

Exploring the Causes of Mental Illness by Analysis of Congenital and Acquired Factors

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ABSTRACT

The psychopathic disorder was conceptualized as a mental (antisocial) condition in which a person exhibits amoral and antisocial conduct, a lack of ability to love or form meaningful human connections, lack of guilt and empathy, excessive egocentrism, and an inability to learn from experience, among other characteristics and other symptoms. Antisocial behaviors were defined as physical violence, stealing, and violation of social standards that occur outside the norms, rules, or laws of the social group in which the person grows. The core of psychopathy was characterized as “callous-unemotional” traits (e.g., lack of empathy, low fear, insensitivity to punishment) as the major predictor of chronic and severe aggression. All of those correlate with either nature or nurture determined as biological or environmental aspects. The studies are based on infants, early childhood, youths, adolescents, and how inborn gender differences, environmental development as well as trauma exposure or brain trauma contribute the adult psychopathy later on. This paper uses those qualitative researches and a summary of relevant literature to analyse both nature and nurture factors that related to mental illness. As the result, biological and environmental are both played a significant role, while as child maltreatment as harsh parenting style such as neglecting, child abuse etcetera represents as the fail failures of care is the most common and remarkable developmental aspect along with the childhood experience to adult psychopathy.

Keywords: *causation, psychopathy, biological, environmental, trauma*

1. INTRODUCTION

Based on biological and environmental aspects, the study of infants uncovers parenting facts in infancy, such as breastfeeding, as well as deeper aspects such as educational, social, and economic issues. At the same time, the study of infant development also involves major questions of genotype, receptor genes, triggering alleles, including ANKK1, DRD2, DRD4, MAOA, COMT, and 5-HTTLPR, which can be triggered at different stages or months of the infant Psychotic personality problems in the future. Individual who shows a high level of psychopathy have impaired emotional priming and facial expression recognition, this is associated with ANKK1 and DRD2, studies suggest that part of those genes and some aberrant phenotypes would involve affective priming and identification of emotional expressions but further studies do really need. [1].

Other studies also include the investigations of early caregiving encounters, not only of caregivers but also of the infant's own genetically sensitive temperament [2]. There are two types of psychopathic disorder--primary

psychopathy and secondary psychopathy. In the case of primary psychopathy, this entails premeditated violence, grandiosity, and a lack of emotion which are more considered as hereditary and biological aspects. And Reactive aggressiveness, impulsivity, and antisocial conduct have been defined as the symptoms of secondary psychopathy which are suggested to be related more to the environmental aspect. More generally, primary psychopathy is defined as thought to be linked to issues with emotional functioning that concern the person him/herself, whereas secondary psychopathy is defined as a lack of empathy or emotional consideration for others [3]. There are many ways to investigate the real issue, the most efficient is the twin study as researchers can investigate the involvement of genes in the overall development of a characteristic or illness. According to the aspects of biological reason, the bulk of extant brain imaging research of large sample size of twins on aggressiveness focus on people with antisocial personality disorder and psychopathy, especially concentrate on the frontal-limbic-striatal circuitry. The result suggests that violent behavior is linked to decreased or lack of grey matter volumes in the

orbitofrontal cortex, middle frontal cortex, and temporal lobe. In these frontal regions, lower volume and cortical thickness are associated with increased aggression in adolescents. Particularly, the dorsolateral prefrontal cortex, the anterior cingulate cortex involved in impulse control, and the orbitofrontal cortex for emotion regulation. In addition, the study assumed a positive correlation between the number of adolescent striatum in adolescents, the higher the level of violence.

However, the possibility of twins with different parents or living in different countries, cultures, and environments makes it easy for researchers to study the relationship between their life differences and aggressive or violent personalities. [4]

This article focuses on how biological and environmental issues can contribute to a person's mental illness, including the causes of post-traumatic stress disorder, stress, and trauma. At the same time, the investigation is mainly based on early childhood, taking the study of twins as an example. In addition to the influence of family and social factors, children's behaviour is related to their sensitivity to the surrounding environment, so their childhood and adulthood are closely related. The discussions are based on why and how people become psychopathy. According to nature, many studies were as longitudinal studies that start from early childhood as well as focus on the protein coding gene DRD2 and DRD4. In addition to family and social aspects, children's behavior is associated with sensitivity to their surroundings, and childhood development is closely related to adulthood. All the stressful and traumatic issues and PTSD are related to nurturing. Parents' abuse, neglect, maltreatment is the most crucial reason why a child lacks empathy and is guilty. Men can more easily become aggressive, and therefore, gender differences are something that cannot neglect. Different hormone systems and responses have different effects, as the MAOA gene works differently in males or females. Those investigations help people understand more about the reasons behind psychopathy, people with a lack of empathy and guilt, and people who are more likely to become aggressive.

2. ANALYSIS

2.1 Nature

The development of psychosis in early childhood and adolescence as well as later in life, which was defined to be the most crucial stages, was studied by predicting callous-unsympathetic traits (CU) and found that the traits of psychosis were remarkably stable from childhood to adulthood [2]. Lots of empirical experiments were done even in the early 1930s to show the great possibility of psychopathy due to negative childhood experiences by mainly investigating people or even juveniles in prison due to psychopathic

delinquency. However, because the studies are still preliminary, they may be restricted in methodological validity, as they lack a reliable and rigorous evaluation of psychopathy, and their empirical relevance is frequently questioned by posterity, despite its historical significance. But the idea has been consistent in later years when more empirical experiments have been done and show that about 40-60% of the diversity in psychopathic characteristics is due to hereditary causes [5] as shows that CU trait is also highly heritable [6]. This tells us that both biological and environmental aspects have played a series of roles as the individual manifestation of psychopathy-related traits is influenced by inherited gene combinations as well as environmental variables as leftover 40-60%.

Furthermore, the inborn genetic associates with the environment and different temperaments also contributed to the traits, which especially under the condition when the infant had DRD2 (dopamine D2 receptor gene) and DRD4 (dopamine D4 receptor gene) that link with brain function which relies on the neurotransmission process. Norepinephrine, serotonin, and dopamine are the most researched neurotransmitters linked to antisocial conduct. Serotonin levels which will be mentioned later, for example, are linked to impulsive and aggressive behavior, alcohol addiction, and violence [7]. Therefore, this determines a possible causal link between genotype and psychopathy. Twin studies also found that psychopathy is thought to be 30-50 percent or even higher heritable. The dopamine beta-hydroxylase gene (DH), as well as the dopamine D2 receptor gene (DRD2), have both been linked to aggressiveness and psychopathology. Especially DRD2, researchers recently conducted a genome-wide association analysis and identified 30 genes that may be linked to psychopathy [7]. Also, for DRD4, infants with this genotype are more sensitive to parental quality than those without DRD4 [2]. As if that infants with genetic exposure will show greater psychopathic characteristics in less responsive parental care, especially as infants reach age 15 when psychotic traits begin to emerge.

2.2 Environment (Family and society)

As in the early text, there are also problems of youth's temperament that would associate with sensitivity to the environment. Their temperament can be influenced by their familial and social surroundings. Separation of parents and single motherhood was directly linked to children's temperament, capacity to regulate emotions, and overall well-being. Infants with a "difficult" temperament type were described as having negative emotional expressions, limited adaptation, excessive reactivity, and low emotional control in the past, so to the opposite, would be defined as an easy temperament. [8]. Studies found especially among males, discovered that mother and paternal sensitivity had the greatest impact

on male babies with an easy temperament (assessed at 1 and 6 months). And they are more likely to exhibit psychopathic characteristics in adolescence chiefly when they have easy temperament experiment to low parental sensitivity. Nevertheless, there are also a few studies focused on the relationship between the 5-HTTLPR gene which is a serotonin transporter, and antisocial and aggressive behaviors, as well as child maltreatment and antisocial traits. Serotonin (5-HT) is a crucial neurotransmitter in the central nervous system that regulates various psychological characteristics, behavioral and physical processes, as well as cognitive and emotional states. Since the central role of 5-HTT is to control the level of 5-HT neurotransmission, so the dysfunction of 5-HTT can cause abnormality in emotional regulation [9] and the lower the expressing of 5-HTTLPR, the more likely these individuals will display psychopathic behavior [10]. Moreover, from the genetic aspect, as each parent passes on a copy of this gene variation to their children, research found that participants with short alleles were more likely to express negative emotion like anger and contempt [11]. However, there are still some studies show that the 5-HTTLPR gene didn't really play a significant role when determining psychopathic personality, whether in the studies of children or in longitudinal studies in adolescents [12].

2.3 Nurture

Not only about the inborn issues but also some traumatization like brain trauma etc. Biological risk factors, social and economic risk factors, including marital status as unmarried or singles, prior history-related risk factors such as previous head trauma, family psychiatric history, and the last one, negative modifiers of course and outcome as genetic factors, are the four most important risk factors of brain trauma. [13]. Also, different traumatic events such as sexual abuse, combat, a threat with weapon, accident, natural disaster, physical abuse, neglect [12]. All of these events can cause the development of post-traumatic stress disorder (PTSD) which is an anxiety disorder induced by stressful, scary, or upsetting experiences, but prevalence varies by gender.

2.4 Stressful or traumatic

Nevertheless, traumatization is also considered to be related to psychopathy. Trauma is defined as an emotional response to a distressing event, such as a physical attack, sexual abuse or natural disaster[3]. It is thought to have the most detrimental impact in the first ten years of a person's life, during the first decade, children's emotional systems are not being completely formed, as well as trauma exposure, which would cause issues with aggressiveness, impulse control, dissociation, interpersonal relationships, and attributional disorders.

Also, distinct forms of trauma, are linked to different subtypes of psychopathy, like what I mentioned before, primary psychopathy and secondary psychopathy. A concept called developmental trauma disorder which most associated with psychopathy as this resulting all the issues that psychopathy might have, like behavior dysregulation, maladaptive schema, impulsive risk-taking. Especially the Betrayal Trauma (BT) theory within the concept. This theory happens when an abused victim additionally feels betrayed since the abuser is a close relative or caregiver, someone the victim trusted and/or relied on. [3]. Therefore, this really showed how caregivers and grow up environments are important during a person's childhood.

Stressful or traumatic events, such as abuse including emotional abuse, physical abuse, sexual abuse, mistreatment, parental desertion as considered both emotional neglect and physical neglect, poverty, or exposure to crime, etc. are all classified as adverse childhood experiences as child maltreatment. Emotional neglect and physical neglect are both described as failing to provide a child's emotional (e.g., love, support) or bodily (e.g., shelter, food) requirements. Any sexual interaction between an adult and a minor is considered sexual abuse. [14]. All of those experiences would play a significant role in the development of callous-unemotional traits and antisocial behavior because any form of parental rejection or abuse can lead to a child's loss of conscience, which can last into adulthood and finally lead to psychopathy [7]. There are many studies had done some similar investigation on adult criminal psychopathic or psychopathic delinquents that all come up with the results that the majority of them were exposed to risk factors such as parental abuse (particularly sexual abuse), brutality, immorality, insanity, rejection, or neglect, as well as a disturbed household during their youths [5].

Start with infancy, which is the developmental era during which individual variations in empathy and guilt arise, whereas the caregiver's work is really important at that stage. As the studies even found that breastfeeding was not used throughout infancy and breastfeeding for a shorter period of time substantially raised the likelihood of psychopathic personality characteristics in maturity (ages 24 - 32) when sex, ethnicity, and socioeconomic status are taken into account [2].

As mentioned earlier, the reason for focusing on neurotransmission is because the process of neurotransmission may be influenced by environmental stimuli or genetic factor. For instance, during infancy or early childhood, any exposure to negative parental treatment would cause notable stress and this situation is very likely to lead to malnutrition. But since neurotransmitters need to involve proteins to function properly, any malfunctioning protein can lead to abnormally high or low levels of a particular

neurotransmitter, which may be associated with psychotic personality traits.

2.5 PTSD

Same as psychopathy, PTSD is also a form of psychopathology which are linked to higher rates of crime, violence, and re-offending than the general population. Moreover, a variety of different traumas can adversely affect a person's ability to empathize as a child grows. It can also lead to emotional and violent outbursts due to a lack of impulse control. There is also a theory called child trauma theory which is basically about children being more vulnerable to severe, long-term behavioral and emotional deficits, and they are reported to react differently to trauma than adults [3].

2.6 Gender

Besides the biology and environmental aspect, gender differences also correlate with psychopathic. There are few early clinical reports of psychotic features in women, as men are always more aggressive and violent due to hormones such as testosterone. In addition, studies have shown that between the ages of 21 and 35, when male testosterone levels are at their highest, male aggression against men increases [15]. But that doesn't mean females or girls do not develop psychopathic characteristics over the last two decades, there has been an upsurge in studies on female psychopathy which has found that the way they display and respond to certain aspects would be different.

Most studies use Psychopathy Checklist-Revised (PCL-R) to investigate the relationship between them [16]. This list is a psychological assessment that is most often used to determine whether or not someone has psychopathy which includes the detection of interpersonal traits and antisocial traits. These two traits are also related to hormone reactivity as estradiol and testosterone reactivity which can explain why men are more likely to be reported as psychopathy [17]. However, The Monoamine oxidase A (MAOA) gene is also one of the biological differences between males and females which is a significant reason for girls or females who is psychopathic and have callous-unemotional traits. This gene can actually metabolize serotonin. The results showed that this MAOA gene actually interacts with early parenting styles, as principally affects females who are MAOA-LL carriers, so this genotype appears to be a genotype associated with a greater sensitivity to parental effects, no matter a positive or negative one. Especially when they are at age 3 as a pre-schooler, if they exposure to punitive parenting, they will show higher CU traits at age 5, however, if this happened oppositely, as they exposure to constructive parenting, it can benefit more on their personality [6]. Any random inactivation or epigenetic of their X-chromosomes in women may

trigger estrogen as an important sexual and reproductive hormone in women and to show off a protective impact against hereditary variables that increase the risk of violence in women. This may also influence MAOA gene transcription, therefore the presence of this specific genetic polymorphism may result in subtle molecular abnormalities, which, when combined with other genetic, hormonal, and environmental factors, may influence physiological processes, synaptic plasticity, and information processing, potentially predisposing people to violent behavior [6].

2.7 Twin cases study

The Twins Early Development Study (TEDS) can be really useful to investigate the origin of the callous-unemotional syndrome as it is used to analyze how an individual's genes and the environment, they grow up in affect who they become over the course of their lives. In the study, they judge the genetic contributions by comparing between identical twins who shared 100% of genes and non-identical twins who shared 50% of genes on average by using samples from the USA, Sweden, and the UK, different age groups, and a variety of callous-unemotional characteristics tests. The result of the study indicated moderate to substantial heritability of callous-unemotional characteristics in youths, with estimations showing that genetic factors accounted for 40 – 78% of the variance in callous-unemotional traits throughout the population, as the funding showed that genetic factors contribute a lot to psychopathic personality. However, this twin study can also document the relationship between psychopathic and environmental factors. This would be considered with either shared environment or non-shared environment whereas shared environment was defined as refers to shared environmental experiences that bind family members together, so they have similar behavior patterns. This would make the non-identical twins become more likeness with each other which is higher than would be predicted based only on genetic affinities. The non-shared environment is then applied to the distinct environmental experiences that cause family members to be less similar to one another and is seen when identical twins do not look exactly alike with each other than how genetic relatedness predicts as 100%. Consequently, all the studies have shown that in order to explain variance in callous-unemotional characteristics, non-shared environmental inputs are particularly crucial. Also, even more, affections would show when this is also related to parenting, like when a parent offers less affection or care to one twin than the other, and this variation in parenting may impact the development of callous-unemotional characteristics in each twin differently [17]. Twin studies on brain images show that volumetric disturbances of the orbitofrontal cortex (OFC) and striatal regions and thickness disturbances of temporal and parietal lobes are all associated with aggression. Studies used 104 pairs of

twins and, across the entire sample, results show that higher total aggression was correlated with larger volumes in the right lateral orbitofrontal cortex (OFC) and striatal regions. Lower lateral and medial frontal volumes may play a bigger role in proactive aggressiveness which is beyond physical aggression and are behaviors that are focused toward a certain aim, whereas larger left putamen may play a bigger role in reactionary aggression. Nevertheless, the thinner frontal cortex and thicker temporal and parietal lobes can also cause a higher aggression rate [4].

3. CONCLUSION

Through all the studies, psychopathic disorder issues have been become more and more attention by scientists. No matter the biological or environmental aspect, no one is more important, they all somehow played a significant role in causing the psychopathic problem of psychopathy shown by different studies. A child's developing environment child's environment should typically allow them to acquire good abilities and functions including trust, self-control, social understanding, and empathy [3]. But the research is still been preliminary and limited, there is not enough evidence on the relationship between trauma and psychopathy as well as on gender difference, as lack of research and empirical study on female psychopathy. And for the actual development of psychopathy, researchers more often do the interview or study on adult or adolescences psychopathy that in jailed by been violented to others, but if they can actually focus on infants and doing more longitudinal experimental, or investigate them stages by stages as to how they grow up, maybe it's really difficult as it's a long period, but notwithstanding, it would be really helpful to figure out which is one is more important, genetical or environmental. Last but not least, even there are many arguments between each study, we still need to keep on track to do the best.

REFERENCES

- [1] Koeneke A, Ponce G, Hoenicka J, Huertas E. The ANKK1/DRD2 locus is a genomic substrate for affective priming and recognition of angry faces. *Brain Behav.* 2015 Oct 14;5(11):e00405. doi: 10.1002/brb3.405. PMID: 26664790; PMCID: PMC4667759.
- [2] Glenn, AL. Early life predictors of callous-unemotional and psychopathic traits. *Infant Ment Health J.* 2019; 40: 39– 53. <https://doi-org.winthrop.80599.net/10.1002/imhj.21757>.
- [3] Jane L. Ireland, Sophie Mann, Michael Lewis, Rebecca Ozanne, Kimberley McNeill, Carol A. Ireland, (2020) Psychopathy and trauma: Exploring a potential association, *International Journal of Law and Psychiatry*, ISSN 0160-2527, <https://doi.org/10.1016/j.ijlp.2020.101543>.
- [4] Yaling Yang, Shantanu H. Joshi, Neda Jahanshad, Paul M. Thompson, Laura A. Baker (2017). Neural Correlates of Proactive and Reactive Aggression in Adolescent Twins, *AGGRESSIVE BEHAVIOR*, Volume 43, pages 230–240. <https://doi.org/10.1002/ab.21683>.
- [5] Schimmenti, A., Carabellese, F.F. and Caretti, V. (2020). Child Maltreatment and Psychopathy. In *The Wiley International Handbook on Psychopathic Disorders and the Law* (eds A.R. Felthous and H. Saß). <https://doi-org.winthrop.80599.net/10.1002/9781119159322.ch18>.
- [6] N. Pueyo, J.B. Navarro, M. Fatjó-Vilas, N. de la Osa, E. Penelo, L. Fañanás, L. Ezpeleta, (2021) Monoamine oxidase A (MAOA) interaction with parenting practices on callous-unemotional traits in preschoolers, *The European Journal of Psychiatry*, ISSN 0213-6163, <https://doi.org/10.1016/j.ejpsy.2021.02.003>.
- [7] Tong Wu, J.C. Barnes, (2013) Two dopamine receptor genes (DRD2 and DRD4) predict psychopathic personality traits in a sample of American adults, *Journal of Criminal Justice*, ISSN 0047-2352, <https://doi.org/10.1016/j.jcrimjus.2013.02.001>.
- [8] Xian Abulizi, Laura Pryor, Grégory Michel, Maria Melchior, Judith van der Waerden, on behalf of The EDEN Mother–Child Cohort Study Group, *PLoS One.* 2017; 12(2): e0171971. Published online 2017 Feb 15. doi: 10.1371/journal.pone.0171971.
- [9] Ahmad R. Hariri, Andrew Holmes, Genetics of emotional regulation: the role of the serotonin transporter in neural function, *Trends in Cognitive Sciences*, Volume 10, Issue 4, 2006, Pages 182-191, ISSN1364-6613, <https://doi.org/10.1016/j.tics.2006.02.011>.
- [10] Nordquist, N., & Oreland, L. (2010). Serotonin, genetic variability, behaviour, and psychiatric disorders--a review. *Upsala journal of medical sciences*, 115(1), 2–10. <https://doi.org/10.3109/03009730903573246>
- [11] Haase, C.M., Saslow, L.R., Bloch, L., Saturn, S.R., Casey, J.J., Seider, B.H., Lane, J., Coppola, G., & Levenson, R.W. (2013). The 5-HTTLPR Polymorphism in the Serotonin Transporter Gene Moderates the Association Between Emotional

Behavior and Changes in Marital Satisfaction Over Time. *Emotion*. DOI: 10.1037/a0033761

- [12] Cathy Spatz Widom, Dana Miller, Xuechen Li, Derek Gordon, Linda Brzustowicz, 2020, Childhood maltreatment, serotonin transporter gene, and risk for callous and unemotional traits: A prospective investigation, *Psychiatry Research*, ISSN 0165-1781, <https://doi.org/10.1016/j.psychres.2020.113271>.
- [13] Henry R. Hermann, (2017), Chapter 9 - Alternate Human Behavior, Editor(s): Henry R. Hermann, Dominance and Aggression in Humans and Other Animals, Academic Press, ISBN 9780128053720, <https://doi.org/10.1016/B978-0-12-805372-0.00009-2>.
- [14] Guillaume Durand, Joana de Calheiros Velozo, The interplay of gender, parental behaviors, and child maltreatment in relation to psychopathic traits, *Child Abuse & Neglect*, Volume 83, 2018, Pages 120-128, ISSN 0145-2134, <https://doi.org/10.1016/j.chiabu.2018.07.013>.
- [15] Sturmey, P., Carré, J.M., Ruddick, E.L., Moreau, B.J.P. and Bird, B.M., 2017, Testosterone and Human Aggression, 1. Definition, Conception, and Development Biology, *The Wiley handbook of Violence and Aggression*, <https://doi.org/10.1002/9781119057574.whbva020>.
- [16] Leah M. Efferson, Andrea L. Glenn, (2019) Examining gender differences in the correlates of psychopathy: A systematic review of emotional, cognitive, and morality-related constructs, *Aggression and Violent Behavior*, ISSN 1359-1789, <https://doi.org/10.1016/j.avb.2018.05.009>.
- [17] Natalie A. Harrison, Ryan L. Earley, Randall T. Salekin (2020) Reconsidering the role of sex hormones in psychopathy development: Estrogen and psychopathy among male justice-involved youth, *Psychophysiology*, volume 58, Issue 1, <https://doi.org/10.1111/psyp.13694>.