excused for their behavior because of how their brains function. Dugan's trial illustrates the ways in which biological research on psychopathy is gaining traction in the public domain and beginning to have real-world effects. As we learn more

from this research, new questions are arising. How much control does a psychopath have over his or her behavior? How much of that behavior is influenced by biology versus the environment? If research shows that the brains of psychopaths are different, what chance do we have of preventing these individuals from causing harm?

The prevalence of psychopathic personality traits takes a major toll on society. In criminal populations, offenders with psychopathic traits are responsible for a disproportionate amount of crime, particularly violent crime. In the rest of society, psychopathic traits are a driving force behind much of the corruption, exploitation, manipulation, and deception that occurs on both large and small scales. Psychopathy causes undue physical, emotional, and financial trauma in the lives of countless individuals. Because of this, in recent years, much attention has been devoted to understanding psychopathy, including identifying the ways in which the biology of these individuals may be different, and how these differences lead to the development of psychopathic traits.

Unlike much of the research in the field of criminology, which has focused primarily on the social causes of crime, early researchers in the scientific study of psychopathy took a particular interest in examining the biological correlates of the disorder, and this biologically based approach has continued among many researchers in the field. Studies using brain imaging, skin conductance recordings, and other biological methods have identified differences between individuals with and without psychopathic traits, and behavioral genetics studies have determined that there is a significant genetic contribution to the disorder.

The purpose of this book is to provide an overview of this biologically based research on psychopathy, which has spurred the interest of scholars in many fields and is beginning to have real-world applicability. To those who are not familiar with biological methods, it may be difficult to sort through descriptions of complex technologies and statistical methods, learn the role of dozens of brain regions, hormones, and neurotransmitters, and gain a clear understanding of what the research can and cannot tell us about psychopathy. A goal of this book is to help scholars navigate this literature and to summarize some of the key findings in biological research. In addition, we also want to clarify many of the misunderstandings that often arise regarding the purpose of biological research and how findings should be interpreted.

Unsurprisingly, biologically based research on crime has led to much debate over issues such as free will, criminal responsibility, and punishment. This book aims to provide a context for understanding this research, to discuss the ethical issues related to it, and to demonstrate the ways in which understanding biological factors, in addition to social and environmental factors, may help us to solve the problem of psychopathy in the future.

What Is Psychopathy?

Although the term “psychopath” is used colloquially in many different contexts, psychopathy is a personality disorder describing individuals with a specific set of traits. Interpersonally, these individuals are described as grandiose and self-centered; they come across as having an exaggerated sense of self-importance and tend to blame others for their failures and shortcomings. They readily take advantage of others using charm, manipulation, and deception. Their emotions tend to be shallow and insincere. They experience little guilt or remorse when they harm others. They have a pronounced lack of empathy and are described as callous and cold. They are also described as being fearless and tend to be more reckless and take risks in several domains. They have diminished concerns about punishment, physical injury, or social repercussions. Psychopaths are impulsive and seek reward and novelty. In life they are often irresponsible and fail to make appropriate life plans. They tend to have a volatile temperament and can easily become irritable and hostile. They show disregard for social norms and frequently engage in behavior that would be considered immoral to most. The observation that this “constellation” of traits could be identified in individuals again and again, albeit in different forms, led to the idea that these traits represent a single disorder.

Psychopathic traits increase the risk for engaging in criminal behavior and alcohol and drug abuse. However, these traits not only are observed in criminal populations, but also can be observed in individuals at many different levels of society, including in some people who have achieved high professional status. The crux of psychopathy is not the display of antisocial behavior, per se, but rather the distinctive personality traits, including emotional deficits, that characterize these individuals.

Original Description of Psychopathy

Throughout modern history the term “psychopath” has been used to describe a variety of different types of individuals. However, current conceptualizations of psychopathy in the scientific literature are based largely on the writing of Hervey Cleckley in his 1941 book *The Mask of Sanity*. Cleckley’s book provided the first extensive description and interpretation of psychopathy. He describes psychopathy based on his experiences with inpatients in a psychiatric hospital and details several case histories that he believes exemplify psychopathic personality. He then presents a list of 16 specific criteria for psychopathy:

1. Superficial charm and good intelligence
2. Absence of delusions and other signs of irrational thinking
3. Absence of nervousness or psychoneurotic manifestations
4. Unreliability
5. Untruthfulness and insincerity
6. Lack of remorse and shame
7. Inadequately motivated antisocial behavior
8. Poor judgment and failure to learn by experience
9. Pathologic egocentricity and incapacity for love
10. General poverty in major affective reactions
11. Specific loss of insight
12. Unresponsiveness in general interpersonal relations
13. Fantastic and uninviting behavior with drink and sometimes without
14. Suicide threats rarely carried out
15. Sex life impersonal, trivial, and poorly integrated
16. Failure to follow any life plan

The title of *The Mask of Sanity* represents Cleckley’s idea that psychopathy represents severe pathology masked by a façade of robust mental health. In contrast to individuals with other psychiatric conditions who outwardly demonstrate signs of depression, confusion, or agitation, psychopaths give the impression of being confident, personable, and well-adjusted. It is only through continued observation that the clinician begins to notice signs that things are not as they seem.

Modern Conceptualization and Measurement of Psychopathy

From the late 1950s through the 1970s, Cleckley's descriptions of the characteristics of psychopathy served as the basis for research. For example, early work by Dr. Robert Hare and colleagues used a clinical rating of how closely an individual's personality and behavior matched the description provided by Cleckley (Hare, Frazelle, and Cox 1978). However, the idea that psychopathy is a disorder that is "masked," and that repeated interactions may be necessary before signs of psychopathy become evident, presented a significant challenge for early attempts to accurately measure the disorder. The scientific study of psychopathy began to burgeon with the creation of a reliable and valid tool for assessing it. In order to clarify Cleckley's criteria, Hare developed an interview-based inventory, the Psychopathy Checklist (PCL; Hare 1980) to distinguish between psychopathic and nonpsychopathic individuals in forensic settings. The PCL (most recently revised in 2003; PCL-R; Hare 2003) is a 20-item scale that trained clinicians complete based on an extensive interview with a criminal offender and a review of institutional records.

Although Cleckley described psychopathy in a psychiatric unit and the first reliable method for measuring psychopathy was developed for forensic populations, individuals with high levels of psychopathic traits can be found at all levels of society and in many different contexts, including business, politics, and law enforcement. In the past 20 years, several additional measures have been developed to assess psychopathy in nonincarcerated samples. Several of these measures are based on self-reports, making the measures easier to administer to large samples of individuals than the PCL-R, which involves extensive interviews. Some self-report measures are derived from the PCL-R, such as the Self-Report Psychopathy Scale and its revisions (Hare 1985, Williams and Paulhus 2004, Paulhus, Neumann, and Hare in press) and the Levenson Self-Report Psychopathy Scale (Levenson, Kiehl, and Fitzpatrick 1995). Other measures contain items intended to assess the core features of psychopathy, but in different formats from that of the PCL-R, and may include fewer assessments of criminal behavior than measures designed for use in incarcerated populations. These include the Psychopathic Personality Inventory and its revision (Lilienfeld and Andrews

1996, Lilienfeld and Widows 2005), and the Elemental Psychopathy Assessment (Lynam et al. 2011). These scales generally relate to external correlates of psychopathy, such as aggression and other personality measures, in a similar way as PCL-R-based measures. Recently, an additional measure called the Business-Scan (Mathieu et al. 2013) has been developed to assess psychopathic traits in business settings. One of the challenges of self-report measures of psychopathy is that individuals with psychopathic traits are prone to lying and therefore may not be truthful when completing the measures. Self-report measures must be carefully worded with language that does not signal disapproval so that people with psychopathic traits will feel free to endorse them (Levenson, Kiehl, and Fitzpatrick 1995). The PCL-R has also been used to assess psychopathy in community samples. The information gathered from prison files, which is required in the PCL-R, can be replaced by official criminal records and other sources of information gathered about an individual during a laboratory visit (Raine et al. 2003). Overall, the development of precise measures of psychopathy has greatly advanced research in the field and has clarified communication among researchers.

Structure of Psychopathy

Research on psychopathy has determined that psychopathic traits exist on a continuum, meaning that these traits vary in the population and there is no distinct point at which a person is designated a “psychopath” (e.g., Guay et al. 2007); each individual falls at some point on the spectrum of psychopathic traits. For research purposes, cutoff scores are sometimes arbitrarily designated to group together individuals with high levels of psychopathic traits, but these distinctions do not mean that the individuals above and below the cutoff point are qualitatively different.

Researchers have also attempted to uncover the basic structure of the construct. For example, statistical methods called factor analyses have been conducted to examine how the different items on psychopathy scales may reflect underlying groups of variables. This research has led to much debate in the literature about whether psychopathy comprises two, three, or four underlying factors (Benning et al. 2003, Cooke and Michie 2001, Mahmut et al. 2011, Hare 2003).

For example, factor analyses of the PCL-R reveal two overarching factors, each of which can be divided into two additional factors or facets. The overarching Factor 1 subscale assesses the core personality traits of psychopathy, including manipulateness, callousness, and lack of guilt or remorse. This factor can be subdivided into Interpersonal features (Facet 1) and Affective features (Facet 2). The overarching Factor 2 subscale assesses features of the antisocial lifestyle, including impulsiveness, irresponsibility, and antisocial behavior. This factor can be subdivided into Lifestyle features (Facet 3) and Antisocial behavior (Facet 4). Figure I.1 illustrates the features of each of the four facets.

As mentioned previously, different measures of psychopathy encompass these features differently. For example, some conceptualizations of psychopathy emphasize callous-aggressive tendencies, involving taking advantage of and victimizing other people (Hare 2003, Lynam and Derefinco 2006). Other conceptions emphasize deficits in emotional reactivity, such as fearlessness and a lack of anxiety (Cleckley 1976, Lilienfeld and Widows 2005). Thus, psychopathic traits may be emphasized and grouped differently according to the assessment measure being used. These distinctions may be important in understanding why some biological factors may relate to the subfactors of psychopathy differently depending on the measure used to assess psychopathy. For clarity, throughout this book we primarily refer the structure utilized by the PCL-R, but we attempt to highlight cases in which different measures may reflect different constructs. The two overarching factors of psychopathy are labeled as Interpersonal-Affective Factor 1 and Lifestyle-Antisocial Factor 2. We refer to the four facets as Interpersonal Facet 1, Affective Facet 2, Lifestyle Facet 3, and Antisocial Facet 4.

As mentioned above, Cleckley viewed psychopathy as more of a configuration of disparate tendencies. On one hand, individuals with psychopathic traits come across as personable, lacking anxiety, lacking delusions, and psychologically well-adjusted. On the other hand, they have problems regulating their behavior and maintaining relationships and empathizing with others. However, The PCL-R was designed to measure psychopathy more as a unitary construct than as a condition in which two (or more) separable dispositions co-occur in some individuals. Although the idea that psychopathy is a unitary construct has been dominant in the field, some have suggested that Cleckley's original

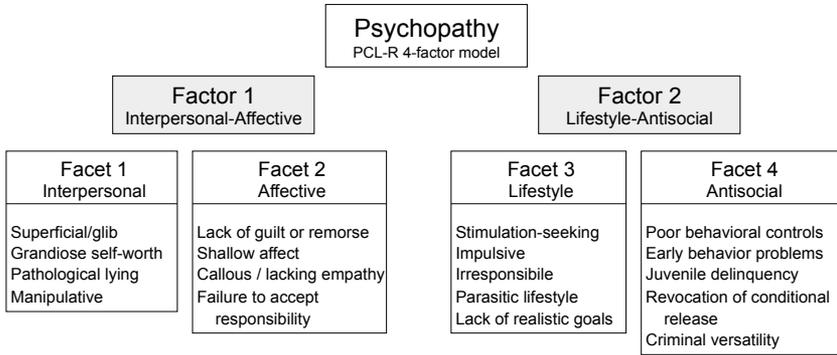


Figure I.1. Factor structure of psychopathy as defined by the Psychopathy Checklist-Revised (Hare 2003).

conception of psychopathy as a grouping of distinct constructs may be more accurate (Patrick and Bernat 2009, Patrick, Fowles, and Krueger 2009). For example, psychopathic individuals demonstrate features that are thought to reflect tendencies common with a general externalizing spectrum, which underlies antisocial behavior, substance use, and impulsive and disinhibited personality traits (Krueger et al. 2007). In addition to this, they also demonstrate trait fearlessness, or under-reactivity to treats. These two dispositions may result from deficits in different biological systems. This is particularly important to consider when unpacking the biological research on psychopathy. Do common or distinct neurobiological factors underlie the different features of psychopathy? Although further research is needed, in the following chapters we highlight research that may speak to this issue. Progress toward understanding the development of psychopathy may be improved by considering the idea that the different features may be the result of separable deficits.

Psychopathy, Aggression, and Criminal Behavior

Psychopathy is often incorrectly equated with criminal behavior and violence. The reality is that in some individuals, psychopathic traits are accompanied by criminal behavior, evidenced by the fact that psychopathic individuals are overrepresented in forensic settings. It is estimated that they compose about 25 percent of the prison population (Hare 2003). Other individuals with psychopathic traits may be better able to achieve success in life, and may thrive in careers in which some degree of psychopathic traits may be advantageous. Overall, whereas some psychopathic individuals engage in crime, sometimes violent crime, others may never come into contact with the legal system. These individuals likely engage in acts that would be considered antisocial or immoral, such as lying or manipulating others, but may never engage in, or at least be caught engaging in, behaviors that are explicitly illegal. Psychopathic individuals with criminal convictions have been referred to as “unsuccessful psychopaths,” compared to “successful psychopaths” who have not had encounters with the law, and some of whom may have achieved substantial personal success. In Chapter 9, we review the research that has examined the biological similarities and differences between unsuccessful and successful psychopaths.

Psychopathy is also sometimes incorrectly equated with antisocial personality disorder (APD or ASPD). APD is listed in the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association 1994) as a personality disorder describing individuals with persistent antisocial behavior, such as serious violations of the law, frequent deception, and aggressive behaviors. Many individuals with high levels of psychopathic traits may meet the criteria for APD, as the criteria are similar to the Lifestyle-Antisocial (Factor 2) features of psychopathy. However, what sets psychopaths apart is the presence of the core Interpersonal-Affective (Factor 1) features. Many individuals with APD would not exhibit these features. APD is a much more inclusive and heterogeneous category; approximately 75 percent of individuals in a prison setting would be diagnosed with APD. Much research has been conducted on APD, as well as on criminal offending in general. In most of these studies, it is not clear what proportion of individuals in the sample has psychopathic traits, so it is difficult to generalize the

findings to psychopathy. In this book, we attempt to focus the discussion of biological findings on studies that have examined psychopathic traits specifically. However, we also believe it is important to highlight some of the similarities and differences between individuals with psychopathic traits and antisocial individuals more generally.

When psychopathic individuals do demonstrate aggressive behavior, it tends to be more instrumental in nature. Instrumental aggression is planned, predatory, unprovoked aggression that is used to achieve a goal. Individuals with other disorders associated with aggression, such as schizophrenia, intermittent explosive disorder, and posttraumatic stress disorder, and individuals with conduct disorder or APD who do not demonstrate psychopathic traits generally do not demonstrate instrumental aggression. Instead, the aggression of these individuals is primarily reactive in nature. Reactive aggression is triggered by a frustrating or threatening event and involves unplanned attacks on the source of the threat or frustration. Individuals with psychopathy also demonstrate reactive aggression, in addition to instrumental aggression (Cornell et al. 1996).

In sum, psychopathy is set apart from disorders such as APD by the presence of interpersonal and affective personality traits. It can be but is not necessarily accompanied by criminal behavior. In terms of diagnostic categories, psychopathy represents a more specific set of traits, but still may reflect separable underlying dimensions.

Subtypes of Psychopathy

In addition to the distinction between successful and unsuccessful psychopathy, other subtypes have also emerged. Early researchers in the study of psychopathy suggested that there may be etiologically distinct subtypes (Lykken 1957, Karpman 1941). More recent research has supported this idea. Models assessing personality characteristics of individuals with high overall scores on psychopathy measures reveal two subgroups—one group described as being emotionally stable and generally unreactive to stress, and another group characterized by negative emotionality, impulsivity, and hostility (Hicks et al. 2004, Hicks, Vaidyanathan, and Patrick 2010). These two groups have been referred to as primary and secondary psychopaths.

Secondary psychopathy has been found to be associated with higher levels of anxiety (e.g., Newman and Schmitt 1998, Skeem et al. 2007) and poorer interpersonal functioning (i.e., demonstrating greater irritability, greater social withdrawal, lack of assertiveness) than primary psychopaths, yet rates of antisocial behavior are similar (Skeem et al. 2007). Evidence suggests that different factors may influence the development of these two subtypes of psychopathy (Kimonis et al. 2011, Skeem et al. 2003). In addition, each may be characterized by different neurobiological abnormalities.

Psychopathy in Youth

A growing body of research has found that psychopathic personality traits, although traditionally conceptualized in adults, are also observable in children and adolescents. The construct resembles psychopathy in adults and remains relatively stable during the transition from adolescence to adulthood (Frick et al. 2003, Loney et al. 2007). Similar to adults with psychopathic traits, youth with psychopathic traits engage in more severe and versatile antisocial behavior that begins at an earlier age (Edens, Campbell, and Weir 2007, Frick et al. 1994). One of the most defining features of psychopathy in youth appears to be the presence of callous (e.g., manipulative, unempathic) and unemotional traits (e.g., lack of guilt and remorse, shallow affect).

Several measures have been developed for measuring psychopathic traits in youth. These include the Psychopathy Checklist: Youth Version (Forth, Kosson, and Hare 2003), which is a modified variant of the PCL-R designed to be used in adolescent offenders ages 13 to 18, the Youth Psychopathic Traits Inventory (Andershed et al. 2002), the Child Psychopathy Scale (Lynam 1997), and the Antisocial Process Screening Device (Frick and Hare 2001), which is designed to assess psychopathic tendencies in children ages 6 to 13. In addition, the Inventory of Callous-Unemotional Traits (Frick 2004) provides a more extensive assessment of the affective traits of psychopathy in youth. Evidence for distinct primary and secondary subtypes of psychopathy in youth has been limited (Lee, Salekin, and Iselin 2010). In this book, we also review research examining the biological factors associated with psychopathic or callous-unemotional traits in youth.¹

Biological Research on Psychopathy

As mentioned above, early researchers of psychopathy recognized the importance of understanding the biological mechanisms underlying the disorder. Cleckley wrote in 1941, “[W]e must also consider the possibility that the psychopath may be born with a biologic defect that leaves him without the capacity to feel and appreciate the major issues of life or to react to them in a normal and adequate manner” (p. 286). Since Cleckley’s writing, the idea that there may be a biological basis to psychopathy has been an exciting area for exploration. Research findings have drawn the attention of a broad audience of individuals who are interested in understanding what makes psychopaths the way they are, and what the implications are for policy and treatment. To a lesser extent than research investigating other psychological disorders, studies exploring the biological factors associated with psychopathy or criminal behavior can be a sensitive topic, as they have implications for a number of ethical issues that people feel strongly about, including culpability, the punishment of criminals, and the existence of free will. Suggestions that psychopaths may not be responsible for their behavior because of biological deficits or that persistent criminal behavior should be considered a mental disorder are often met with harsh criticisms. This research also raises civil rights concerns, with some suggesting that biological research on crime may open the door to discrimination based on genes or that it may lead to individuals being labeled or punished before they have committed any crime. Some have even alleged that research examining the genetic factors that may contribute to crime is similar to “the kind of racist behavior we saw on the part of Nazi Germany” (Palca 1992).

Although biological research on crime certainly has implications for a number of ethical issues, many of these strong reactions may stem from a misunderstanding of the purpose and conclusions of biologically based research. These misunderstandings are often propagated by the media. For example, we frequently come across headlines such as “Can Your Genes Make You Murder?” (*National Public Radio*, July 1, 2010), “Is the Psychopathic Brain Hardwired to Hurt?” (*Vancouver Sun*, June 9, 2012), “Child Brain Scans to Pick Out Future Criminals” (*Telegraph*, February 22, 2011), or “Criminal Behavior May Be Hard-Wired in the Brain, Researchers Find” (*Los Angeles Times*, November 17,

2009). Articles such as these summarize studies that have found genetic associations or differences in the structure or functioning of the brains of psychopaths, and often draw conclusions that may be somewhat misguided. A few common examples are the following:

1. *Aha! Psychopaths behave the way they do because of how their brains function.*

Technically, this is true. But in reality, *all* people behave the way they do because of how their brains function. In theory, each thought we have and decision we make can be traced to a pattern of neurons firing. The purpose of research on the brains of psychopaths is really to discover *how* their brains are different, rather than to propose this as an explanation for their behavior. Brain functioning is the most proximate, direct cause of everyone's behavior, not just that of psychopaths.

Take, for example, the case of Charles Whitman, the straight-laced and intelligent 25-year-old man with no prior criminal history who one day in 1966 went on a killing spree at the University of Texas at Austin, killing 13 people and wounding many more. An autopsy determined that he had developed a tumor in this brain that likely led to the radical change in his behavior. These types of cases provide strong evidence that our personalities and behavior are the product of how our brains function. However, there is an important distinction to make: A more *proximate* cause of Whitman's extremely violent behavior was that specific parts of his brain were not functioning properly. The cause of his poor brain functioning was the tumor. But the *ultimate* causes that led to the development of tumor are unknown, and may be genetic or environmental in origin. Thus, when brain imaging research reports that a particular brain region is smaller or functions differently in a particular individual or population, it really says nothing about the *ultimate* cause(s) of an individual's behavior. Brain imaging studies are important for describing what the differences are so that we can work toward determining what some of the ultimate causes (genetic and/or environmental) might be.

2. *It's biological.*

People often conclude that the identification of brain deficits in psychopaths means that the disorder is biologically based. This is

understandable because we often categorize things as “nature versus nurture” or “biological versus environmental,” and information about the *brain* seems to fall into the biological category. But in reality, the brain is just the machine that the biological and environmental factors act upon. The factors that make our brains function the way they do can be either genetic or environmental in origin, or, more likely, a combination of the two. Our genes are determined at conception. The environment is influential from that point forward; it affects how our genes are expressed, how our brains develop, and how our brains function. Thus, the identification of a brain abnormality in psychopathic individuals should not be viewed as evidence that the disorder results more from biological than environmental factors.

This also applies to other types of “biological” research that we review in this book, including psychophysiology, and the study of hormones and neurotransmitters. These are either indicators of brain functioning or the mechanisms that drive it, and therefore should not be viewed any differently. Environmental factors influence these measures as well as genetic factors. For example, abuse or trauma in early childhood may cause lasting changes in hormone levels, which, in turn, affect brain functioning. Exposure to toxins in utero may affect the way the brain develops. Thus, although this book reviews much of the research in these “biologically based” areas, it is important to understand that this describes the biological *mechanisms*, rather than suggesting that biology plays more of a role than the environment.

3. *If their brains are broken, nothing can be done.*

The headline above, “Criminal Behavior May Be Hard-Wired in the Brain,” implies that individuals are predisposed for crime early in life and that there is little we can do—biology is destiny. In our view, it is quite the opposite. As we discuss in this book, the environment plays a significant role in shaping how the brain develops and how it functions, even in adulthood. Environmental factors can even alter the way that genes are expressed, meaning that being a carrier of a particular gene does not necessarily mean that the functions of that gene will be realized. Rather than eliminating any possibility for a solution, understanding the biology of psychopathic individuals puts us one step closer to understanding how psychopathic traits develop. *How* do specific genes

predispose for psychopathic traits? *How* do environmental factors predispose for psychopathic traits? Answering these questions will help us to develop more targeted and sophisticated methods for prevention and intervention, which is the ultimate goal.

Levels of Biology

In this book, we present findings from several different areas of biological research. Each represents a step in the biological pathway that underlies behavior. Genes embody the first step in this pathway, representing the first source of biological variation between individuals. Very early on, genes play a role in the development of the structure and organization of the brain. Genes are unique in this pathway because genes and environmental factors are the only two ultimate causes of behavior. The other steps in the pathway simply represent the mechanisms by which genes and the environment have an effect. When we say that a person behaves a particular way because he or she has a deficit in a specific brain region, we really mean that genetic or environmental factors caused this deficit in the brain, which resulted in the behavior.

Genetic and environmental factors continue to be influential throughout the life span via their effects on neurotransmitter and hormone systems, which in turn influence brain functioning, the most proximate cause of traits and behaviors such as those observed in psychopathy. Figure I.2 depicts the basic levels at which the biology of a disorder can be studied. The intermediate biological mechanisms that form the link between genes and the disorder are called endophenotypes. Endophenotypes include sources of variation at the molecular level (e.g., altered hormone levels) or on a larger systems level that involve the structure and function of brain regions and brain networks. In addition, indirect assessments of brain functioning, such as psychophysiological responding, may also be considered endophenotypes.

Brain structure and brain functioning are unique in the biological pathway because they represent a more direct, proximate cause of behavior. All behavior is caused by brain functioning. Genetic and environmental influences ultimately are associated with behavior because of their effects on brain structure and functioning. Environmental factors can exert an influence at any one of these levels. This means that the

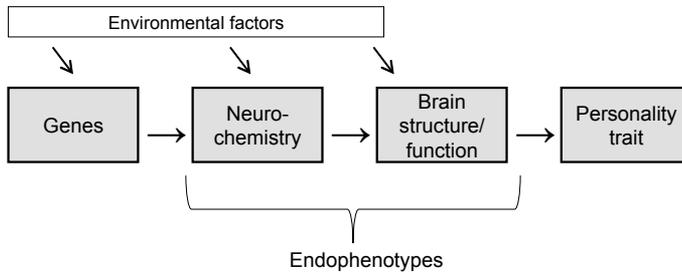


Figure 1.2. The biological pathway leading to the development and maintenance of a set of behaviors or personality traits.

relationships between two levels may be modest because additional factors are entering the equation. However, information about each level has the potential to increase our understanding of the many factors along the biological pathway that lead to the development of these traits.

Overview of Book

The goal of this book is to provide an overview of the different areas of biological research on psychopathy, explaining the techniques that are used, reviewing the existing findings, and discussing their implications for our understanding of psychopathy. We begin in Chapter 1 with a discussion of one of the ultimate causes of behavior—genes. We review two types of genetic research on psychopathy: behavioral and molecular genetics. From there, we turn to the various endophenotypes that form the biological pathway. In Chapter 2, we examine research on the potential role of hormones in the development and maintenance of psychopathy. These neurochemicals are important in facilitating brain functioning. Chapters 3, 4, and 5 focus on actual brain functioning, measured with different techniques. In Chapter 3, we review research that estimates brain and peripheral nervous system functioning using psychophysiological techniques, which include skin conductance activity, heart rate, and electroencephalogram. In Chapter 4, we explore research that estimates brain functioning based on performance on standardized neuropsychological tests that have

been developed to assess the degree of dysfunction in a particular brain region or set of regions. Neuropsychological techniques have been vigorously used in the study of psychopathy and have provided a wealth of information regarding the specific nature of the psychopath's deficits. In Chapter 5, we discuss the more direct method for assessing the brain—structural and functional brain imaging. These studies have utilized tasks assessing empathy, moral decision making, and emotional responding, among others, to uncover the brain regions that appear to function differently in individuals with psychopathic traits.

After reviewing findings from studies implementing these various biological techniques, in Chapter 6, we turn to the environmental factors that have been linked to psychopathy, or to the impairments that have been observed in psychopathy. We devote particular attention to examining how environmental factors may interact with biological factors in predisposing individuals to psychopathy, as well as how environmental factors may alter biology during development. In Chapter 7, we focus on a particular subtype of psychopath—the successful psychopath—and review studies that have examined biological similarities and differences between successful and unsuccessful psychopaths.

In Chapter 8, we provide an in depth discussion of a number of ethical and legal issues that have arisen based on biological research on psychopathy and criminal behavior. We address issues such as whether psychopathic individuals are truly responsible for their crimes given evidence of biological deficits and whether brain imaging evidence should be allowed in court, and discuss the purpose of punishment.

In Chapter 9, we look toward the future of biological research and discuss how it may enable us to more accurately develop methods for prevention and intervention that ideally can be implemented at an early age. We briefly review existing studies involving treatment for psychopathy and discuss the potential for future studies that may take biological factors into consideration. Finally, in the concluding chapter we focus on the theoretical concept that psychopathy has a neurodevelopmental basis and review the evidence that the neurobiological processes associated with psychopathy likely have their origins early

in life, emphasizing the need for future work examining the development of psychopathy and ways in which we may ultimately prevent it.

The idea that there is a significant biological component to the development of psychopathy has attracted great interest from a variety of fields. This book aims to provide a concise, nontechnical overview of the biological findings in psychopathy research. We intend this book to be useful for undergraduates, graduate students, and academics both within psychology and outside the field who are interested in an introduction to biological research on psychopathy and a discussion of the ethical and legal implications associated with these findings.

Note

1. For more information regarding research on psychopathic traits in youth, see the handbook edited by Salekin and Lynam (2010).