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Neurological Abnormalities' Impact on Crime and Behavior

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Abstract

This study analyzes and discusses various types of neurological abnormalities and the ways in which they affect antisocial behavior and criminal propensity. It also explains how many of these abnormalities are caused and why they can lead to antisocial behavior. Further, the article discusses gaps in the extant literature, the various legal impacts related to neurological abnormalities, and policy implications. Throughout the study, a series of real life examples and cases that are used to put things into perspective are analyzed in order to demonstrate how serious this subject is and the potential it has to be an even more serious problem if not addressed properly and promptly. The findings of this article suggest that neurological abnormalities play a vital role in determining if an individual is subject to increased criminal propensity, and in some cases, psychopathy, while questioning if those affected are right to be considered fully responsible for their actions due to the abnormalities affecting mental ability and reasoning.

Keywords: Criminal propensity, neurological abnormality

Introduction

Neurological abnormalities have a significant impact on the way a person behaves and their propensity towards criminal activity. A neurological abnormality is something physically wrong with the brain, whether it occurred due to developmental issues or a trauma/head injury. These specific deformities/abnormalities of the brain can cause certain antisocial tendencies such as the inability to feel emotion or to control impulses. In turn, a lack of self-regulation can increase the likelihood that a person with the abnormal brain will commit crime. Some people experience these factors more than others, subsequently making them more susceptible to crime. An important thing to keep in mind is that for the most part, many of these factors (the research for this will be discussed in later sections) are out of our control individually, and are controlled by those around us and the decisions they make when we are young and our minds are their most vulnerable. Some of these may even occur before birth, putting individuals at increased risk for criminal propensity before social factors become involved.

Brain abnormalities in specific areas of the brain, such as the amygdala or orbital cortex, are more likely to cause characteristics that are psychopathic (Fallon, 2005). People with these characteristics are known as psychopaths. The dictionary definition of a psychopath is "a mentally unstable person, especially a person having an egocentric and antisocial personality marked by a lack of remorse for one's actions, an absence of empathy for others, and often criminal tendencies." (Merriam-Webster Online, 2019). Now, a psychopath is not necessarily a cold-blooded killer, and a cold-blooded killer is not necessarily a psychopath. There are psychopaths all around us within society (Hare, 1999). Many of them live normal lives like the rest of us. It is when the psychopath is socialized differently that we start to see antisocial behavior and criminality that cannot be corrected or reasoned with due to the combined neurological abnormalities displayed within said psychopath. It is possible for biological abnormalities to lead to antisocial behavior on their own. Additionally, it is also possible for improper socialization to lead to antisocial behavior. Both of these combined however enhance the chances of someone exhibiting antisocial behavior (Moffitt, 2005).

The thesis of this study is that neurological abnormalities have a direct impact on the causes of criminality and antisocial behavior, and in further expanding knowledge on the subject, it shows future possibilities and hypothetical situations in which the knowledge can be applied to real world problems. This study uses a systematic literature review to methodologically identify the gaps in the extant literature on the topic of neurological abnormalities and criminal behavior. In doing so, it discusses the existing research, and analyzes theoretical and legal implications resulting from real world examples of neurological abnormalities and criminal events. It also

highlights the future of neurological science and how it relates to criminology.

Literature Review

Research indicates that neurological abnormalities in the brain are a significant cause of antisocial behavior which in turn can lead to crime (Raine, 2014). Antisocial tendencies among society is increasing, and thus so is the question of why (Holmes et al., 2001). We can start with the developmental factors that can lead to inhibited functioning of the brain. These include physical abuse, parental rejection, early childhood maltreatment, neglect/abuse during pregnancy, birth complications, or having an antisocial parent (May & Beaver, 2014). If a person is affected by brain abnormalities that alter their behavior in some way, the first possible place that something could have gone wrong was before they were even born, or during birth.

Prenatal

A mother that smoked cigarettes while she was pregnant and had possible combinations of parental antisocial behavior, depression, genetic influences, and a disadvantaged family had children that were more likely to be antisocial and have behavioral problems (Maughan et al., 2004). According to this study, genetics (already harmed from smoking) and depression accounted for 75% of the behavior issues and antisocial tendencies that these young children displayed. Fetal alcohol exposure can also be linked to developmental issues seen in antisocial adolescents. Binge drinking is associated with the antisocialness, problems in the classroom, and learning disabilities, and even casual drinking can be connected to cognitive, behavioral, and developmental difficulties seen in children (Olson et al., 1997). Additionally, a study done in Brazil found that out of 262 institutionalized male adolescents between the ages of 13 and 21, 48.8% of them had mothers that consumed alcohol during pregnancy (Momino et al., 2012). The study concluded that Fetal Alcohol Syndrome is common among criminal adolescents.

While the baby is being born, birth complications (biological factors) can occur and be extremely detrimental because brain development in the first few months following birth is crucial to having a healthy brain. An example of a common birth complication is hypoxia, or partial lack of oxygen, at birth can cause brain cells to die because they are not getting the oxygen they need. This is destructive to the hippocampus, an area in the brain that is responsible for short-term memory along with spatial ability. People who have been life-course persistent offenders (Moffit, 1993) are often found with damage to the hippocampus, according to Raine et al. (2005). Birth complications are also associated with lower IQ at age 11 (Liu, 2003). A couple studies showed that birth complications interacting with negative early home environments predispose to adult violence nearly 4 times more than either by themselves (Raine, 1994; Piquero & Tibbetts, 1999). Another similar study

conducted by Raine, Brennan, and Mednick (1994) found that birth complications, when combined with early childhood rejection, predisposed to violent crime in adulthood. While only 4.5% of subjects had both of these risk factors, they also accounted for 18% of all the violent crimes committed out of 4,269 males (Raine et al., 1994).

Pre-Adulthood

Children and adolescents who have a brain abnormality, or even do not have one, may still be at risk for criminal propensity and antisocial behavior due to an underdeveloped brain. Many brain researchers agree that the brain is still structurally developing during the adolescent years, with growth maxing out at around 20 or 21 years old (Beckman, 2004). Some even say maturation does not fully occur until age 25. So since the brain is not fully developed, does this mean that cognitive skills such as reasoning, judgment, and impulse control have also not yet been fully developed? The question remains, yet many studies have indicated that teenagers are more prone to erratic behavior than adults. One such study demonstrated brain activity between adolescents and adults in emotion identification/fear processing (Baird et al., 1999). The amygdala is very active when participants were shown a face with a fearful expression, however, only the adults' prefrontal cortex showed lots of activity as well. The adolescents' lack of activity in the prefrontal cortex suggested that emotional responses have little inhibition. The teens also mistook fearful expressions for other emotions such as anger. Baird argues that adolescents can pay attention to things that matter to them but have difficulty interpreting images that are unfamiliar at the time (Beckman, 2004).

Christopher Simmons was charged with the death penalty after convincing another friend to help him rob a woman and then tie her up with duct tape and throw her off of a bridge, killing the woman. Simmons was only 17 years old at the time. The defense team argued that because Simmons was so young at the time of the murder and his underdeveloped brain made him more prone to commit this crime, he should not receive the death penalty. The case, Roper v. Simmons, went to the Supreme Court in 2005. There, they ruled 5-4 that it was unconstitutional to execute an adolescent as a violation of the 8th amendment. Instead, Simmons was sentenced to life in prison with no chance for probation or parole. This case is an example of how an underdeveloped adolescent brain was used as a defense for a teen's criminal actions.

Environmental

Social influences are just as great of a risk to the brain as physical influences. Mothers being out of the baby's life for four or more months within the first two years of the baby's life can stop the social-interpersonal development of the child (Raine, 2014). This can result in adulthood psychopathy as the baby may not properly develop emotional attachment and struggle socially as a child and young adult. Attachment is an element of Hirschi's Social Bond Theory (Hirschi,

1969). Emotional attachment is important for reducing crime, without it, one may not be able to "internalize the norms of society" (Hirschi, 1969; p. 291). If a person is not bound to society through these norms, then they are more likely to engage in antisocial behavior. This was the case for a young woman named Jane Toppan. "Jolly" Jane Toppan was an orphan until the age of 5. She was at risk for psychopathic violence already due to the institutionalization and lack of attachment that she experienced. Toppan went on to become a nurse and killed at least 31 people on their hospital bed from the years of 1887 - 1901. Harsh punishment/abuse from a parental figure is a major factor when predicting future antisocial behavior. Childhood maltreatment, an alcoholic father, parental conflict, maternal depression, and single parenthood are some other significant factors that may lead the child to display antisocial disorder and/or criminal ways (Holmes et al., 2001).

Childhood maltreatment is causally associated with adolescent delinquency according to Carolyn Smith. The study she conducted in 1995 shows a 13% increase in delinquency when mistreated as a child. This number replicates two other studies, (Widom, 1989; Zingraff et al., 1993). Also, control variables such as sex, race/ethnicity, family structure, and socioeconomic status have a minimal impact on the relationship between maltreatment and delinquency, making the relationship very significant (Smith, 1995). This means that it does not matter a significant amount whether the delinquent was mistreated in an impoverished or upper class household, what their skin color is, how many siblings they have, or if they were male or female. No matter how different the child and his/her backgrounds are, most of the time maltreatment will result in criminal propensity.

Brain Abnormalities

The fascination for brain abnormalities being the cause of psychopathic behavior first originated with a 25-year-old railroad worker named Phineas Gage in 1848. An iron rod was shot up through his skull from his cheek, taking out an eye and his orbitofrontal cortex, while also damaging the prefrontal cortex. Gage went from being responsible and kind to moody, impatient, and disrespectful. However, he did not suffer any defect to his memory, intelligence, speech, motor-function, or perception (Weber et al., 2008). This is evidence that the frontal cortex is likely responsible for certain personality characteristics and regulating socially acceptable behavior. The prefrontal cortex (PFC) has control over the limbic system which regulates emotion. When the PFC is not functioning properly, it results in an inability to control certain emotions, such as rage and anger (Raine, 2014). It also leads to poor social judgement, which means that instead of finding a nonviolent solution to a social problem, the person is more likely to become aggressive (Damasio, 1994). PFC dysfunction can also strain one's ability to think clearly and critically, resulting in problem-solving impairment and a lack of intellectual flexibility (Bechara & Damasio,

2005). This emotional, social, and cognitive inhibition of the PFC accompanied by the personality and behavior problems that also come with PFC damage, as displayed by Phineas Gage, are a recipe for psychopathic behavior.

The temporo-limbic regions, such as the amygdala, are believed to play a part in the development of emotional behavior regulation (Weber et al., 2008). The amygdala is linked to psychopathy specifically because lesions in this area have been found to impair stimulus-reinforcement based instrumental learning (Mitchell et al., 2006) and impair the processing of emotional material (Tiihonen et al., 2000). For example, if you and I rob a bank, get caught, and serve 10 years in prison, we likely aren't going to try that again because we learned through consequences that it was not worth the risk. Psychopaths with damaged amygdalas are unable to determine that they should not rob that bank again as their brain was not able to condition them. This learning technique used to determine that the amygdala is responsible for behavior regulation is similar to operant conditioning. Operant conditioning is the learning of something through the use of rewards and punishments. The person learning makes positive and negative associations between a certain behavior and consequence of that behavior (McLeod, 2018). In the case of our bank robbery, the bank robbery is the behavior and prison is the consequence, giving us a negative association to robbing banks. The psychopath on the other hand is unable to associate the consequence to the behavior.

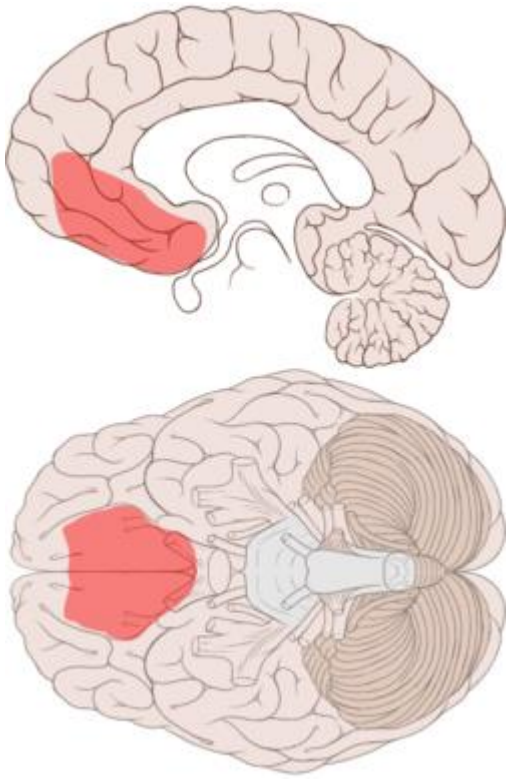
Closely related to the amygdala is the hippocampus, largely responsible for memory. It also lies within the region associated with emotions. When there is damage or a lesion to the hippocampus, many things can be affected. Contextual fear conditioning, kind of like what happened with the amygdala, except this time it is because emotional memory retrieval is also impaired (Laakso et al., 2001). In other words, a damaged hippocampus does not necessarily allow someone to remember how a situation made them feel. Associated learning can also be impaired as it is mainly the memory affected when the hippocampus is not functioning properly (Laakso et al., 2001).

Findings

The question addressed in this section includes why do brain abnormalities make someone more crime prone? The answer was partially addressed by examining features such as faulty amygdala, hippocampus, and prefrontal lobe functioning. The ventromedial prefrontal cortex (VMPC) is located in the middle area of the front of the brain, and towards the bottom (see Figure 1). It is mostly responsible for risk and fear processing. When the VMPC is damaged, it can also impair judgment of harmful intent (Young et al., 2010). Young and colleagues found that patients with damage to the VMPC were unable to give normal judgments in response to dilemmas in morality, and also judged attempted harm to

others as morally admissible, in light of certain controls. In this study, the controls were sugar and poison. Patients with a damaged VMPC believed it was okay if they thought it was poison being put into someone's coffee but it turned out to only be sugar, since the person was not harmed in the outcome. Common sense argues that attempting to poison someone, even if unsuccessful, is wrong. Most of society can understand this because of our normal moral judgment, something many psychopaths do not have (Young et al., 2010).

Figure 1: Image of Ventromedial Prefrontal Cortex (VMPC)



Source: Bechara, Damasio, Tranel, & Anderson, 1998

Another associated defect with the VMPC is an impairment in real-life decision making. This ties into the idea that we explored about the bank robbery and damaged amygdala. The decision-making impairment occurs during decisions involving immediate rewards versus long term rewards (Bechara et al., 1994). These defects are highly concentrated in the social and personal scheme of things, rather than general intellect ("should rob this bank?") or the ability to solve a problem (Anderson et al., 1991). For example, there are two stacks of money on a table. The first stack contains $100, with a $50 payment required one month from now. The second stack contains $60 with no required payment. A rational person would take the $60 with no payment, as they would make $10 more than if the person chose the first stack. Somebody with an improperly functioning VMPC would likely choose the $100 because it pays them more now, even though in the long term they would make less money.

If someone is unable to distinguish rewards versus consequences with a small amount of money (due to a brain abnormality), then they are likely unable to distinguish the rewards vs consequences for a criminal act. This problem combined with one such as not seeing anything wrong with attempted but failed harm, or harm to someone who deserves it, are likely to increase the chances one has of committing crime. The lack of fear and risk response and missing morality

in judgment involved with a damaged VMPC can make it very difficult for someone to recognize and prevent themselves from engaging in antisocial behavior along with criminal activities.

Overall lower brain activity is also linked to affective/reactive murderers (Raine et al., 1998). However, predatory/proactive murderers did not have overall lower brain activity. Reactive murderers are people who commit acts of violence as a result of rage or reaction that occurs when they are emotionally upset. Proactive murderers are the opposite; they are controlled, and purposefully plan violence to achieve a desired goal (Dodge, 1991). Their brain scans, or PETs, are also very different. Reactive murderers show little to no activity in the prefrontal cortex, some activity in the temporal lobes, and normal to high activity in the occipital cortex (responsible for vision). Proactive murders show high activity in nearly all regions of the brain, except for the middle, where emotion regulation is controlled (Raine, 2014). This makes sense, the impulsive killers do not have the ability to think about what they are doing and that it might be wrong, an example of short-term thinking. The thoughtful killers, on the other hand, know exactly what they are doing and a lot of the time, how to get away with it, an example of long-term thinking.

Randy Kraft had a proactive brain, and he killed 64 people within a 12-year time period. He was no doubt psychopathic, but a psychopath with increased brain functioning and no remorse or emotion. He planned and executed every kill, and in turn was able to evade the law for so long because of it. He was actually pulled over for drunk driving and happened to have a dead body in his car, otherwise he may have never been caught (Raine, 2014). Antonio Bustamante on the other hand, showed very little brain activity, and was a messy criminal. He was a good student and social person not long before his criminal ways began, however. But after a head trauma that damaged his prefrontal cortex, his life took a bad turn. Following the injury, he was arrested 22 times before being arrested the final time for murder. He was in the middle of burglarizing a house when an old man returned home, scaring Bustamante. Bustamante reacted, uncontrollably, and beat the defenseless old man to death (Raine, 2014). He was the epitome of a reactive murder, as Kraft was of a proactive murder. Bustamante, with very little ability to process long term thoughts due to the inhibited functioning of the prefrontal cortex, could not think about the consequences of his actions and impulsively made a decision that he very easily could have avoided, if he was able to think clearly about what he was doing. Kraft, with exceptional prefrontal cortex activity, was the exact opposite of impulsive. He calculated just about every move, and that's why he was able to get away with it for so long and while Bustamante was not. Two very different brains, two very different criminal tendencies, two very different killers.
It has been found that prefrontal gray and white matter volume deficits in the brain result in pseudo-psychopathic personality in people who also have neurological disorders

(Raine et al., 2000). Gray matter is made up of nerve cells, and the white matter consists of nerve cell axons, which transport signals to alternate areas of the brain and/or body. Raine and colleagues measured gray and white matter volumes among several groups of people using structural magnetic resonance imaging (MRI). There was a group of 21 people with antisocial personality disorder (APD), and two control groups; one made up of 34 healthy subjects and another consisting of 26 patients with substance-dependence. They discovered that the APD group had an 11% reduction in prefrontal gray matter volume in the absence of ostensible brain lesions and reduced autonomic activity during a stressor (Raine et al., 2000). This was the first evidence of structural brain deformities in people with antisocial personality disorder, which goes hand in hand with crime. The deformity includes possibilities of poor fear conditioning, lack of emotion/conscience, and poor decision-making skills. These are all features displayed in antisocial and psychopathic behavior (Raine et al., 2000). Now, aberrant brain gray matter in murderers has been discovered (Sajous-Turner et al., 2019). The gray matter is made up of cells, neurons, and glia, all the things needed to process information and make computations. Homicide offenders show a significant gray matter reduction in regions of the brain that are critical for social cognition, emotional processing, executive function, and behavioral control in comparison to non-homicide offenders. This is very useful information as it is able to "demonstrate, for the first time, that unique brain abnormalities may distinguish offenders who kill from other serious violent offenders and non-violent antisocial individuals" (Sajous-Turner et al., 2019).

Discussion

There are two concepts of the criminal offender, the first being the criminal justice model, and the second being the medical model (Rowe, 2002). According to David Rowe, the criminal justice model consists of a mentally normal, average person. When confronted with a temptation, they freely and willingly choose to violate the law for some type of gain in return. In other words, "the offending act is intended; it is not an accident." (Rowe, 2002, p. 133). The medical model is different, it argues that a criminal offender's actions are possibly the result of a mental or psychiatric disorder. In a perfect world, the average offenders would be punished in the form of trial and the mentally unstable offender would be prescribed psychiatric treatment in order to fix what made them think it was okay to commit the crime. This is not the case unfortunately, and the majority of criminals end up taking a plea bargain or taking their chances at trial (Davis, 2018). This can be attributed in part to the decline in the number of people handled by the psychiatric system, also known as deinstitutionalization. With less mentally disordered people getting the proper treatment and housing they need, it leaves more of them subjected to a higher likelihood of engaging in criminal activity. The

unadjusted crime rate of the mentally ill is higher than that of the general population, and the unadjusted rate of mentally ill people among criminals is also higher than that of the general population (Monahan & Steadman, 1983). With nowhere to go due to the crumbled psychiatric system, they are subjected to criminal institutions instead. Proportionality must be present between the crime and the associated punishment, under the 8th Amendment. So if a person is committing crime and has either been diagnosed with a medical condition before or after the crime, it is only right that they are treated accordingly. An entry into the health system rather than the criminal justice system, followed by a psychological or medical test, treatment, medication if needed, and maybe even counseling sessions is a possibility (Rowe, 2002).

A representative sample of 23,000 prisoners taken in 2002 showed that the prisoners were several times more likely to display signs of or have some form of depression or psychosis, and ten times more likely to demonstrate antisocial behavior (Fazel & Danesh, 2002). It is suggested by the authors that millions of prisoners across the globe have serious mental illness. Another study showed that violent and death-row criminals had higher levels of head injury and antisocial populations had more frequent birth complications, resulting in neurological damage and parental mental illness (Volavka et al., 1995; Raine, 1993). Despite all of this, it is not to be said that all criminal behavior is the result of brain dysfunction. It does mean, however, that brain dysfunction increases the likelihood of criminal behavior (Mobbs et al., 2009). Neurological disorder and criminal conduct go hand in hand with one another.

Legal Implications

It is very difficult for a judge to determine that a killer is not guilty by rule of insanity or mental disorder, so it is likely that medical proof of inhibited brain functioning is ignored. Russell Weston Jr. shot and killed two Washington, D.C. police officers and wounded a tourist (Clines, 1998). Weston had a history of psychiatric hospitalization and after being caught, he was hospitalized yet again for schizophrenia. Even though he did not undergo a trial, he was hospitalized with the intent of prescribing medication to make him clinically sane so that he could be tried for double-murder, even though he was schizophrenic at the time of the shooting. This is just one example of how the criminal justice system looks to punish mentally unstable/brain damaged people, rather than rehabilitate them, even though they may not have been able to control what they were doing at the time of the incident. This does not mean that inhibited brain functioning is a moral excuse or justification for criminality, especially that of double homicide in Russell Weston Jr.'s case. However, it can be a legal defense and does need to be considered and deeply analyzed in order to figure out what went wrong and determine if it can be corrected or not.

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Brain imaging technology in the form of MRI could be a useful tool for determining if someone is mentally unstable prior to being tried for a crime. However, there are several limiting factors when using brain imaging as evidence (Mobbs et al., 2009). Firstly, brain imaging cannot tell us what a person is thinking, so even if we see PFC damage, we don't know if that was making them think in an illogical manner. Much of the brain is responsible for multiple different things, some more complex than others. Also, lack of activity in one region does not tell us for certain what precisely went wrong and why, therefore it can be difficult for a prosecutor, judge, or jury to make assumptions, despite the research we have about the damaged brain being the cause of a heinous crime. Interpretation of the brain scans is often somewhat subjective (Mobbs et al., 2009). Lastly, correlations between criminal activity/antisocial behavior and brain functioning are not crystal clear. Not every violent criminal has a damaged brain and not everyone with a damaged brain is a violent criminal. There are even studies and cases that show damage to the PFC can actually reverse antisocial behavior. For example, a man with a history of violent behavior and pathologic aggression attempted to commit suicide by shooting a crossbow through his head. He did not die, but rather injured his left ventromedial prefrontal cortex. His aggression and violence turned into docility and cheerfulness (Ellenbogen et. al., 2005). His emotions could have been deregulated from the shot, or he could have shot out the part of his brain responsible for his violence (left VMPC), there is no way to know for sure. The unclear connection can make it difficult to see the link between a criminal act and neurological abnormalities while being solely reliant on brain imaging data (Mobbs et al., 2009).

Implications for Future Research

The biggest question that remains is whether people with neurological abnormalities are fully responsible for their criminal actions and/or antisocial behavior? With the amount of information we know about the brain and what areas are responsible for what feelings and actions, etc., it is safe to say that no, not everybody should be held fully responsible for something they do that was caused by one of the discussed brain abnormalities. Leading scientific evidence suggests that certain neurological and physiological factors do in fact predict violent behavior (Raine, 2014). There are many different ways that an abnormality can occur, many of which are not the person's fault, such as a birth defect, neglect as a young child, a sudden head trauma, physical abuse, and even having an antisocial parent. It is not normal for someone to experience any of these, or at least should not be, and yet the defects caused by these circumstances are often seen as something that the person chose to have happen so that they could purposely lead a life of crime. This most definitely is not the case, these people are often disadvantaged from the start and are either forced to commit crime or cannot determine their actions from being right or wrong. While this is not a

justification or moral excuse for committing violent acts such as murder or double police homicide in the case of Russell Weston Jr., the brain does need to be considered as a possible mitigating factor in order to determine if the perpetrator should be punished or if an attempt should be made to rehabilitate them.

Conclusion

Neurobiological research is the key to understanding criminal and antisocial behavior (Sterzer, 2010). With that being said, the future rise in knowledge of neurobiological research may bring up a neuroethical concern that is already seen in many aspects across the globe today. With the potential science and technology that we would have and what we would be able to predict (such as violent crimes due to brain functioning), do we infringe on an individual's rights and protect society (Raine, 2014)? Or do we set a boundary and not take action against an individual and leave society in danger of being harmed? If you could predict the future with 100% certainty and see that someone was going to attempt and succeed with a mass murder, would you stop them before they had the chance, or would you sit back and let things play out how they would without intervention? You have to pick one as time running its course is inevitable. The train is either going left along the tracks into society or right into a potential mass murder. Considering the amount of possible suffering and pain that we could 100% see happening to many, the decision now doesn't seem too difficult. But then again, who are we to decide who lives and dies in the grand scheme of things? It's a difficult concept to grasp, but a very real possibility if society keeps progressing as it has been and new doors open for us in our research on neurological abnormalities' impact on crime and behavior.

In order for this to happen, more research must be conducted in the field of neurology and crime to better understand the connection between the two and exactly how/why it's happening to further explain what is going on and how to minimize and stop the damage that has taken place or has yet to occur. Since neurological abnormalities have a direct and significant impact on the causes of criminality and antisocial behavior, expanding our knowledge on the subject will allow real world problems as well as future problems to be solved in a way that is logical as well as ethical for potential and actual offenders.

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