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CHAPTER 2: Theories of Crime: Biological and Evolutionary Explanations

MULTIPLE CHOICE

1. The "father of criminology" is considered to be:
   a. Francis Galton
   b. Charles Darwin
   c. Cesare Lombroso
   d. Johann Spurzheim

Answer: c Difficulty: Moderate Page: 34 Skill: Recall

2. What is the most important type of methodology a behavioural genetics researcher would employ?
   a. twin methodology
   b. case study methodology
   c. self-report methodology
   d. CT scan methodology

Answer: a Difficulty: Moderate Page: 36 Skill: Recall

3. Concordance rates are typically converted into a heritability coefficient which represents what type of variance in the population?
   a. proportion of genotypic variance
   b. proportion of phenotypic variance
   c. proportion of environmental variance
   d. proportion of ancestral variance

Answer: b Difficulty: Moderate Page: 37 Skill: Recall

4. If concordance rates/correlations for antisocial behaviour are higher for the biological parents and the adopted offspring than the adoptive parents and the adopted offspring, then which is inferred?
   a. environmental contributions
   b. genetic contributions
   c. intra-individual contributions
   d. inter-family contributions

Answer: b Difficulty: Moderate Page: 37 Skill: Applied

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5. A study conducted by Mednick et al. (1984), examining the records of over 14 000 adoptions, found rates of criminal offending were highest for adopted children when:
   a. both their biological and adoptive parents had a criminal record
   b. their adoptive parents had a criminal record but their biological parents did not
   c. their biological parents had a criminal record but their adoptive parents did not
   d. neither their biological nor their adoptive parents had a criminal record

Answer: a Difficulty: Moderate Page: 37-38 Skill: Applied

6. Rhee and Waldman (2002) completed the most comprehensive meta-analytic review of twin and adoption studies on antisocial behaviour and concluded that the variance in antisocial behaviour that can be attributed to heritability is:
   a. 8%
   b. 89%
   c. 41%
   d. 21%

Answer: c Difficulty: Moderate Page: 38 Skill: Applied

7. It is safe to say that given our current understanding of antisocial behaviour that:
   a. genes exert less influence in adulthood than in childhood
   b. the gene-crime link is likely a direct conduit
   c. there is relatively similar rates for males and females
   d. it results from a series of complex interactions between numerous factors

Answer: d Difficulty: Challenging Page: 38 Skill: Applied

8. The MAOA gene has been linked to aggressive behaviour when the activity of the gene in a person is:
   a. low
   b. moderate
   c. high
   d. undetectable

Answer: a Difficulty: Moderate Page: 39 Skill: Applied

9. Hormone production and distribution are regulated in the human body by which system?
   a. endocrine
   b. autonomic
   c. parasympathetic
   d. fluid

Answer: a Difficulty: Moderate Page: 39 Skill: Applied

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10. Two meta-analyses have found that there is a link between the hormone testosterone and:
    a. property crimes
    b. aggression
    c. impaired driving
    d. white collar crime

Answer: b Difficulty: Moderate Page: 40 Skill: Applied

11. While hormones are the messengers of the endocrine system, neurotransmitters are the messengers of which system?
    a. nervous system
    b. skeletal system
    c. reproductive system
    d. spinal cord system

Answer: a Difficulty: Easy Page: 41 Skill: Recall

12. Which neurotransmitter plays an important role in behavioural inhibition and mood regulation?
    a. tryptophan
    b. adrenaline
    c. dopamine
    d. serotonin

Answer: d Difficulty: Easy Page: 43 Skill: Recall

13. On average, serotonin levels among antisocial individuals are lower than for non-antisocial individuals:
    a. if the target of violence is known to the perpetrator
    b. if the perpetrator is male
    c. if the perpetrator has a history of suicide
    d. regardless of gender, target victim, and history of suicide

Answer: d Difficulty: Challenging Page: 43 Skill: Applied

14. One of the reasons why researchers think there is a link between serotonin and antisocial behaviour is that:
    a. low levels of serotonin makes it difficult for people to learn from punishment
    b. low levels of serotonin are associated with high levels of impulsivity
    c. those with antisocial personality disorder tend to have low serotonin levels
    d. committing crimes has a direct effect on neurotransmitter levels

Answer: b Difficulty: Challenging Page: 43 Skill: Applied

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15. Research examining heart rate and electrodermal activity (also called galvanic skin response) has found that compared to non-antisocial individuals, antisocial individuals tend to have:
    a. both low heart rate and electrodermal activity
    b. low heart rate and high electrodermal activity
    c. high heart rate and low electrodermal activity
    d. both high heart rate and electrodermal activity

Answer: a Difficult: Moderate Page: 44 Skill: Applied

16. Schoenthaler (1983) showed that, with incarcerated young offenders, a healthy diet plan:
    a. increased socializing by 75%
    b. reduced antisocial behaviour by 48%
    c. increased antisocial behaviour by 20%
    d. reduced antisocial behaviour by 12%

Answer: b Difficulty: Moderate Page: 46 Skill: Applied

17. An evolutionary theorist explains criminal behaviour by examining if
    a. genes function differently in offenders and non-offenders
    b. brain images differ between offenders and non-offenders
    c. offending behaviours were adaptive to survival back in ancestral environments
    d. historical documents spanning certain time periods mention offending behaviours

Answer: c Difficulty: Moderate Page: 51 Skill: Recall

18. The fact that women's ability to produce offspring is restricted compared to men is referred to as:
    a. Evolutionary birth theory
    b. Chromosomal birth variance
    c. Reproductive fitness variance
    d. Gendered crime theory

Answer: c Difficulty: Easy Page: 58 Skill: Recall

TRUE/FALSE

1. Heritability coefficient represents the proportion of genotypic variance of a given behaviour.

Answer: False Difficulty: Moderate Page: 37 Skill: Recall

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2. Contrary to popular belief, genetic studies are just as much about the environment as they are about genes.

Answer: True Difficulty: Moderate Page: 37 Skill: Recall

3. The "gene-crime" link is a direct conduit and not influenced by mediating effects such as low intelligence and impulsivity.

Answer: False Difficulty: Moderate Page: 38 Skill: Recall

4. Childhood maltreatment (e.g., physical abuse, emotional abuse, sexual abuse, neglect) contributes to the development of antisocial and criminal behaviour.

Answer: True Difficulty: Easy Page: 38 Skill: Recall

5. The gene implicated in antisocial behaviour and aggression, the low-activity MAOA gene, expresses itself only in the presence of certain environmental cues, such as childhood abuse or provocation.

Answer: True Difficulty: Moderate Page: 39 Skill: Recall

6. The relationship between testosterone and aggression in humans is positive and strong.

Answer: False Difficulty: Moderate Page: 40 Skill: Recall

7. Increases in heart rate and electrodermal activity signal fear, anger, and anxiety responses.

Answer: True Difficulty: Easy Page: 44 Skill: Recall

8. Biology can predispose an individual to future antisocial behaviour.

Answer: True Difficulty: Easy Page: 46 Skill: Recall

9. Having hypoglycemia decreases the likelihood that someone will engage in antisocial behaviour.

Answer: False Difficulty: Easy Page: 46 Skill: Recall

10. Environments such as positive parenting can reverse the negative effects of fetal and birth complications on antisocial behaviour.

Answer: True Difficulty: Moderate Page: 47 Skill: Recall

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11. Evolutionary theories are considered to be proximate explanations of crime.

Answer: False Difficulty: Moderate Page: 47 Skill: Recall

12. Selection pressures are adaptive problems that those in our ancestral environment had to solve to survive, such as finding a mate, hunting and gathering, and protecting their children.

Answer: True Difficulty: Easy Page: 49 Skill: Recall

SHORT ANSWER

1. Describe early biological and evolutionary explanations of crime and some of the issues with early theories.

Answer: Italian physician, Cesare Lombroso (1835-1909) is commonly known as the father of criminology. Lombroso argued that criminals possess distinctive physical features (such as sloping foreheads and twisted lips) that were not often observed in his "normal" subjects. He referred to these features as atavisms, and suggested that criminals were evolutionary throwbacks who had more in common with Neanderthals than modern day humans (Lombroso 2006). Charles Darwin published *On the Origin of the Species* in 1859, almost 17 years before Lombroso published the first volume of *Criminal Man*. Darwin argued that humans had evolved from ancestral species via the mechanisms of **natural selection**. Unfortunately, others began to misuse his work, most notably Darwin's own cousin, Francis Galton. Galton founded **eugenics** – the theory that was ultimately responsible not only for the forced sterilization (or worse) of thousands of individuals deemed "unfit" to reproduce in the United States during the early twentieth century, but also for the atrocities that occurred under Hitler's regime – forced abortion, sterilization, and concentration camps (Niehoff 1999).

Difficulty: Moderate Page: 34-35 Skill: Recall

2. Explain how "twins studies" methodology works.

Answer: A researcher identifies a sample of MZ and DZ twins, which were both raised by their respective biological families, and obtain an estimate of criminal behaviour. Researchers would record whether each twin was "criminal" or "non-criminal" and this frequency would then be converted into a concordance rate that represented the percentage of both twins classified as "criminal". Concordance rates are then calculated separately for MZ and DZ twins and then compared. Evidence for a genetic contribution to crime is inferred if concordance rates are higher among MZ than DZ twins.

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3. Describe two common criticisms of twin study research.

Answer: Twin study research has been criticized because it may overestimate (or in some cases underestimate) the genetic contributions to behaviour. This may happen because parents are more likely to provide similar environments for MZ twins (same toys, clothes, and learning opportunities) than their DZ counterparts which may artificially inflate the genetic contribution. In addition, heritability estimates for MZ twins may be confounded by prenatal factors that aren't necessarily genetic. Early twin studies were also criticized for using small sample sizes and being subject to political influence.

Difficulty: Moderate Page: 37 Skill: Recall

4. Summarize the key conclusions made by Yang and Raine (2009) regarding brain structures and antisocial behaviour.

Answer: Structural and/or functional damage to the frontal lobe, specifically the pre-frontal lobe, is the most replicated brain imaging abnormality found in offenders to date. Specifically, there are three areas within the prefrontal cortex that are more likely to be impaired in antisocial populations. These particular areas regulate emotional processing, decision-making, impulse control, and cognitive flexibility; therefore it is unsurprising that deficits in these areas would be implicated in criminal offending.

Difficulty: Moderate Page: 45 Skill: Recall

5. Describe the neuroimaging and neuropsychological approaches to explaining crime, as well as the main findings of research that study these approaches.

Answer: Neuroimaging research examines both the structure and function of the brain directly using specialized equipment. Typically, the brains of known offenders (e.g., violent offenders, sexual offenders) are compared with brains of a comparison group (e.g., those without a criminal record generally, offenders who do not commit sexual crimes specifically), sometimes while participants are completing a task. This research has found that antisocial individuals tend to have impairments in the prefrontal lobe of the brain. In particular, the impaired areas within that lobe are responsible for emotional processing, decision-making, impulse control, and cognitive flexibility. Conversely, neuropsychology studies brain function indirectly. Neuropsychological tests include paper and pencil and/or motor tasks that are used to diagnose deficits in brain function. Most neuropsychology tasks tap into executive functioning capabilities. Though there is some disagreement in the literature, a meta-analysis by Morgan and Lilienfeld (2000) found that deficits in executive functions are higher in antisocial individuals than non-antisocial individuals.

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SHORT ESSAY

1. Describe the design and results of Caspi et al.'s (2002) groundbreaking study demonstrating the interaction of a specific gene and childhood maltreatment.

Answer: Researchers were interested to know how a low-activity version of the MAOA gene may or may not intensify the effects of childhood maltreatment. The MAOA gene is in part responsible for metabolizing the key neurotransmitters implicated in aggression and there are two versions: low activity and high activity. The study was epidemiological and followed a cohort from birth to age 26. They found a strong "gene by environment" interaction across four measures of antisocial behaviour – conduct disorder, violent convictions, violent disposition, and antisocial personality disorder symptoms. Over 80% of youth classified as having low MAOA activity and suffered childhood maltreatment were classified as conduct disordered; however only 40% with high activity MAOA plus severe maltreatment were similarly classified. While maltreatment by itself had deleterious effects, its effects were exacerbated by the presence of low-activity MAOA gene. Furthermore, merely having the low-activity MAOA gene type did not elevate risk of antisocial behaviour.

Difficulty: Moderate Page: 39 Skill: Applied

2. Describe and explain how evolutionary forensic psychology has been applied to criminal offending with specific reference to two of the following: life history theory, psychopathy, homicide, and female offending.

Possible answers (students will choose two):

Life history theory: Our ancestors had several competing demands on their time. Their challenge was to engage in the most effective trade-off to meet these demands (e.g., hunting and gathering vs. producing and raising offspring). Life history theory argues that nature has selected for psychological mechanisms that enhance reproductive success, whereby those who were most successful at selecting these trade-offs would survive. Further, this theory argues that the psychological mechanisms that regulate how we spend our time have evolved to be highly flexible and responsive to environmental cues, referred to as "adaptive phenotypic plasticity". Thus, if it appears that life is likely to end at any time or the future is bleak and unpredictable, we will engage in riskier activities that are more likely to attract and retain a mate in order to pass on our genetic information. In support of this theory, Simpson et al (2012) found that those who have a chaotic and unpredictable upbringing engage in more risky behaviours and criminal activity later on in life compared to those who did not have such an upbringing.

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Psychopathy: Psychopathy is a disorder characterized by affective, interpersonal, and behavioural characteristics (e.g., lack of remorse, lying, living a parasitic lifestyle). Evolutionary forensic theorists argue that psychopathy is an adaptive trait, based on the principle of frequency dependency selection. This principle centres on polymorphisms (e.g., eye colour), which are traits or characteristics that have multiple forms called morphs (e.g., blue eyes, brown eyes, green eyes). Lalumiere et al. (2005) argue that psychopathy is a morph. Frequency dependency selection argues that the success of one morph depends on its frequency in the population. Specifically, for it to be adaptive, a morph must be rare relative to its sister morphs. Psychopaths engage in what are referred to as "cheater strategies" (e.g., "Have sex with me and I will protect you") to manipulate others and increase their reproductive success. Cheater strategies require a substantial pool of honest, trusting, cooperative individuals to manipulate in order for them to be successful.

Difficulty: Challenging Page: 52-55 Skill: Applied

Homicide: Most homicides result from altercations between male acquaintances. Despite the fact that many homicides seem trivial, evolutionary theorists argue that they may not in fact be trivial, but rather that engagement in violence was an adaptive trait. Daly and Wilson (1988) argue that in ancestral times, it was adaptive for men to have a reputation as being a credible threat of violence, and homicide perpetrators are in fact responding to actual or perceived threats to their reputation. They argue that maintaining this reputation was important to survival for two reasons: first, to prevent current and future exploitations of one's resources and second, to signal to prospective mates that he would be a strong provider for herself and her future children. Daly and Wilson do not argue that the act of killing has been naturally selected for, but rather it is a by-product of developed violence and aggression responses to environmental cues or threats to status/reputation.

Difficulty: Moderate Page: 56-57 Skill: Applied

Female Offending: A universal fact is that men commit more crime than women. Researchers like Anne Campbell argue that risky behaviours were naturally selected for in ancestral environments when they enhanced reproductive success under certain environmental pressures, such as resource scarcity. She argues that resource scarcity drives crimes committed by females, as women are more likely to commit property offences than other types, and that violence they engage in typically reflects female-female competition for resources. She argues that poverty is a necessary precursor to female crime, though it is not a sufficient cause of female offending. Campbell's thinking can also be understood in the context of life course theory, particularly by examining the costs and rewards associated with sex differences in mating effort versus parental investment. The term **reproductive fitness variance** captures the fact that women's ability to reproduce is restricted in comparison to men's. In an ancestral environment, the cost/benefit ratio favoured high mating effort over parenting investment (on average) for men, whereas it favoured high parental investment for women. For women, the costs of engaging in high mating effort and consequent risk-taking and

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aggressive behaviours simply weren't worth the risk of dying and not being able to ensure the survival of offspring. However, offspring survival wasn't nearly as dependent on the father's life. There is considerable evidence that men invest more energy in mating effort than women, while women are more partial to parental investment (Low 2000; Schmitt, 2005)

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