



## INFLUENCE OF BIO-CHEMICAL FACTORS AND CENTRAL AND AUTONOMIC NERVOUS SYSTEM ON CRIMINALITY \*

### INTRODUCTION

Hormones, the secretions of Endocrine Gland were first discovered and artificially copied in Laboratories before 1990. Eventually effect of these substances grew and their relation to the personality began to be studied. Eventually interest turned towards the effect of Hormonal imbalance on Criminal activity.

**Berman** (1938) conducted a study on 250 inmates of Sing Sing Prison in New York compared with a non-criminal control group. His result suggests that the incidence of Hormonal imbalance in the prisoners was two to three times more than the controlled group.

In the recent studies no such result has been found and general consensus seems to be that most of the Hormonal imbalances do not significantly affect Criminality. It has been discovered that Hormones act as a Catalyst for behaviour or may provide Biological environment favourable to other casual factors but they have rarely been found to be connected to Criminality.

Exception to this may be one which involves an imbalance in sex Hormones. In case of Women Factors which affect are large Hormonal changes which occur just before and during the Menstruation referred to as PMT and MT.

These factors can mitigate the sentence in some cases. In case of a Male main exception seems to be the relationship between levels of Male sex hormones, **Testosterone and Criminality**. In Infanticide a Mother who kills a child within 12 months of its birth is given some allowance either because her mind was disturbed by reason of giving birth or Lactation. The Court has accepted these arguments still do not fully support them.

### *Testosterone*

It has been popularly related to most aggressive and antisocial crimes such as Rape and Murder. It is said that the Male Hormones, Plasma Testosterone, adversely affects the Central Nervous system causing aggressive behaviour. Exact meaning of aggression or violent behaviour is not defined but most writers are interested in interpersonal violence such as Rape, Murder and Assault.

**Daisy Schalling** (1987) discovered that high testosterone levels in Young Males were associated with verbal aggression but not actually with physical aggression. High Testosterone

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boys tend to shun monotony, enjoy competitive and physical sports, to be more extrovert and sociable and care less about conventional rules.

**Ellis and Coontz (1990)** noted that testosterone peaks during puberty and early 20's. Sexual Assault by Males, particularly rape tend to be committed by men at an age when their sex Hormones are strong. This policy was was tried in countries as Denmark, Germany, Norway, Estonia. They claim that socio environmental research have failed to explain why this distribution exists across almost in all societies and culture they claim this is an persuasive support for a biological explanation, evidence of such connection is tenuous (slight) and does not arise from a direct experimental data. There is no sufficient proof of casual relation as generally rapist and non-rapist don't have different level of testosterone except the violent ones.

Recently, Antiandrogyn drugs such as Cyproterone acetate and Medroxyprogesterone acetate are offered to aggressive sex offenders as an alternative to Castration. This drugs which reduce the effect of Testosterone have proved to be fairly effective in certain cases. They explain that the Androgen Testosterone has a strong presence in the male Foetus before birth and is central to the formation so the sex of the child. At this stage they pass into the brain where they are developed. In case of Female testosterone levels are present but they do not pass into the brain.

According to Ellis and Coontz testosterone in the brain at this early stage, produces three main effects each of which they see are related to criminality.

- 1) The rate at which stimuli reach the brain is controlled by reticular arousability, (the level of development of bundle of fibres located at the base of the brain controls the way in which the external stimuli will be passed onto the brain.). The development is dictated by genetics, some of which are located on the "Y" chromosome. Evidence of this show that certain medicinal problems such as Cot Death (Death of a child in sleep due to unexplained reason), Hyperactivity and Sex Differences to the tolerance of pain are all gender dependant. The first two are occurring more frequently in male than in females and the later being sex dependant. They link the low reticular arousal with criminality that is a person who needs very high levels of stimulation will perform such behaviour to produce result, he will be less affected by negative stimulation which in others would deter behaviours with very high stimulation levels
- 2) The Limbic system which controls emotions such as Love, Hate, Jealousy, Envy and Religious Fervour (feeling of intensity) can be affected by testosterone levels in brain. Problem in Limbic area may cause sudden and unpredictable emotions such as epilepsy and the proof to this that their relation to testosterone and these conditions are far more common in men.
- 3) They suggest a link between domination of a particular hemisphere and criminality. Heavy reliance on hemisphere that is least open to reason, logic and linguistic statements and mostly closely related to Limbic system is claimed to be related to criminality, such reliance is more common in males than females, and proof of this arises from the fact that there are more left handed or ambidextrous men than women.

## Various Criminologists On Testosterone

### **Rose, Bernstein, Gorden & Catlin (1974)**

- Studied Testosterone hormones in monkeys
- They studied their aggressive behaviour
- Once the monkey finds his position in the social structure his testosterone levels or aggression are not affected
- Change in social settings will affect his testosterone levels

### **Keverne, Meller & Eberhart (1982)**

- Males held together have similar levels of testosterone
- Introduction to female monkeys individually led to rise of similar levels
- Introduction to mixed social grouping the dominant ones produced high level and the small ranking produced low level of testosterone even if kept in separate cages

### **Dan Olwens (1987)**

- Conducted studies on young men with no criminal career
- Also studied young male inmates with a control group of males of similar age
- He found a relation between testosterone and both verbal and physical aggression he also noticed distinction between provoked and unprovoked aggressive behavior

### **Daisy Schalling (1987)**

- Discovered that high testosterone level in males were associated with verbal aggression but not with physical aggression
- Young boys with high testosterone levels by means of threats and tend to shun monotony enjoy competitive and physical sports to be more extrovert and sociable
- Low testosterone boys won't protect their position preferring to avoid conflict

## ***Criminality and Central Nervous System***

CNS is found in Brain and Spinal Column. It is responsible for Conscious thoughts and Voluntary movements. Control Behaviour of all sorts, learned, unlearned and behaviour partly learned and partly unlearned. Assuming that brain controls behaviour and that each individual's brain structure is slightly different.

### **Electroencephalography**

It measures the brain wave patterns by monitoring the electrochemical processes in brain. Between 5% to 20% of non-criminals are said to have abnormal wave patterns but in criminals that abnormality rate rises to the range 25% to 50%. Difference is even more marked if violent recidivist criminals are studied.

**Mednick and Volavka's** reviews clear that most of the studies have related criminality to an excessive amount of slow brain wave activity. Slow brain wave activity is often found in children and it has been related to criminality, because their brains have not matured and grown as quickly as their bodies due to which their socialisation is retarded. Criminals also experience a low level of cortical arousal or they have suffered head or brain injuries.

**Volavka** compared two extensive pieces of research. Each claimed to have discovered a clear connection between slow brain wave activity and a specific type of anti-social activity namely

theft. It was concluded that those with slow brain waves are more likely to commit theft than other individuals. But this could not conclude that this meant that thieves had less well developed brain.

According to Raine(1993) a new process called “Brain Imaging” shows abnormality in Physical Structure of the brain in some violent and sex offenders who may thus be suffering some form of brain dysfunction. It is possible that development of Alpha Frequency (Brain waves measured by Electronephalography) is a result of per-natal brain damage, but this is almost impossible to prove.

### ***Epilepsy (Brain Injury)***

It has been associated to Criminality for many years. The first connection could well be risen because a person suffering an Epileptic fit often appears violent. This is the most popular acceptance of past and today and for mitigating circumstances. The idea that a Fit is violent is generally accepted, despite the fact that violence rarely accompanies a Fit.

Lombroso closely linked Criminality with Epilepsy in his earlier writings. But research which now links these two is more precise in its assertions than Lombroso. Epilepsy is a very complex disorder. But the bold assertion that Epilepsy is linked to Criminality is not generally useful.

Most recent research has shown milder forms of epilepsy called Temporal Lobe Epilepsy (Area in the Brain related to understanding of Speech) or Psychomotor Seizures (relating to the origination of movement in conscious mental activity), during which the person suffering does not lose consciousness but behaves in a mechanical manner and suffers some emotional changes such as increased fear and anxiety.

Mark and Ervin (1970) concluded that those suffering from temporal lobe epilepsy are more prone to aggression both during and after seizure. Rodin (1973) found no such aggressive behaviour. Thus evidence in support of this argument is not conclusive but contradictory.

Also as a percentage of population the number of epileptics is tiny as could not account for much of the total criminal activity in our society.

## ***Brain Dysfunction***

Buikhusien (1987) reviewed all literature and research which attempted to answer this question. He noted that almost without exception the research discovered that delinquents do not perform as well as control groups. This can be used to uphold the claims that delinquents have a lower IQ than non-delinquents. Many of learning problems were found to arise in the brain's pre frontal lobes, it regulates behaviour and allows people to plan their actions, assess their outcomes and change the actions if necessary. Any damage to this area could seriously affect ability to understand consequences of the action. Serious impairment reduces ability to concentrate, cause lack of self control and increase in impulsive action, induce a lack of understanding of others feelings and an inability to feel shame, guilt or remorse. It reduces the normal inhibition which controls aggression and sexual activity.

From this it can be deduced that those suffering from this type of brain dysfunction are most likely to commit poorly planned crimes and will often act on impulse. The crimes could be of a relatively serious nature, although they will not involve ingenuity or planning. The fact that they are unlikely to learn from past punishment, are unable to understand the consequence of their actions, and tend to act on impulse, means that they are likely to become recidivists. Another possible association is termed as "Mild Brain Dysfunction" recently referred as attention deficit disorder which may appear alone or with hyper activity.

The central nervous system is split into two hemispheres each which is responsible for different functions of the brain. Yeudall, Fromm – AUCH and Davies 1982 suggested that juvenile recidivists suffered a higher incidence of dysfunction in the non-dominant spheres. The non-dominant sphere is normally on the right and it plays an important role in the understanding of an reaction to negative emotional stimuli such as fear and punishment, normally pain or other unpleasant experiences are remembered and connected to the action for which the punishment is used so that if the individual considers similar action fear of further action will stimulate the pituitary gland to release hormones which will force reconsideration of the action. If the hemisphere regulating this action is damaged the fear will not be experienced so sanctions become meaningless and continuous criminal is likely to occur. Interestingly in these people the dominant hemisphere is undamaged, this regulates responses to pleasant stimuli such as joy or praise and if the right hemisphere is damaged they might be dissuaded from criminality by the reward for good behaviour rather than punishment for bad or criminal behaviour. Our criminal justice system is unable to cope with this type of approach. Although this research suffers from problem such as small unrepresentative samples and unmatched controls the results are sufficiently convincing to offer fairly large evidence that brain dysfunction could explain criminality.

## ***Criminality and the Autonomic Nervous System (ANS)***

ANS (Brain and Spinal cord system) controls many of the involuntary functions of the body. It sets bodily functions so as to obtain maximum efficiency. It speeds up and slows down the heart, dilates the pupils of the eyes, controls the rate of breathing and regulates the temperature of the body by means of dilating and contracting blood vessels and by regulating the sweat glands.

The most commonly used method of measuring ANS is Lie-Detectors i.e. the measurement of the Electric activity of the skin, usually taken from the activity of sweat glands in the palms of the hand, recorded o a Polygraph. In a clam and unemotional state the skin will be dry and disinclined to conduct a current. But if the person to whom the electrical current is applied is emotionally aroused or frightened, then those persons ANS causes the sweat glands in the



palms to operate creating less resistance to the current. Recording the variations in resistance will be indicative of the extent of ANS arousal.

Criminologists are interested in the aspect of this system which depicts emotional moods or feelings. ANS is one of the best test of a person's involuntary and therefore natural reaction to external stimuli.

If the individual is frightened then the body takes certain precautions in case it needs to react quickly. This is commonly called the "Fight or Flight" situation and involves increasing the rate of breathing and stimulating the sweat glands. To this the ANS stimulates the production of certain enzymes which tell the body to make ready for action. The enzymes production can be measured in bodily functions. These measurements are supposed to decide how well the individual has learnt to live in society, in that they measure condition ability. The theory that most children are punished when they act in an antisocial manner and so they will anticipate punishment when they misbehave, this anticipation brings on the involuntary bodily changes associated with 'fight or flight'. As these body changes are associated with unpleasantness, most children learn to avoid situations where they may arise. The body changes and associated feelings are often referred to as conscience or guilt where the body changes are affected very slowly or at a very low level by the use of punishment or when the return to the normal state is very slow, then the child will be difficult to control and his behaviour is most likely to become criminal

Hans Eysenck (1977) was the main propounder of this theory he argued that personality is central to criminality but that personality is largely determined by psychological characteristics.

He pin points two personality traits which are important to criminality

- 1) Extroversion or outward looking personality
- 2) Introversion or inward looking personality

The first type will tend to be sociable, carefree, optimistic, impulsive and aggressive, he possess lower inhibitory control and so acts without restraint and will possess an enhanced desire for stimulation all which renders him more likely to turn to criminality. These traits arise due to different functioning of the ANS.

The introverts tend to be more serious, pessimistic, cautious and controlled the research in this area is not unanimous. In 1970 Hoghugh and Forest compared a number of persistent property offenders with a control group he discovered that there was either no difference in the levels of extroversion or that the delinquents were more introverted.

In a review of biological tests for comparison of the operations of the ANS of the delinquents (criminals) and controlled both Sidle (1977) and Venables (1987) conclude that those with anti-social behaviour show problems in their ANS that is low levels of electro dermal response and an irregular heart rate, the tests seemed to show a particularly strong connection between anti social behaviour and slow recovery rate. The reason for this is that when a person can recover from a state of fear quickly experiences a high degree of relief which greatly strengthens the conditioning. If recovery is low level, relief is low and so conditioning is less likely to occur. Slow ANS recovery rates are in these studies seen as the answer to the question Mednicks work was designed to explain "Why are nearly 50% of the offences committed by just 1% of the population?"

Mednick carried out longitudinal study, which means he studied the same people over a considerable period of time where he still found a connection between ANS and criminality.

## *Conclusion*

Although this area of study is relatively new initial researches do show some connection between chemical factors and criminality. Though it appears possible relationship between crime and ANS is strong, no such definite conclusion can be drawn.

However it is possible as many researchers work with small and possibly unrepresentative samples, have tend not to match the criminal and controlled group for similar background and often critically taken official information of criminality as being correct. There is some doubt as to whether the characteristics of ANS which have been linked with criminality are actually the result of that activity rather than the reason for it.

Initial research suggests a link between criminality and ANS, the part played by the environment in that relationship and particularly the effect of different types of upbringing require more attention.

There are some positive factors which may arise out of medicinalization of criminality. A sick individual may be blameless this has a very clear knock on effects for sentencing because if there is a medical reason for a behaviour it removes justification for punishment in favour of treatment. Both the individual and society can benefit from improved behaviour making recidivism less likely. The positive effects of this study as seen above are rarely clean and almost never clearly causative. The negative aspects are many for e.g. shifting the explanation of criminality away from social order onto the individual suggest that certain individuals need to be altered with all the appalling consequences to which they may give rise. If the individual's biology is deemed to be the cause of criminality and the condition is untreatable then that individual maybe assessed too dangerous to release. These suggest confinement for good of society and not to punish the individual but the effect, permanent incarceration feels the same if not worse. Again without full causative understanding their validity and utility is questionable. The essential point is that science in the modern world is endowed with great authority partly because of its apparent neutrality and reliance on apparently disinterested experts. The apparent neutrality allows the experts to gain power over the control systems for these reasons any biological explanations should not lead to irreversible or even permanent intervention

