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Undergraduate

Nature (MAOA) and Nurture in a Criminal

By Julian Highsmith, Mark Mercado, Jose Hernandez, &
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Abstract

In this literature review, we will be discussing the nature and nurture aspects that make up a criminal's mind. Studies such as McDermott, et al. and Pickles, et al. have shown that low levels of monoamine oxidase a gene (MAOA) lead to higher rates of aggression. The study conducted by McDermott, et al. compared two groups—low MAOA (MAOA-L) and high MAOA (MAOA-H)—of male participants to each other, and the researchers concluded that the participants with MAOA-L showed more signs of aggression versus the participants with MAOA-H that showed low levels of aggression. Pickles, et al. (2013) conducted a study which studied two groups of infants that had different maternal sensitivity and MAOA levels. The researchers from this study concluded that MAOA and nature are two contributing factors to aggression. The serial killer Ted Bundy is an example of this idea. Having a loving family, but low levels of MAOA, Bundy showed high levels of aggression. The purpose of this literature review is to emphasize the theory that nature and nurture are prime factors to a serial killer's mind.

Key terms: MAOA, Nature, Nurture, Genetics, Gene Environment Interaction, Psychology Factorials, Criminology, Ted Bundy

Introduction

Serial killers are important to this country, because most of the world's serial killers are American citizens (Aamodt, 2014). Being aware of what previous killers have done is important in trying to define how a criminal thinks and how certain events or personalities are correlated to a criminal. In understanding these topics, nature and nurture will be further analyzed to determine the exact roles they play in the human mind. This subject matter has long been a subject of importance, as the numbers of criminals in the United States continues to rise through every decade. Understanding the mind is a crucial point in the field of psychology, which gives researchers the opportunity to expand the little knowledge of the mind that is available. Nature and nurture are two key concepts found in most psychological problems. Because of this, gene environment interaction is an important factor. Monoamine oxidase A (MAOA) gene is the most common denominator in a criminal's mind. MAOA gene is used in the body to modify norepinephrine, epinephrine, serotonin, and dopamine. MAOA prevents the individual from obtaining high levels of aggression. The gene originates from the X chromosome, however, low levels of this gene are found for the most part in males. Low levels of MAOA make it hard for individuals to resist inflicting physical and psychological damage to the individual, while individuals with higher levels of MAOA allows them to resist these harms (McDermott, 2009). Acts of aggression in individuals include 1st and 2nd degree murder, aggravated assault, domestic and non-domestic battery, voluntary manslaughter, aggravated kidnapping, rape, and indecent liberties with children (Stetler, 2014). These acts of aggression belong to the entire aspect of nature versus nurture. The MAOA gene and the nature and nurture concept both make up the foundations of understanding a criminal's mind. Gene environment interaction is behind this explanation, and is also connected to the nurture aspect as well. Genes are a major factor of what makes the foundation of a criminal's mind. Genetics is a part of why criminals choose to do the unlawful acts they do. Raine (2013) argues in his book *The Anatomy of Violence* that family lineage—in the terms of genetics—is a factor in the nature aspect of the report. Raine stated that Jeffrey Landrigan was a criminal from the moment he was born. Landrigan had discovered that his biological father and his grandfather were both criminals during before he was sentenced to death. Landrigan's criminal career began when he was in his adolescent years. Aslund (2013) concluded in his study that adolescent and antisocial behavior—another common criminal characteristic—are derived from childhood maltreatment. In a study conducted by Levitt (2013) it was conducted that nurture was an important factor in condemning criminals, due to the same antisocial behavior characteristic that was described by Aslund. However, Levitt also concluded in another study that free will—in genetical terms— should be taken into consideration when condemning criminals. These connections—genetics and psychological—are all part of the same large debate that encompasses criminology. All criminals are judged the same way, and their background and upbringing (nurture) along with their genetic structure (nature) make up a criminal's mind. Ted Bundy is one of America's most notorious criminal, who is best known as a killer and rapist (Biography.com, 2015). Bundy had several psychological and biological dispositions, and the MAOA gene can be concluded as one of them. One his biggest problem was that he was raised by his grandparents on the belief that his mother was his sister (Biography, 2015). Bundy began his criminal career when he was 28 years old. By the time he was executed, Bundy had killed over one hundred civilians. Pickles, et al. (2013) had similar conclusions to Bundy's nature and nurture composure and how they are factors to his criminal

identity. Research showed that infants that were more sensitive to maternal love, were the participants that held low levels of the MAOA gene, and in a whole these infants would be just as vulnerable to criminal activity just as Bundy was. Bernet, et al. (2015) also held similar conclusions to that of Pickles, et al. These researchers did not conclude anything significant, but their study added on to how environmental and genetic makeup may lead to aggressive behavior.

Review of Literature

I. Nature (MAOA)

Recent research has shown that childhood maltreatment can be related to adolescent and antisocial behavior (Aslund et. al, 2010). Aslund and his colleague's purpose of this study were to investigate a large sample of adolescents to compare previous findings of interactions in polymorphism (MAOA-VNTR) (2010). In the psychosocial factors that anticipate delinquency, direction of this interaction alters depending on the sex (Aslund et. al, 2010). The methods that were used in the research was an anonymous survey that was distributed to 22 schools in Vastmanland, Sweden 1,825 student participants, 943 boys and 882 girls (Aslund et. al, 2010). The questionnaire consisted of questions about childhood maltreatment, sexual abuse, and delinquency (Aslund et. al, 2010). Students also provided a saliva sample for a DNA extraction to isolate for MAOA-VNTR polymorphism (Aslund et. al, 2010). The results of the research confirmed previous findings of MAOA-polymorphism, maltreatment regarding males and females delinquent behavior (Aslund et. al, 2010). Research groups have conducted studies on the life of children to their adulthood and concluded that environment and genetics of children can lead to the development of violent adolescents and adults (Bernet et. al, 2007). Bernet et al. (2007) conducted a similar research to those research groups by taking a sample of their test subjects DNA and testing for low activity of monoamine oxidase (MAOA) gene and short paired alleles of serotonin transporter (SLCC6A4 gene) (Bernet et. al, 2007). The low activity of the MAOA gene causes the metabolism of neurotransmitters in the brain such as serotonin, dopamine, and norepinephrine to be not efficient (Bernet et. al, 2007). Children with low activity of MAOA gene and maltreatment have a greater chance of developing violent antisocial behavior in their future (Bernet et. al, 2007). Individuals with short paired alleles of SLCC6A4 gene manifest more depressive and suicidal symptoms to stressful events, than those with long pairs (Bernet et. al, 2007). The researcher conducted the test on 15 defendants that were prosecuted by the state of Tennessee of first degree murder or attempt of first degree murder (Bernet et. al, 2007). The results of the DNA test concluded that 5 out of the 15 defendants displayed a low activity of the MAOA gene, short paired alleles of SLCC6A4 gene, or both (Bernet et. al, 2007). Those 5 defendants were compared to their criminal upbringing and displayed violent and depressive behavior (Bernet et. al, 2007). The researcher also discussed about cases of using an individual's environmental and genetic makeup being used in the justice system (Bernet et. al, 2007). They attempted to use their test results of the 15 defendants to prove their psycho insanity in their trials but, were not effective (Bernet et. al, 2007). The research did not exhibit exceptional results but, assisted in the advancement of how environmental and genetic makeup can lead to violent behavior. Pickles et al. (2013) discussed the topic of how genes and parenting affected infants. The MAOA gene was also an important factor in determining infant aggressiveness. Maternal sensitivity was considered an environmental factor, which contributed to the nurturing of an infant (Pickles, 2013). In the studies, the sex of the child seemed to have a role in how the infant would react to maternal sensitivity, which leads to displays in

aggressiveness. Infants were exposed to harsh environmental conditions (Pickles, 2013). The infants placed under these conditions that had the MAOA gene showed more adversity to dealing with the parameters set (Pickles, 2013). This study showed that infants with the MAOA gene have significant differences than infants without it (Pickles, 2013). They are more prone to maternal sensitivity and the world at large (Pickles, 2013). Both genetic and environmental factors were determined to be important in determining aggressiveness within infants (Pickles, 2013). To state that one factor played a primary role would be a dissatisfaction to the study and psychology as a whole (Pickles, 2013). Past studies have come to a consideration of a link between MAOA and violent behavior further investigations have looked at the variants of the MAOA-uVNTR (Stetler et. al, 2014). Six different MAOA- uVNTR variants can be characterized based on the numbers of repeats (2, 3, 3.5, 4, 5 and 6) (Stetler et. al, 2014). The variant 2 and 3 repeat are associated to lower -activity allele (L-MAOA) in which it has been linked to risk of impulsive aggression (Stetler et. al, 2014). Current research presents the investigation the possibility of male convicts incarcerated for violent and non-violent acts, and whether this relation may be paralleled by alteration in other psychological traits related to violence, impulsivity and aggression (Stetler et. al, 2014). Stetler et al. (2014) study consisted of 89 male inmates participants (49) violent and (40) non-violent. Each sample consisted of Caucasian and African American Individuals (Stetler et. al, 2014). Violent offenders were defined based on the category of crime in which they were convicted, and included (1st and 2nd degree murder, aggravated assault, domestic and non-domestic battery, voluntary manslaughter, aggravated kidnapping, rape and indecent liberties with children). Nonviolent crimes included (forgery, burglary/robbery/theft, sale and possession of drugs and DUI manslaughter) (Stetler et. al, 2014). The participants all took part of a psychometric self-report to measures consisting of: (1) The Childhood Trauma Questionnaire (CTQ), this examined childhood abuse, neglect or other forms of maltreatment; (2) Barratt Impulsivity Scale -11 (BSM-11) to assess the level of impulsivity one would have; (3) Buss-Perry Aggression Questionnaire (BPAQ) for assessment of aggression (Stetler et. al, 2014). DNA sample were collected by a mouth swab sample collected from the participants (Stetler et. al, 2014). All participants were found to have the 3-repeat allele (L-MAOA) or 4-repeat variant (H-MAOA) with the exception of one with carrier of 2-repeat variant (Stetler et. al, 2014). The results of this study showed that incarcerated male offenders, violent crime charges were significant to those that were frequent in carriers of L-MAOA alleles (Stetler et. al, 2014). Researchers examined the conditions under which individuals pay money to cause physical pain to other participants who have taken money from them (McDermott et. al, 2009). The study demonstrates a willingness to engage in expensive punishment, but it also tests the influence of MAOA that is linked to aggression (McDermott et. al, 2009). Aggression is measured with a simple economic game to observe the conditions under which people will harm others despite the financial cost to themselves (McDermott et. al, 2009). Genetic samples were collected from 78 male subjects who were assigned to 2 groups (i.e. males carrying the high MAOA activity [MAOA-H] or males carrying the low MAOA activity [MAOA-L]) (McDermott et. al, 2009). Women were exempted from the study (McDermott et. al, 2009). Participants administered hot sauce to an opponent when the opponent would take 80% or 20% of their financial money (McDermott et. al, 2009). Participants with MAOA-H tended to administer less hot sauce while participants with MAOA-L tended to administer higher doses of hot sauce (McDermott et. al, 2009). MAOA-L participants demonstrated higher trait aggression and higher trait interpersonal hypersensitivity than those with MAOA-H (McDermott et. al, 2009). Changes in aggression levels may be correlated with “moralistic aggression” in promoting cooperative relationships (McDermott et. al, 2009).

Nurture

Levitt (2013) talked about how the debate between nature vs. nurture has become very redundant and common through the media. Its popularity within the media has made the subject less of a scientific study and more of a cultural and societal fad (Levitt, 2013). Americans have been fascinated with this study and have turned it into a larger issue than it is, and have attributed it to other areas of research (Levitt, 2013). This debate has become one of the most common debates and topics within the field of psychology after the topic of twins (Levitt, 2013). Through various studies, criminologists claimed that the environment was a more important and common occurring factor in studying the criminal mindset, over the biosocial factors (Levitt, 2013). Antisocial disorder was seen as a precursor to becoming a criminal, and thus fixing that was thought to prevent the advent of the criminal mindset (Levitt, 2013). Data was gathered from the U.S. public on their thoughts about nature vs. nurture (Levitt, 2013). The results showed that the majority of the public believed that nurture was more important than nature (Levitt, 2013). They believed that life factors and societal and political pressures affected the way that an individual grew and adjusted to the world around them in a psychological manner (Levitt, 2013). The source closed by talking about how behavior affects gene expression (Levitt, 2013). Levitt (2013) focuses on how participants explain the assigning responsibility of violent and antisocial behavior when genetic and environmental influences are claimed to be the cause of the behavior. These same participants viewed that genetic factors were not the cause of violent and antisocial behavior, but by most it was considered to be irrelevant to personal responsibility (Levitt, 2013). When the participants took a questionnaire, of the forty students most agreed that the offender had a choice and/or free will while less than half of the thirteen senior participants agreed (Levitt, 2013). The senior participants seemed more open to the idea that genetics and behavior could affect the act of free will, while the students seemed more closed to that idea (Levitt, 2013). The study states that even though children have a higher excuse in regard to the nature aspect of violence, the children must still be held responsible for their actions so they learn to change their behaviors (Levitt, 2013). In the end, choice and free will are not removed by an individual because of genes or environment (Levitt, 2013). The individuals must be held responsible over their actions (Levitt, 2013).

II. Ted Bundy

In the 1970s, Theodore Robert Cowell, known as Ted Bundy, was convicted of raping and murdering at 36 young women in several states (Bio, 2015). Bundy was born in a home for unwed mothers in Vermont (Slade, 2014). Due to his illegitimate birth, he grew up thinking that his actual mother, Eleanor Cowell, was his older sister, and his grandparents were his parents (ATEN UK, 2013). Eleanor moved to Tacoma, Washington with Ted and married a military cook, Johnnie Bundy (Slade, 2014). Johnnie adopted Ted into his family of Eleanor, himself, and four additional children they had (ATEN UK, 2013). Ted Bundy was part of a working-class family (Bio, 2015). Bundy was shy, smart, and handsome but he was teased and an outsider in high school (Slade, 2014). When he discovered about the truth of his actual parent, he resulted to commit petty crimes and gain a sense of untrustworthiness (Slade, 2014). In 1966, Bundy was enrolled at the University of Washington in Seattle (Slade, 2014). His peers viewed him to be charming, intelligent, well dressed, and popular (Slade, 2014). He fell in love with a fellow

student named Stephanie Brooks and was in a relationship for a year (ATEN UK, 2013). Brooks end of their relationship dealt a psychological blow that caused him to have to drop out of college (ATEN UK, 2013). He was able to get his life together and gain back Brooks into his life but decided not to (Slade, 2014). This is when he started his rapes and murders of young women that resembled Brooks in the Seattle area (Bio, 2015). He would lure his victims by acting injured and asking for help (Bio, 2015). Bundy was smart and articulated; his murders left no tracks that could lead it to him (Slade, 2014). In 1972, he was able to graduate with a degree in psychology and move to Utah for law school (Bio, 2015). As he was in Utah, women started to disappear as well (Bio, 2015). His luck ran out, when he was caught by a police officer for possession for burglary tools that included a crowbar; face mask, rope, and handcuffs (Slade, 2014). The police officers were able to link all the murders he committed to him and were able to succeed in escaping captivity (Sladem 2014). He continued to commit murders and was caught again (Slade, 2014). He spends the rest of his years fighting for his innocence in court and was killed by electric chair for his crimes (Bio, 2015).

Methods

The method of the research was set to follow the hourglass model from the beginning. The research began by sharing each other's interests and synthesizing them together to form a research question. Some of the topics and questions that were asked stemmed from the facilitation presentation on the birth of modern day psychology. Psychology is a new established field of study that is still growing, incorporating, and mixing with other fields to create new sub fields, such as neuropsychology, biopsychology, developmental psychology, and criminology. From here we worked on forming our proposal. While putting the proposal together, research was conducted into the different factors that create the criminal mind. In the research, various literature supported notions of both nature and nurture, were key components in determining the behavior of potential serial killers. The literature provided detailed evidence that supported our research question. It introduced us to genetics and the MAOA gene. This gene was found to cause aggressiveness in subjects and supported the nature side of the argument. Sources also argued for the environment and social factors as elements that contribute to creating a criminal mindset. At the core of this argument was anti-social behavior disorder. This disorder is a common factor in subjects that display criminal behavior. The debate between nature and nurture has become popular because of media attention. It is believed that both factors are imperative to the advent of criminal behavior, but to what extent is still being researched. An annotated bibliography was used to keep record of each piece of literature, while engaging with the source materials.

Results

Results conclude that both nature and nurture are necessary in understanding criminal behavior. Genetics play a key role in the bio psychological makeup of a criminal. Criminals who possess low MAOA are more susceptible to show aggressiveness as infants and violence in adolescence. Individuals with low MAOA are more prone to violence than subjects without. Subjects possessing the gene have a higher chance of being among other criminals. This trait is found for the most part in males with low MAOA as they are at a higher risk of portraying criminal behavior. Environment was found to be just as important as genetics in determining

criminal behavior. Social factors also mold the behavior of criminals. In a study by Levitt, infants with MAOA who were exposed to maternal sensitivity, showed more aggression than infants without the gene. The environmental factor of maternal sensitivity reacted with subjects' genetic disposition to produce results. In the case of Ted Bundy, the subject's genetics and environmental experiences were possible factors to his criminal mind. Based on the research, Bundy has portrayed characteristics of low MAOA gene activity. He grew up in a well-mannered and sustainable family. A critical point in his life in which demonstrated aggressive behavior was exposed to the ending of his relationship with Stephanie Brooks. This life changing moment cause a shift in his psyche.

Discussion

Throughout the research of reviewing the literature, the articles showed a variety of flaws or setbacks that played a pivotal role in the findings. From this MAOA has been found to not be the sole factor in contributing to criminal behavior. Because there is no single indefinite factor to criminal behavior, it is difficult to predict criminals and stop them before they commit crimes. Aiding this is the way that popular media portrays criminals and the factors that make them commit crimes. Media has portrayed criminals coming to a devious realization from surviving through harsh backgrounds and environmental conditions. The sources concluded that that it is not environmental factors alone, but genetic factors that play a role in criminal behavior. The research that was conducted by the sources was based on experimental probability rather than actual scientific phenomena. The collective research was useful in producing additional research and material towards the ongoing debate. The evidence found supported the original hypothesis asked. Criminal behavior is comprised of a multitude of factors and should be studied case by case. Until further research is done, regarding the defining factors of criminal makeup, predicting potential criminals and serial killers is a futile task. Overall, the hourglass model provided us the guidance needed in solidifying the topic of research and how to move forward, while being able to synthesize the various sources into original work.

Conclusion

The research predicted that nature and nurture are prime factors to a serial killer's mind. Results portrayed in the research showed that individuals with the MAOA gene are more prone to violence than those without it. As well as both nature and nurture are necessary in understanding criminal behavior. Individuals with the L-MAOA variant allele gene were more prone to criminal violence than those with H-MAOA gene. These individuals with environmental factor affecting the gene have a higher chance of portraying violent behavior than those without the gene. Genetic nor environmental experiences can play a role in serial killers motive in their behavior by itself but a combination of both can a possible explanation of their actions. For example, Ted Bundy portrayed possible characteristics of L-MAOA and nurture. He did not expose his aggressive and violent behavior until he experienced the psychological breakdown from Stephanie Brooks. Research showed a variety of flaw and setbacks in the findings such as MAOA gene being the indefinite factor to a serial killer and sample size. For future research, it will be focused around a general population and environmental based. Other serial killers could be researched and analyzed for the possibility of L-MAOA. The exploration

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of the genetics of criminals can be research more in detail. A possible research can involve a long-term analysis of children with L-MAOA in various environmental settings.

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Biography

Jose “Pepe” Hernandez is a transfer student that will be receiving his BA in Psychology with a minor in Cognitive Science this fall. In addition, he works part time as the cross country/track coach at El Capitan High School.

Julian Highsmith recently obtained his BA in Political Science with a minor in Writing in the summer of 2015. He hopes to attend law school and become an international law attorney.

Susana Madrigal is an Undergraduate pursuing a Psychology BA with a Writing minor. She enjoys writing short stories, and helping her peers to grow in their writing profession. She plans to release a fiction novel in the future.

Mark Mercado is an undergraduate student pursuing a bachelor's degree in Mechanical Engineering. He is part of the professional engineering fraternity Theta Tau.