WEP Warwick Evans Publishing

International Journal of Social Sciences and Public Administration

ISSN: 3005-9836 (Print), ISSN: 3005-9585 (Online) | Volume 7, Number 1, Year 2025
DOI: https://doi.org/10.62051/ijsspa.v7n1.15
Journal homepage: https://ijsspa.org

Physiological and Psychological Factors in Determining the Criminal Responsibility of Minors

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ABSTRACT

This study explored the impact of physiological and psychological factors on the determination of minors' criminal responsibility. Studies have shown that the development of adolescent brains lags behind the emotional system, making them more likely to make impulsive decisions and increasing the risk of illegal behavior. In addition, psychological maturity is closely related to physiological development, and lack of family support and mental health problems often lead to criminal behavior. In order to more accurately assess the criminal responsibility of minors, this study proposes to establish a dual-track identification model of "physiological + psychological assessment", emphasizing the application of neuroscience and psychology in judicial assessment to optimize the mechanism for determining juvenile criminal responsibility and promote the judicial practice goal of giving equal importance to education and assistance.

KEYWORDS

Juvenile Delinquency; Criminal Responsibility; Physiological Factors; Psychological Factors.

1. INTRODUCTION

In recent years, juvenile criminal offenses have exhibited the dual characteristics of increasing numbers and concentrated types. According to judicial statistics, in 2024, the number of juvenile criminal suspects accepted by the procuratorate nationwide reached 101,526, an increase of 4.3% by 2023 [1]. Property crimes were the main type. Some suspects were under 10 years of age. This phenomenon is closely related to social and economic development, poor information on the Internet, and a lack of family education. Social governance must find a balance between protecting the rights and interests of minors and maintaining social security.

China's Criminal Law divides the criminal responsibility of minors into three stages: no criminal responsibility for those under 14 years, relatively responsible for those between 14 and 16 years, and fully responsible for those over 16 years. However, the boundary between 12 and 16 years of age remains controversial. Minors aged 12–14 and the crimes they are involved in do not fall under the eight statutory felonies, so they cannot be held accountable, which raises questions about judicial fairness. Although minors aged 14 to 16 years are considered relatively responsible, due to individual differences, "different judgments for the same case" often occur in judicial practice.

Although the Criminal Law Amendment (XI) implemented in 2021 has made limited adjustments to the age of criminal responsibility, lowering the starting point of the age of criminal responsibility in certain circumstances to 12 years old, and setting up a pre-procedure of "approval by the Supreme People's Procuratorate," the overall legal framework still seems to be slow in responding to vicious cases involving young minors [2]. This misalignment between institutional design and the actual

behavioral capacity of minors highlights the importance of physiological and psychological factors in determining responsibility.

This study explores the dynamic relationship between physiological and psychological dimensions, focusing on the relationship between testosterone levels and violent tendencies during adolescence, and the problem of misjudgment of responsibility due to insufficient emotional control ability in minors who are physiologically precocious but psychologically lagging. This study aims to reveal the compound impact of physiological and psychological factors on responsibility through interdisciplinary analysis and to fill the gap in related research. The significance of this study is to promote the establishment of a dual-track system of "age + assessment" in judicial practice, promote the transformation of juvenile justice strategies to a "correction-oriented" system, and provide an important reference for humanitarian justice.

2. LITERATURE REVIEW

As society pays more attention to juvenile delinquency, the role of physiological and psychological factors in determining minors' criminal responsibility has become increasingly prominent, becoming the core dimension of assessing responsibility (Corrado & Mathesius, 2014; Abhishek & Balamurugan, 2024; Dattagupta et al., 2024) [3-5]. Arain et al. (2013) pointed out that the development of the prefrontal cortex of adolescents lags behind the emotional system, making them more likely to make impulsive decisions when faced with temptation, thereby increasing the possibility of illegal behavior [6]. Ivanova (2024) further proposed that the "developmental imbalance" model of the nervous system explains why adolescents lack the ability to inhibit behavior under emotional drive and are easily involved in high-risk behavior [7]. Scott et al. (2018) emphasized that adolescence is a critical stage for brain remodeling, and synaptic pruning and brain structural changes increase the possibility of adolescents engaging in antisocial behavior under stress and social influence [8]. These studies show that when adolescents are in the stage of immature physiological development, the occurrence of criminal behavior has a certain biological basis, which should be fully considered in the determination of criminal responsibility.

Psychological maturity is closely associated with physical development. Chen (2024) pointed out that lack of family emotional support, peer pressure, and psychological disorders of adolescents (such as emotional disorders and impulse control difficulties) are the core psychological factors that drive them to commit crimes [9]. Scherf and Scott (2012) pointed out through his developmental trajectory classification theory that adolescent-limited crimes are mostly caused by imitation psychology and identity bias, while lifelong persistent crimes are often caused by early psychological defects and emotional disorders [10]. Teplin et al. (2002) further showed that approximately two-thirds of detained adolescents have at least one mental disorder, manifested as anxiety, depression, or behavioral control disorder [11]. These psychological problems seriously weaken their judgment and behavior regulation abilities, increasing the risk of illegal behavior. These studies have revealed the core role of psychological factors, especially emotional regulation ability, mental health status, and cognitive development level in juvenile delinquency. Therefore, it is not enough to judge responsibility capacity based on age alone, and individual analysis needs to be conducted in combination with psychological state.

When assessing the criminal responsibility of minors, many studies believe that it is necessary to consider the immaturity of adolescents in terms of physical and psychological development to formulate judicial measures that are more in line with their developmental characteristics (Gavzer, 2024; Kadima, 2023; Dache, 2023) [12-14]. Although some studies have explored the impact of physical development on judgment and self-control, systematic analysis is lacking. The relationship between psychological maturity and physical development and how they jointly affect the balance between rationality and impulse in minors in complex decision-making situations has not been explored in depth. Based on this, this paper will focus on three research questions: first, how to

quantitatively evaluate the impact of minors' physiological development and psychological maturity on their criminal responsibility; second, how physiological and psychological factors interact to affect minors' decision-making ability and responsibility assessment; and third, how to effectively use psychological assessment tools in combination with physiological development to improve the scientificity and fairness of responsibility determination. This paper aims to fill the above research gaps and propose a comprehensive assessment model that emphasizes the interaction between physiology and psychology to help assess minors' criminal responsibility more accurately.

3. LEGAL BASIS OF CRIMINAL RESPONSIBILITY OF MINORS

The determination of criminal responsibility of minors in China is based on Article 17 of the Criminal Law, which constructs a ladder-type responsibility system through age stratification and special crime provisions, and establishes the legislative logic of "education as the main and punishment as the auxiliary." The current system not only reflects the legal tolerance for the physical and mental specialness of minors but also reflects the bottom line requirements for serious criminal acts in social governance [15].

From the legal definition, Article 17 of the Criminal Law divides the age of criminal responsibility into four levels: first, those under the age of 12 are absolutely not criminally responsible; second, those aged 12 to 14 must be prosecuted for specific violent crimes (intentional homicide, intentional injury resulting in death, or causing serious injury or disability to others by particularly cruel means) with the approval of the Supreme People's Procuratorate; third, those aged 14 to 16 are criminally responsible for eight types of serious crimes such as intentional homicide, rape, and robbery; fourth, those aged 16 to 16 are fully criminally responsible. This hierarchical design not only follows the internationally accepted concept of "relative age of responsibility" but also adjusts it in accordance with the trend of younger juvenile delinquency in China. The newly added 12-14 year old approval and prosecution clause in the 2021 Criminal Law Amendment (XI) is a targeted response to vicious cases. This adjustment not only responds to society's concerns about juvenile vicious crimes, but also avoids excessive prosecution through strict procedural restrictions (such as approval by the Supreme People's Procuratorate).

In terms of legislative logic, the principles of leniency, education, and rescue priorities run through the entire process. On the one hand, the Criminal Law clearly stipulates that juvenile crimes should be given a lighter or reduced punishment and require that they be detained and managed separately from adults during the execution of the punishment; on the other hand, the Law on the Protection of Minors and the Law on the Prevention of Juvenile Delinquency emphasize the realization of correctional goals through social investigations, psychological intervention, conditional non-prosecution, and other systems (Cao & Min, 2024)[16]. The conditional non-prosecution system in the Criminal Procedure Law allows for the postponement of prosecution for minors who may be sentenced to imprisonment for less than one year. setting a 6-12 month probation period to implement behavioral correction reflects the transformation of criminal policy from retributionism to restorative justice.

4. THE IMPACT OF PHYSIOLOGICAL FACTORS ON CRIMINAL RESPONSIBILITY

4.1. Brain Characteristics

Brain development is a long and complex process that begins during the embryonic period and is gradually completed in early adulthood. In this process, the structure and function of the brain constantly change, and these changes are closely related to an individual's ability to control behavior. The prefrontal cortex is the core area of executive function and decision control, and includes the

ability to make decisions, inhibit impulses, plan for the future, and other behavioral control capabilities (Friedman & Robbins, 2022)[17]. Studies have shown that the degree of maturity of the prefrontal cortex is positively correlated with an individual's ability to control behavior (Krawczyk, 2002) [18]. Their maturity is usually delayed until approximately 25 years of age. Especially between the ages of 12 and 16 years, the density of connections in the prefrontal neural network of minors is significantly lower than that of adults, resulting in their weak impulse inhibition ability.

Abnormal brain development may lead to defects in an individual's ability to control behavior, which in turn affects their criminal responsibility. Common abnormalities in brain development include congenital brain and brain injuries. Congenital brain diseases such as autism spectrum disorder and attention deficit hyperactivity disorder (ADHD) affect an individual's brain neural development, causing problems in behavior control, social interaction, and cognitive ability (Thapar et al., 2017)[19]. Patients with ADHD often have difficulty concentrating, are prone to impulsive behavior, and lack effective control over their own behavior. In some cases, they may commit illegal acts because they cannot suppress impulses. However, owing to the behavioral control defects caused by abnormal brain development, they may need special consideration in the assessment of their criminal responsibility.

Brain damage is an important factor that affects brain development and behavioral control. Severe head impact and brain infection can cause brain damage. Brain damage may damage neural circuits and affect the normal transmission of neurotransmitters, thereby leading to a decrease in the ability to control behavior (Robertson & Murre, 1999) [20]. In legal practice, for individuals whose behavior control ability is impaired due to brain damage, it is necessary to comprehensively consider the degree of brain damage, the impact on behavior control, and the specific circumstances of criminal behavior to accurately assess their criminal responsibility.

4.2. Endocrine System

Fluctuations in hormone levels during adolescence have a profound impact on behavioral patterns. Peak testosterone concentrations were significantly correlated with violent crime rates (Sher, 2023)[21]. Juvenile male offenders have high serum testosterone levels and are more likely to react aggressively in provocative situations (Batrinos, 2012)[22]. Cortisol is the core hormone of the stress response, and its abnormal secretion can lead to disorders of the "fight or flight" mechanism. Empirical studies have shown that minors who have been subjected to domestic violence for a long time have circadian rhythm disorders of cortisol levels and are more likely to resort to extreme violence.

In addition, increased sensitivity of the dopamine system and insufficient serotonin secretion further amplify the risk of adolescents seeking excitement and losing control of their emotions. A longitudinal study by the National Institute on Drug Abuse (NIDA) showed that the violent crime rate of minors carrying the DRD4-7R gene mutation was 3.2 times that of the general population, confirming the close relationship between abnormal neurotransmitter metabolism and aggressive behavior (Chmielowiec et al., 2021)[23]. Functional magnetic resonance imaging (fMRI) studies have shown that when minors make high-risk decisions, the activation level of the prefrontal cortex is only 60%-70% of that of adults, while the activity of the amygdala, the emotional response center, is more than 20% higher (Rosen et al., 2005)[24]. This imbalance in neural activity makes it easier for minors to choose immediate gratification and ignore the long-term consequences.

4.3. Physiological Maturity

The asynchrony between psychological maturity and physiological development implies that relying solely on physiological standards may overestimate the responsibility of minors. Freitag et al., (2012) showed that the average psychological age of physiologically precocious adolescents was only 1.2 years earlier than their peers, and there was no significant correlation with key psychological

indicators such as emotion regulation and risk cognition [25]. In addition, the existing neuroimaging technology has not yet formed a unified judicial application standard.

The application of physiological indicators also involves ethical concerns. If neurodevelopmental data are used as the main basis for judging responsibility, this may cause systemic injustice to minors with developmental delays or neurological diseases. For example, patients with attention deficit hyperactivity disorder (ADHD) have different prefrontal lobe functions than ordinary people; however, this does not mean that they are completely without criminal responsibility.

Therefore, the determination of the criminal responsibility of minors must focus on their physiological developmental characteristics. This means that when judicial authorities try relevant cases, they need to fully understand that each minor is different from others and have a development timetable to ensure a comprehensive and accurate evaluation of their abilities and behaviors.

5. THE IMPACT OF PSYCHOLOGICAL FACTORS ON CRIMINAL RESPONSIBILITY

5.1. The Development Stage of Cognitive Ability

The cognitive ability of minors is a dynamic developmental process. There are obvious differences in thinking patterns, moral judgments, and logical reasoning abilities at different ages, which directly affect their cognition of criminal behavior and understanding of legal responsibility. According to Piaget's cognitive development theory, minors under the age of 12 are usually in a concrete operational stage, and their thinking is still mainly based on concrete images, making it difficult for them to abstract the deep meaning of legal norms and social rules (Ghazi & Ullah, 2015) [26]. When they are over 12 years old, minors gradually enter the formal operational stage and begin to have certain logical reasoning abilities, but they may still misjudge the consequences of their behavior due to lack of experience.

For example, a four- or five-year-old child may take someone else's belongings out of curiosity but does not understand the legal and moral wrongness of this behavior. As children grow older, they enter childhood and begin to transition into abstract logical thinking. They can understand some simple rules and causal relationships, but their understanding of complex legal concepts remains limited. According to China's criminal law, children's cognitive abilities are not yet mature, and they are unable to adequately identify and control their own behavior. Adolescence is a period of rapid cognitive development. However, their thinking is often one-sided and superficial and is easily influenced by emotions and the external environment. Adolescents may commit illegal and criminal acts because of the pursuit of excitement and peer pressure.

Kohlberg's theory of moral development also reveals that the moral judgment ability of minors is generally at the preconventional level (oriented towards punishment and rewards) or the conventional level (oriented towards social norms and the evaluation of others) and rarely reaches the post-conventional level (based on universal ethical principles). This means that when minors understand the severity and legal consequences of criminal behavior, they may have misunderstandings due to their lack of mature moral cognition. This has also been confirmed in real cases and in judicial practice. Some young criminals show cognition of "gaming" violent behavior. The suspects lacked a sense of guilt for their abuse of the victim, which showed their limitations in cognitive ability and inability to correctly assess the illegality and social harm of their own behavior. These cognitive characteristics prevent minors from fully demonstrating a sense of responsibility when facing legal consequences, thus affecting their capacity for responsibility.

5.2. Emotional and Emotional Factors

Minors have weak emotion-regulation abilities and are easily affected by external stimuli. Impulsivity, aggressiveness, and emotional instability are important psychological factors that can induce crime (Guofang, 2024)[27]. Neuroscience research shows that the prefrontal lobe of the adolescent brain (responsible for impulse control and rational decision-making) is not yet fully mature, whereas the limbic system responsible for emotional responses is highly active, which makes minors more likely to act aggressively when they are angry, fearful, or excited. The incidence of aggressive behavior in adolescents is three times higher than that in adults when they are emotionally excited (Liu et al., 2013) [28]. In judicial practice, when sentencing perpetrators of passion crimes, their emotional factors may be taken into consideration, and the punishment may be appropriately lighter.

Minors who have been in an environment of domestic violence, school bullying, or social exclusion for a long time are prone to hostile attribution bias and tend to interpret neutral events as malicious, thereby increasing their risk of violent crime. At the same time, peer pressure and herd mentality during adolescence are also factors that influence criminal behavior. Many minors commit crimes in groups. Individuals may participate in illegal behavior because of "obeying authority" (such as gang leaders) or "fear of being excluded", even if their personal moral cognition does not fully approve of the behavior. Studies have also shown that Internet addiction and substance abuse (such as alcohol and drugs) can further damage the willpower of minors and reduce their ability to control their behavior. Minors who are addicted to violent games are more likely to be "desensitized" to violent behavior and react aggressively more quickly in conflict situations.

Therefore, owing to their immature psychological development, minors' recognition ability, self-control ability, and social adaptability are significantly different from those of adults. These factors directly affect criminal motives, behaviors, and responsibilities.

6. CONCLUSION

Judicial practice must transcend traditional age-based thinking and use interdisciplinary assessment tools and institutional innovation to build a juvenile responsibility identification system that considers both physiological maturity and psychological cognitive ability. In order to optimize the mechanism for identifying juvenile criminal responsibility, this study recommends the construction of a "physiological + psychological assessment" dual-track identification model. Flexible clauses can be set within the framework of Criminal Law to introduce an interdisciplinary expert witness system. An expert team composed of neuroscientists, developmental psychologists, and clinical psychologists can participate in the judicial evaluation of juvenile cases, apply brain-imaging technology to analyze the defendant's physiological state, and combine psychological theoretical means for evaluation. Through such a mechanism, the law can not only reflect the actual situation of minors' capacity for responsibility but also achieve comprehensive consideration of their education and rescue.

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