

The Influence of Nature and Nurture on People's Criminal Behavior

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Abstract. At present, juvenile illegal crimes show the characteristics of low age and diversified behavior, which has become an important public safety issue affecting social stability and individual lifelong development. This article takes congenital and acquired interaction as the core analysis framework, and adopts the literature review method to carry out research: on the one hand, it systematically sorts out the relationship between genetics, neurophysiology and other congenital traits and juvenile criminal behavior; on the other hand, it also analyzes childhood trauma, family upbringing, peer interaction, campus environment, judicial society. The influence mechanism of acquired factors such as intervention. The study found that juvenile delinquency is not caused by a single factor. Congenital factors constitute the basis of behavioral susceptibility, and the acquired environment plays a triggering and strengthening role. The two-way adjustment and mutual shaping jointly induce deviant behavior. Existing research has limitations such as congenital mechanism separation, insufficient attention to gender differences, and weak empirical research on protection factors. Accordingly, this article proposes an intervention path from the aspects of early risk screening environment optimization, judicial correction and social support, so as to provide a reference basis for the improvement of the theory of juvenile crime and local prevention and intervention.

Keywords: Nurture and Nature, juvenile delinquency, gene, external environment

1. Introduction

Globally, juvenile criminal acts have become a prominent public safety issue that affects social stability, family welfare and individual lifelong development. Its incidence rate is high, and the trend of juvenile crime and behavior diversification is significant, which has attracted wide attention from seniors, the judicial practice and all walks of life. For a long time, the research on the cause of crime has gone through the development stages such as single-factor explanation and multi-factor integrated analysis. From focusing on external conditions such as social economy and family environment in the early stage, to gradually paying attention to individual psychology, neurophysiology and genetic characteristics, the research perspective has been deepened, but it has never been able to break away from the core solution of "innate and acquired". Explain the framework. A large number of empirical evidence shows that juvenile criminal behavior is not determined independently by a single variable, but a complex result of the dynamic interaction and

joint effect of congenital genetic endowment and acquired environment. At the innate level, genetic polymorphism, neurophysiological characteristics and genetic differences constitute the potential biological basis for the development of individual behavior, which determines the sensitivity and behavioral response tendency of individuals to the risk environment; at the acquired level, environmental factors such as childhood trauma, family upbringing, peer relationships, campus atmosphere and social intervention will directly trigger, strengthen or inhibit the occurrence and development of criminal acts. The two are not linearly superimposed, but jointly promote individuals from risk exposure to behavioral implementation through two-way adjustment and mutual shaping. The classic research of Caspi et al. on the relationship between genotype and the cycle of violence in child abuse revealed the key role of genetic and environmental interaction on antisocial behavior for the first time with rigorous empirical evidence [1]. Role of genotype in the cycle of violence in maltreated children. *Science*, 297(5582), 851-854. Burt further quantified the contribution of genetics and the environment to antisocial behavior through the latest meta-analysis, confirming the intersection of the two. The mutual effect is significantly higher than the independent effect of a single factor, which provides key support for the innate and acquired integration framework [2]. Based on this, this article takes "innate and acquired interaction" as the core framework, systematically sorts out the impact mechanism of genetic neurological characteristics and social environmental factors on juvenile crime, integrates classic empirical research at home and abroad and the latest literature results, and uses literature review to clarify the action path and boundary conditions of key variables. This article aims to clarify the core positioning of congenital factors as the basis of potential risks and acquired factors as direct trigger conditions, explain the inherent logic of the interaction between the two affecting juvenile crime, provide evidence support for the integration of the theory of crime, and at the same time provide a scientific basis for juvenile crime prevention, early intervention and judicial correction, and also It has the value of theoretical integration and the significance of practical guidance.

2. Innate factors: the biological roots of juvenile delinquency risk

Innate factors refer to the biological qualities people are born with, such as genetic variations and natural neurophysiological features. These factors do not directly lead to criminal behavior. Instead, they create a vulnerable foundation that may be awakened and shaped by life experiences and surroundings. In short, biology provides the dry wood, and the environment lights the fire.

Innate factors influence juvenile delinquency in three main ways: genetic polymorphism, neurophysiological functions, and gene-environment interaction.

2.1. The genetic polymorphism pathway

Genes carry important information that indirectly affects behavior. Studies have found that changes in certain genes are closely related to personality traits such as impulsivity, emotional control, aggression, and risk-taking—qualities often seen in young people who break rules.

A famous study by Caspi and his team showed that children who suffered abuse and carried a low-activity monoamine oxidase A (MAOA) gene were more likely to show violent and antisocial behavior [1]. This discovery suggested that genes do not directly decide behavior but change how sensitive a person is to environmental influences. Later meta-analyses like Burt's estimated that genes contribute to nearly half of differences in antisocial behavior, especially during adolescence, a period with rapid brain development and increased sensitivity [2].

Besides the MAOA gene, variants like serotonin-transporter-linked polymorphic region (5-HTTLPR) and dopamine receptor D4 (DRD4) also affect emotional regulation. Importantly, these genetic tendencies do not completely fix one's fate. They only change how the brain and body react to pressure and difficult situations. Their effects usually appear under specific life conditions, meaning a genetic risk only becomes real when paired with negative environments.

2.2. The neurophysiological pathway

The brain connects genes and actual behavior. Raine's "gene-antisocial behavior" model explains how genes affect brain development, which in turn influences self-control, emotional processing, and moral judgment [3].

Many young offenders show lower activity in the prefrontal cortex, the area responsible for self-control and planning. This may lead to impulsive actions, weak judgment, and difficulty obeying rules. At the same time, the amygdala, which controls emotional responses, may be overactive, causing stronger aggressive reactions. Lower arousal in the nervous system can also reduce sensitivity to punishment and self-management ability.

Lei's research found that weaknesses in executive functions and emotional control are closely connected with aggressive behavior in teenagers, especially those growing up in troubled families [4]. This supports the idea that brain differences do not work alone but interact deeply with life experiences to shape behavior.

2.3. The gene-environment interaction pathway

Innate traits cannot fully explain delinquency on their own. Their effects become clear only when they interact with the environment—a process called gene-environment interaction, or gene-environment interaction ($G \times E$). Genes set the level of vulnerability, but the environment decides whether that vulnerability turns into real behavior.

Young people with genetic or neural risks may still develop well in supportive environments. However, in dangerous settings filled with long-term trauma, neglect, or conflict, these weaknesses may become stronger and greatly increase the chance of delinquent behavior. This interaction tells individuals that biology provides possibility, not destiny, and the environment plays a decisive role in final outcomes.

In short, innate biological factors create a baseline of risk, but their real influence depends largely on living conditions. This understanding deepens the scientific knowledge and shows how important positive environments and early help are for guiding young people toward healthy development.

3. Environmental factors: direct triggers and reinforcers of juvenile delinquency

Environmental factors include the psychological conditions, social interactions, and external influences people experience after birth. Unlike innate factors, they are observable and changeable, making them key targets for preventing and reducing juvenile delinquency. These factors directly trigger or strengthen misbehavior, although their effects are often modified by a person's inborn traits.

3.1. Psychological environment: childhood trauma and family upbringing

The psychological environment forms the most long-lasting external influence on adolescent development. Childhood trauma and parenting styles are among the most important risk and

protective factors.

Farrington's long-term studies showed that early negative experiences, especially within the family, can strongly predict delinquent behavior into adulthood [5]. Physical abuse, emotional neglect, family violence, and parental divorce may seriously damage emotional regulation and form unhealthy ways of thinking, social interaction, and moral judgment. These experiences often lead to hostile attitudes, impulsive aggression, and long-term antisocial tendencies.

Teicher and Samson's research pointed out that trauma does not directly cause crime but works through intermediate factors such as emotional disorder and cognitive bias [6]. These effects are stronger in people with higher genetic risks. Parenting style also matters a lot. Strict, permissive, or over-protective parenting can all increase the chance of misbehavior. In contrast, warm, supportive, and reasonable parenting with clear rules acts as a strong protective factor. Van der Put & Assink's research confirmed that positive family environments greatly reduce repeated offenses and provide strong protection against delinquency [7].

3.2. Social interaction: peer relationships and school environment

Peer influence and school environments form the social context where behaviors are learned and strengthened, based on social learning theory. Akers noted that people learn behaviors by watching and communicating with others [8]. If peers engage in bad actions, teenagers are more likely to copy, accept, and defend such behaviors.

Peer influence becomes especially strong during adolescence. Mixing with delinquent peers usually increases approval for misbehavior and reduces personal responsibility. Trudeau's study further showed that bad peer relationships often combine with family risks to form a "risk chain" that makes problems worse [9].

The school environment also plays a critical role. A safe, orderly, and supportive school with fair rules and good teacher-student relationships can effectively prevent delinquent behavior. In contrast, bullying, unfair or unclear discipline, and poor management may encourage more deviant acts. As a main socializing place for young people, schools can strongly shape behavior in either positive or negative ways.

3.3. External interventions: judicial sanctions and social support

Social responses to juvenile delinquency mainly include judicial punishment and social support. Their effectiveness often decides whether delinquent behavior stops or continues.

Traditional strict punishments such as severe sentences and imprisonment often bring negative "labeling effects" and bad peer influences in detention centers. These may increase repeated offenses instead of reducing them. Sun Qifan's research suggested that alternative justice methods—such as conditional non-prosecution, community correction, and educational treatment—work better in lowering reoffending rates and fit adolescent developmental needs [10].

Social support is an important protective resource, including help from family, school, community, and psychological services. Strong social support helps young people handle stress, make up for negative environmental effects, and rebuild positive social norms. Lee's study on female adolescents found that social support has a particularly strong protective effect for girls, showing that gender differences should be considered when designing interventions [11].

4. Discussion

This paper uses the nature-nurture interaction framework to systematically examine the causes of juvenile delinquency by exploring how biological and environmental factors work together. It combines existing research to provide a complete picture of these complex mechanisms.

The main conclusion is that juvenile delinquency is not caused by one single factor. It comes from the dynamic interaction between biological vulnerability and environmental influences. Innate factors such as genes and neural features shape behavioral tendencies and sensitivity to risks. Environmental factors such as childhood trauma, poor parenting, bad peers, negative school environments, and improper judicial acts directly trigger and strengthen misbehavior.

These factors do not simply add up. They influence each other and together push a person toward delinquent actions. For example, teenagers with high genetic risks may still follow rules if they grow up in supportive families. However, school bullying and peer rejection may turn such risks into real aggression. This interactive model matches classic studies by Caspi, Burt, and others, showing that genes determine vulnerability while environments decide whether that vulnerability is activated.

This review also finds several limitations in current research. Most studies still analyze nature and nurture separately, and real-world evidence on their interaction remains limited. There is a lack of large-scale long-term studies on Chinese adolescents, making it difficult to understand the timing and development of risk factors. Gender and cultural differences are also understudied. Traditional research focuses mostly on boys, while female delinquency is less explored even though its risk patterns are different. Factors such as relational violence, gender pressure, and gender-specific protective factors still need more investigation.

Finally, this paper provides meaningful suggestions for preventing and dealing with juvenile delinquency. Since innate risks require environmental activation, changing the environment is highly important. Early identification of high-risk individuals can be done through school mental health checks, community child welfare services, and family support programs. Building stable families, positive school environments, and targeted psychological interventions can break the link between biological risk and real misbehavior.

Judicial systems should reduce labeling and imprisonment and use more individualized, community-based education and correction. With strong social support, these methods can help teenagers rebuild positive social connections and develop in healthier directions.

5. Conclusion

First, juvenile delinquency is the result of the dynamic interaction between congenital biological characteristics and acquired environmental factors. The two jointly determine the direction and trajectory of individual behavioral development, which is indispensable. Second, congenital factors mainly provide a potential susceptibility basis for criminal behavior, affecting the emotional regulation, impulse control and risk sensitivity of individuals, but do not directly determine the occurrence of criminal behavior. Third, the acquired environment is a direct trigger and strengthening condition for juvenile crime. Factors such as family upbringing, peer relationship, campus atmosphere and social intervention can significantly promote or inhibit the emergence and solidification of risky behavior. Fourth, the interaction between innate and acquired is the core perspective of understanding juvenile crime. A positive environment can effectively buffer congenital risks, while a bad environment will significantly amplify the risk effect, highlighting the important value of acquired intervention. Fifth, based on the overall mechanism of congenital susceptibility and acquired triggering, juvenile crime prevention and correction should be the main

methods of early identification, environmental optimization, social support and scientific intervention, so as to achieve risk control and behavior correction by improving external conditions. In general, through the integrated analysis of relevant mechanisms, this study further clarifies the cause and logic of juvenile crime, which not only provides a reference for theoretical integration diagrams, but also provides a basic basis for prevention, intervention and correction at the practical level.

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