A review of the evolution and utilisation of instruments measuring intelligence within a criminological perspective

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Introduction
As scientific concepts intelligence and crime are analogous to temperature and other scientific concepts. The difficulties in measuring them are no different from those to which the measurement of temperature and other scientific concepts give rise. Over the years the concepts of intelligence and crime have been highly controversial and a great deal of research has been conducted in their respective fields. But the controversy turned into a continuing heated debate when the relationship or connection between them became a research topic. Clarity was and is still sought over the extent to which measured intelligence is itself a social product arising from subcultural variations in learning environments and other social factors of that kind rather than an index of innate intelligence. The following review probes the hypothesised relationship between intelligence and crime from a biological-naturalistic perspective.

Origin of the measurement of intelligence
With reference to intelligence the Greek philosophers Aristotle and Plato both had already drawn a distinction between the cognitive aspects of human nature (those concerned with thinking, problem solving, meditating, reasoning, reflecting and so on) and the hormic aspects of human behaviour (those concerned with emotions, feelings, passions and the will). At a later stage the Roman thinker Cicero introduced the term 'intelligence' to refer to a person's cognitive powers and intellectual abilities. Back to the Greeks who created the concept of intelligence, Aristotle contrasted the 'observed activity' or behaviour of a person with some hypothetical 'underlying capacity' or 'ability' on which it depended (Aristotle 1913). Plato (1982) contributed the distinction between 'nature' and 'nurture' and pointed distinctly to genetic causes when explaining individual differences in intellect and personality. In the last century the concept of intelligence was taken up by the philosophers Herbert Spencer and Francis Galton, the statistician Karl Pearson and the physiologists Hughlings Jackson, Sherrington Campbell, Broadman and Hashley. Their work confirmed Spencer's theory of a 'hierarchy of neural functions' in which a basic type of activity develops by fairly definite stages into higher and more specialised forms. It was found that the brain always acts as a whole, its activity is patterned, not indifferently diffused, and the patterning itself always involves and implies integration. The concept of 'mass action' of the brain was also introduced, which states that cognitive functioning is governed by broad areas of the brain rather than small specialised areas.

Charles Spearman combined all these different motions into a feasible psychological theory by postulating that if there was some all-round, all-embracing cognitive ability which enabled a person to reason well, solve problems and generally do well in the cognitive field - called 'g' by Spearman - then it should be possible to construct a large number of different problems, of varying difficulty, to put this ability to the test (Spearman 1927). At around the same time, Alfred Binet in France and Hermann Ebbinghaus in Germany were in fact devising such tests and what Spearman added was a rather simple statistical idea, namely that it should be possible to show whether some people are better at all types of cognitive tests than others, simply by giving large numbers of tests to a random sample of people and comparing the results of the tests or test items by a process known as correlation. If the hypothesis was true,
then all the correlations should be positive. In other words, being good at one kind of test would make you likely to be good at other types. A correlation is simply a statistical technique for showing the degree to which two factors are related and is expressed as a number ranging from 0 to 1. A positive correlation of 1,00 indicates a perfect correspondence while 0,00 indicates the absence of any relationship at all. A negative correlation which is expressed as -0,75 indicates that the two factors being compared are related but inversely in that the higher the one is, the lower the other. Furthermore Spearman showed mathematically that if ability at a given cognitive task is broken down into two distinct elements which are examined separately - the first being general cognitive ability or intelligence, and the second being the specific ability to perform that particular task - the pattern of correlations between tests assumes a very specific form. Intercorrelations between different tests are expressed in the form of a rectangular table or grid named a matrix. The particular pattern Spearman found is known as a 'matrix of rank 1' which would be very unlikely to occur by chance. His contribution represents a complete break with the past because his theory gives rise to testable, quantifiable hypotheses and this distinguishes it from the theories of Plato, Aristotle, Spencer and all the others.

Spearman's theory was put to the test by Thurstone who, after an initial incorrect sampling technique with the subsequent incorrect results, repeated his study and concluded that his tests did measure something very similar to Spearman's general intelligence, or 'g', but that they also measured a number of primary abilities, over and above intelligence, and independent of it (Smit 1981:12). By now Spearman and his team had also found evidence for various factors such as verbal and numerical ability. Consequently, final agreement was reached on a paradigm which has lasted to this day. The paradigm states that different people have different abilities for solving intellectual problems, and that particularly important among these abilities is general intelligence. There are also specific abilities for dealing with specific types of problems - for instance verbal, numerical, visuo-spatial, mechanical or memory abilities - which can be very important under special circumstances. In addition, every test has its own unique contribution attached to it which interferes with the measurement of intelligence or special abilities. This error can be eliminated by using many different tests incorporating as many different kinds of material as possible.

The intelligence-crime link

Intelligence, which is usually measured by IQ tests, has been linked to crime and delinquency by many researchers. In the early part of this century the predominant view held by many human scientists considered the low intelligence of offenders a major cause of crime. Goring stated in England in 1913 that the one vital mental constitutional factor in the etiology of crime was defective intelligence and he was also of the opinion that the more often a man was convicted the less intelligent he was likely to be (Hibbert 1963). The American psychiatrist Goddard, who introduced the Binet-Simon test to the United States and did much mental testing of delinquent children, published a study in 1914 on the intellectual capacities of inmates and found the percentage of 'defectives', or feebleminded inmates ranged from 28 to 89, with an estimated average of 50 per cent. As a result of this study Goddard came to the conclusion that criminal behaviour was largely attributable to weak intelligence (Halleck 1968:185-208).

According to Brown and Courtless (1967) some studies in the first two decades of the century claimed that up to 100 per cent of offenders were retarded. Criticism of the tendency to view criminality as caused by, or highly correlated with, defective intelligence followed the standardisation of intelligence tests with army recruits in World War 1 and a growing awareness of the errors and inadequacies in test construction and administration. It was the end of the beginning of one of the longest running sagas in criminology where the nature of the relationship between IQ and criminal behaviour was to be investigated and researched through various number of stages. By 1924 Murchison had identified three main weaknesses of previous research projects, namely lacking a definition of retardation, overemphasis on the intellectual level of the population in general, and an underemphasis on the importance played by sociocultural factors.

Sutherland (1931) researched 350 reports dealing with assessments of approximately 150 000 offenders in the period 1910-1928 and concluded that 50 per cent of criminals had been diagnosed as feebleminded in the period 1910-1914, whereas only 20 per cent had been likewise classified in the 1925-1928 period. These findings did not prove that feeblemindedness was a major cause of delinquency. Sutherland attributed the variation in the results to differences in methods and scoring used by testers rather than a change in the intellectual abilities of offenders. The following research studies by the respective authors pro-
duced the analogous percentages of the offenders studied as being mentally defective: Findings by Burt (1925) (81 per cent), Healy and Bronner (1926) (13.5 per cent), Glueck and Glueck (1930) (20.6 per cent), Glueck (1934) (13.1 per cent (men)), Glueck (1934a) (34.1 per cent (women)), McClure (1933) (27.4 per cent (21.8 per cent boys, 32.9 per cent girls) and Merrill (1947) (23 per cent). Ellenberg (1961) reported that the incidence of mental retardation among delinquents in Remnant Homes had decreased from 7.5 per cent in 1930 to 2.1 per cent in 1955.

In the 1950s, as the standard of IQ tests improved and as this important issue was approached with greater methodological sophistication, the difference between the IQs of delinquents and nondelinquents began to shrink. Woodward (1955), reviewing the literature on the etiological importance of low intelligence in delinquency, calculated that the average offenders were not more than eight IQ points below the population mean. Woodward concluded that low intelligence plays little or no part in delinquency and cannot be regarded as an important causal factor in it. However, in the 1960s and 1970s research once again began to suggest an association between IQ and crime. A study by Hirschi (1969) found a significant association between IQ and self-reported delinquency, an association which remained even after allowing for the influence of race and social status. A longitudinal study of 411 boys living in London conducted by West and Farrington (1973) revealed a strong correlation between IQ and recidivism, with boys of lower IQ more likely to become recidivists. The correlation remained when the analysis controlled for family size and income and this led to the conclusion that intelligence is a meaningful predictive factor of future delinquency.

It is apparent that at least two distinct and questionable explanations have been maintained by the various researchers to shed more light onto the intelligence–crime relation. The first is that the IQ–delinquency relation is the result of the differential detection by police of low-IQ delinquents (Murchinson 1926; Stark 1975; Sutherland 1931). This argument purports that the IQ scores of officially designated delinquents are not representative of the scores of the general population of delinquents. The low-IQ delinquents are more likely to be detected in their delinquent acts and are thus more likely to be represented in research samples (Feldman 1977; Hirschi & Hindelang 1977). Moffit and Silva (1988) tested the differential detection hypothesis directly by examining the IQ scores of two groups of self-reported delinquents, namely those who had been detected by the police and those who remained undetected. Contrary to the hypothesis, the two groups did not differ from one another in their mean IQ scores, but both groups scored significantly below a nondelinquent comparison group.

The second questionable argument is that the IQ–delinquency relation is the result of some third variable that exerts an influence on both variables. The two most often proposed variables are social class and race, both of which satisfy the necessary third variable requirement of being related, at least theoretically, to both delinquency and IQ. The social class argument posits that boys from lower social classes tend to have lower IQ scores than boys from higher social classes, and boys from lower classes are also overrepresented among adjudicated delinquents. However, it is social class, not intelligence, that is responsible for both of these relations.

The race-cum-culture argument revolves around the same premise. Black boys tend to be overrepresented in both low IQ and delinquent groups. However, the circumstances and pressures of being a member of an underprivileged minority group may lead to both delinquency and lower IQ scores.

If either the class or the race argument is correct, then the relation between IQ and crime should be removed or substantially reduced when these variables are controlled. In fact, Hirschi and Hindelang (1977) have examined several studies of official delinquency that addressed these possibilities (Hirschi 1969; Reiss & Rhodes 1961; Short & Strodtebeck 1965; Toby & Toby 1961; Wolfgang, Figlio & Sellin 1972).

They established that the IQ–crime relation remained regardless of social class or racial status. The main argument that Hirschi and Hindelang pursued was that the inverse relationship between IQ scores and delinquency continues to be documented regardless of the persistent explanations by certain researchers that IQ is no longer taken seriously by knowledgeable students. Hirschi and Hindelang made the assumption that there is an indirect causal relationship between IQ and delinquency. By indirect they meant that a low IQ leads to poor performance and negative attitudes towards school, which in turn result in delinquency. A high IQ, on the other hand, enhances good performance and positive attitudes towards school, which in turn lead to the internal acceptance of conventional values and conformity. Therefore, Hirschi and Hindelang saw school performance and attitudes as 'intervening variables' that mediate IQ and delinquency.

However, according to Bartol (1991:132) one
basic flaw in the Hirschi and Hindelang argument is the common assumption that IQ is equivalent to intelligence. The term IQ is an abbreviation of the concept 'intelligence quotient' derived from a numerical score obtained by an intelligence test. For any individual to perform well in such tests what is required besides language acquisition and verbal development is the ability to make conventional connections and see distinctions between verbal concepts. In addition to these it is of vital importance to distinguish between IQ and intelligence for the term IQ merely refers to a standardised score from a test while intelligence is a broad all-encompassing ability that defies any facile or simplistic definition. Thus even if a group of offenders do score lower on intelligence tests, this observation should not be interpreted as an ultimate proof that criminals are less intelligent than noncriminals. IQ scores are rough indicators of ordinary language skills that are strongly influenced by experience and also by the type of test used, its content, and the training and skill of the examiner. Despite these many variations, the inverse relationship between IQ scores and the tendency toward delinquency is frequently reported.

Kierkegaard-Sørensen and Medrick (1977) completed a longitudinal study on the value of adolescent intelligence test scores to predict later criminality. Their research indicated that adolescents who committed criminal acts later had a lower tested intelligence score than their more law-abiding peers. In comparing delinquency prevalence rates and delinquency incidence rates Gordon (1976:210–215) found that minority juvenile males had higher arrest and court appearance rates than white males or females, regardless of any specific geographical location, rural or urban. He concludes that differences in IQ may provide the most feasible explanation of these persistent differences in unlawful behaviour but at the same time he does not deny that in black and white populations, factors other than intelligence may be more important than IQ.

Delinquency leading to low IQ

This statement means that the consequences and correlates of being a delinquent can lead to lower scores on IQ tests. Thus, the relation is not spurious and the causal direction runs from delinquency to IQ. At least two explanations are proposed to account for this process.

According to the first explanation, a different lifestyle results in lower intellectual functioning (Hare 1984; Shanok & Lewis 1981). This lowering may be the result of head injuries incurred in numerous fights or of the harmful effects of drug abuse on the central nervous system. If crime leads to lower IQ, then there should be no prospective differences between delinquents-to-be and non-delinquents-to-be. However, prospective studies of juvenile delinquents indicate that lower delinquent IQ scores are present well before the commencement of delinquent activities (Denno 1990; Moffit et al 1981; West & Farrington 1973).

According to the second explanation, delinquents score more poorly on IQ tests because they are not motivated to do well. This explanation does not assume that lower IQ scores for delinquents reflect impaired cognitive functioning but instead it is assumed that delinquents are personally oppositional or test-taking is not valued in their subcultures. In either case, delinquents score more poorly on IQ measures than do nondelinquents.

Low IQ leading to delinquency

This general argument implies that lower IQ is one of the causes of delinquency. The specific explanations generally fall into one of two categories: the direct-effect formulation and the indirect-effect formulation (Moffit 1990:112).

Students of brain-behaviour relations interpret the IQ as a broad index of neuropsychological health. According to this view, deficits in the neuropsychological abilities referred to as 'executive functions' interfere with a person's ability to monitor and control his or her own behaviour. The executive functions of the human brain include sustaining attention and concentration, abstract reasoning, forming goals, anticipating and planning, initiating purposive behaviour, and self-monitoring. Theoretically, executive dysfunction of the brain will eventually lead to an inattentive, impulsive child who is handicapped in considering the future implications of his or her acts. Studies by Moffit and Henry (1989) established that executive deficits predicted delinquency among a subgroup of offenders. The logical conclusion is that to the extent that IQ scores share variance with measures of execution function, IQ should have direct effects on delinquency. Some low-IQ children are more impulsive and less adept at self-control, thus setting the stage for delinquency.

In addition to these many researchers have suggested, at least implicitly, that IQ leads to delinquency indirectly (Hirschi & Hindelang 1977). One of the most plausible theories is that IQ leads to delinquency through school failure (Hirschi 1969): boys who experience failure in school are
more likely to be delinquent than boys who experience success in school.

**Intelligence and moral development**

Moral development or moral reasoning refers to the ability to distinguish between right and wrong based upon value judgements. Generally, children of the same age share particular characteristics that differ from those of children of another age, who may find themselves at a different stage of development (Simpson 1976). Although intellectual maturity is essential for moral maturity, it is not sufficient for proper moral development (Shapiro & Perry 1976). Thus, certain individuals may experience impediments in moral development and maintain a lesser degree of maturity unrelated to their age (Tomlinson-Keasey & Keasey 1974).

The association between age and intellectual and moral development also involves the interaction of many different factors (Hogan 1974). For example, although the acquisition of higher stages of moral development as described by Kohlberg is related to intelligence, extensive longitudinal research on mental retardates indicates that developmental gains in moral reasoning, conduct and judgement are evident throughout adolescence (Aronfreed 1974). In turn, stoppages or temporary breaks in moral development among individuals of average intelligence may be influenced by the environment. For example, a comparison between IQ-matched normal and sociopathic children indicated that sociopathic children have a lower stage of moral development because they lack opportunities for role-taking in their families, while other comparisons suggest that parents of delinquent children may discourage mature moral reasoning (Campagna & Harter 1974).

In addition to stoppages in moral development, discontinuities in both mental and physical development may exist during childhood and adolescence, for a variety of reasons. For example, standard curves of both mental and physical growth tend to be nonlinear over time. According to Epstein (1974), spurts of mental growth generally occur during the ages of 2-4, 6-8 10-12 and 14-16 years. Although the link between physical and mental development is not well established, correlations nevertheless are conveying a suggestion.

**Verbal versus performance intelligence**

Although low scores of universal measures of IQ generally differentiate between delinquents, the most discriminating factor has been traced in their scores on measures of verbal ability, the so-called verbal IQ (VIQ) and performance IQ (PIQ). Since the introduction of the Wechsler scales, it has been a regular finding that delinquent males (though not females) indicated variances between performance IQ (PIQ) and verbal IQ (VIQ) in favour of the former, and since PIQ means inclined to be only marginally lower than those of nondelinquent samples, the PIQ > VIQ sign has generally been interpreted in terms of defective or inferior verbal skills rather than superior nonverbal abilities. Wechsler (1958), who designed the first intelligence test (named the Wechsler-Bellevue) that attended to both VIQ and PIQ scores as well as a Full Scale IQ (FSIQ) score, was the first to suggest that antisocial adolescents had higher PIQ than VIQ scores. The Wechsler Intelligence Scale for Children (WISC) was published in 1949 and the Wechsler Intelligence Scale for Children-Revised (WISC-R) in 1974. Both tests were constructed to have means of 100 and standard deviations of 15. These tests have replaced most of the tests developed earlier for use with both children and adolescents.

When two groups are compared to each other regarding their differences between VIQ and PIQ, it is essential to know ahead of time what differences may be obtained in the general population, what differences may be obtained by chance, and what factors may be associated with the occurring differences.

Kaufman (1976), conducting research on the frequency of PIQ–VIQ discrepancies pertaining to the WISC–R standardisation samples, established that the difference between VIQ and PIQ must be 12 points in order to be significant at the ,05 level. Likewise the difference must be 15 points for the ,01 level of significance. Furthermore one-third of all subjects had 12-point discrepancies while one-fourth showed a 15-point discrepancy. The mean discrepancy score was 9.7 and a VIQ > PIQ pattern was as frequent as the PIQ > VIQ pattern.

Research findings of studies where the WISC-R has been applied revealed sample mean VIQs of delinquents which were almost one standard deviation (10 to 12 points) below the general population mean, and suggest that about two thirds of delinquents have some deficiency in verbal ability (Quay 1987:109). However, in a minority of delinquents, an imbalance in the
direction of VIQ > PIQ was shown. Walsh, Petee and Beyer (1987) reported that 37 per cent of a male delinquent sample produced a PIQ > VIQ of 9 or more points, and 11 per cent a VIQ > PIQ of similar magnitude. These findings compared with 26 per cent and 23 per cent, respectively, of a nondelinquent sample. Even though the underrepresentation of the VIQ > PIQ group in the delinquents seems to suggest that a verbal dominance is a safeguard against delinquency, Walsh, Petee and Beyer (1987) found that both imbalanced groups had a more frequent involvement in delinquency than delinquents not showing this imbalance.

In an attempt to clarify how low intelligence may cause criminality, Quay (1987:113-115) suggests that low verbal ability may contribute directly to antisocial behaviour through limiting the development of higher-order cognitive functions, such as verbal self-regulation, social problem-solving and moral judgement. However, a more common view is that the effect is indirect, and dependent on school performance. Intelligence probably also interacts with other personal attributes.

Language and intelligence development versus criminality

A specific difficulty which continuously faced criminologists in their attempts to interpret the intelligence-delinquency relationship was that, in most cases, scores or measures of both variables have been acquired concurrently. In longitudinal studies that have utilised intelligence as a predictor variable, intelligence has not typically been measured before school age. Empirical findings recalled by Stattin and Klackenberg-Larson (1993:369) indicate that antisocial behaviour is already linked with low intelligence in early childhood. However, because the long-term predictive ability of intelligence at very early ages was still to a great extent unknown, these authors ventured into researching the intelligence-criminality and language development-criminality relationships. In this project the relevant data on mental development were obtained from a prospective, longitudinal study of normal children from birth to adulthood at the Clinic for the Study of Children’s Development and Health at the Karolinska Hospital in Stockholm, Sweden. Language development was investigated using psychologists’ ratings and maternal reports. Two basic questions were addressed: at what age does intelligence start to become prognostic of future criminality? and to what extent, and how early do differences between future criminals and non-criminals appear in the language domain? The results showed significant negative correlations, in that as early as the age of three years, the boys’ intelligence scores were significantly related to their future registered criminality ($r = .25 p < .01 n = 119$). Significant correlations, of the magnitude of -.20 to -.25 appeared between registered criminality and intelligence assessed at the ages of 11, 14, and 17 years (age 11: $r = -.21 p < .05 n = 101$; age 14: $r = -.25 p < .01 n = 97$; age 17: $r = -.20 p < .05 n = 92$). Further support for the hypothesised link was provided by psychologists’ ratings of children’s verbal behaviour and by maternal reports of subjects’ speech at the ages of 3 to 5. Finally the authors recommend that in future studies, retardation in the development of language should be systematically included in models linking intelligence to crime. It is then hoped that a prospective, longitudinal approach would offer opportunities for uncovering in more detail the step-by-step process through which early language ability is related to future crime.

Conclusion

The response to the inquiry whether there is a direct relationship between crime and intelligence remains an enigma, even within a biological-naturalistic perspective. The answer currently depends on which studies a researcher examines. There are several methodological difficulties in studies that endeavour to investigate the relationship between these two variables. In addition to the continuous criticisms of IQ tests, the problem of sampling techniques also needs to be addressed. While there are these imponderables, what is altogether more certain is that the IQ and criminal behaviour debate has still a long road to travel.

Bibliography


