THE ETIOLOGY OF INTELLIGENCE ON JUVENILE DELINQUENCY
USING A MULTIVARIATE ANALYSIS

By

Tammy L. Nickell

An Abstract
of a thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science
in the Department of Criminal Justice
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August 2017
ABSTRACT

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The empirical research consistently indicates an association between intelligence and delinquency. In addition to the empirical discoveries, scholars continue to deliberate the exact processes by which IQ influences delinquent behavior. Furthermore, results from the literature have shown that juveniles of comparatively lower intelligence are more likely to participate in various forms of delinquency than those of higher intelligence. As such, the present study investigated the effect of verbal IQ as well as the control variables of age, gender and race on delinquency. A final sample size of 422, 10-12-year-old youths from the Children of the National Survey of Youth 79 secondary data were used. A logistic regression analysis was employed and predicted that the main independent variable, IQ, and two of the three control variables gender, race were predictive of juvenile delinquency. This study is important because it further extends our knowledge of the biological theory which emphasizes the effect of human biological characteristics on criminality. It should be noted as one of the recommendations for future studies, that there is a continued need for research enabling us to identify better factors predictive of delinquency to develop more effective prevention strategies.
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THE ETIOLOGY OF INTELLIGENCE ON JUVENILE DELINQUENCY
USING A MULTIVARIATE ANALYSIS APPROACH

By
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August 2017

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ACCEPTED:
Chair, Department of Criminal Justice: Dr. Lynn Urban

UNIVERSITY OF CENTRAL MISSOURI
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CHAPTER 1
INTRODUCTION

Overview

Over the years, endeavors have been made to identify the causation of juvenile
delinquency. The investigation into the relationship between intelligence and delinquency began as
an attempt to shed light upon human behavior. For a long time, intelligence has been of great
interest to researchers with little agreement as to its causative role in juvenile delinquency.

Background to the Study

One of the greatest achievements in psychology, along with being one of the most
controversial is the measurement of intelligence (Nisbett, Aronson, Blair, Dickens, Flynn, Halpern,
& Turkheimer, 2012). Skeptics of research into human intelligence oppose using IQ alone as a
valid measurement due to historical and social implications (Ritchie, 2015). Many of the scientists
and developers of intelligence testing were supporters of the eugenics movement (Ritchie, 2015).
The eugenics movement was derived from the idea that society should selectively “breed humans
to produce healthier, smarter future generations, thereby either encouraging people in higher social
classes to have more children, or by discouraging the lower classes from reproducing” (Ritchie,
2015, p. 12).

The eugenics movement began in the late nineteenth century and lasted into the twentieth
century (Ritchie, 2015). Laws were passed years later that called for the involuntary sterilization of
delinquents and the “feebleminded” in the United States and other nations around the world
(Bartollas & Schmalleger, 2013; Pinker, 2002). The eugenic ideology also justified the Nazis’ mental framing of inferior races by murdering millions of Jews, Gypsies, and homosexuals (Pinker, 2002). Not all the history of intelligence research during the eugenics movement is corrupt. One such individual was eugenics supporter and psychologist Alfred Binet (1857-1911).

Commissioned by the French government, Binet was hired to lead with the identification of students who were unlikely to benefit from ordinary schooling. So, Binet developed the first intelligence test, sensitive to different levels of cognitive development to help, not eliminate, children with extra difficulties in education (Richie, 2015). He believed that one might assess children’s intelligence based on their mental age. Later joining with Theodore Simon (1908) they revised the test and concluded that IQ is best viewed as verbal and problem-solving proficiency would be categorized as academic aptitude (Bartollas & Schmalleger, 2013).

Before Alfred Binet, Francis Galton (1822–1911) believed progressions of mental worth were generally determined by physiological indicator, such as cranial capacity. Galton extended the psychometric assessment of human qualities in many directions, including the assessment of intellect with various response time measures; however; Binet’s work had the single most significant impact on the conceptualization of IQ.

With the publishing of Henry H. Goddard’s (1914) book, Feeble-mindedness, in which he contended at least 50% of all criminals are defective mentally, the concept that low intelligence causes delinquency climbed into the spotlight. Goddard believed that feeble-mindedness was the consequence of a single recessive gene. He is regarded by many to be one of the pioneers of the American Eugenics movement. Goddard defined these individuals with low intelligence as “high
grade defectives” (1912, p.104). He characterized these individuals of having a lack of self-control, thus making them more susceptible to sexual immorality and vulnerable to others who might exploit them for use in criminal activity. (1912, pp.54-56). Goddard stated that these individuals could not be educated, should not have children and should be segregated.

He reversed his opinion in the late 1920’s, declaring he had been mistaken, and began to question the validity of the tests used to detect feeble-mindedness. His later research focused on the general idea that intelligence is inversely related to delinquency. In any case, the public needs to separate out the historical implications of the eugenics era and beliefs of these early researchers from the scientific discoveries about intelligence that have since been published.

At Stanford University in 1912, Psychologist Lewis Terman who worked with children, decided to use Binet and Simon’s test. Terman developed a more precise test by standardizing the test’s administration and its age-level norms. However, Terman’s 1916 revision retained Binet’s concept of intelligence as a complex mixture of abilities, and is the only revision that has stood the test of time, remaining in publication today.

The standardization that Terman accomplished was quite rigorous for the time and increased the scale’s technical quality and gave clear direction for examiners. First, introduced by Stern (1914), the scale used the ratio of mental age to chronological age. The test is now referred to as the Stanford-Binet Intelligence Scale, and it became the standard by which other measures of intelligence were evaluated (Isen, 2010).

In the early twentieth century, a major contributor to intelligence testing was David Wechsler. He set out to modify the Stanford-Binet test and published the Wechsler-Bellevue
Intelligence Scale, which linked verbal with nonverbal subtests. Therefore, in addition to an overall IQ score, individuals were given separate assessments of verbal and nonverbal IQ (Zimbardo, Weber, & Johnson, 2000).

There has been a history of controversy with intelligence testing, but most social scientists now agree that intelligence is a normally distributed stable attribute that can be measured by performance on a variety of mental tasks, both verbal and nonverbal (Isen, 2010). Verbal IQ reflects an individual's ability to read and comprehend written material and to use words properly. Performance IQ is evaluated through measures of spatial visualization, pattern recognition, and by the manipulating of objects (Isen, 2010).

**Statement of Problem**

There has been a tsunami of research conducted on sociological and psychological factors that can influence crime, but relatively less number of academic studies that shed light on biological risk factors. Also, few studies have used a national sample.

**Purpose of Study**

The purpose of this study is to determine whether verbal IQ might be a predictive factor for delinquency in 10 -12-year old’s. To make this determination, a gap in research needed to be filled. This gap is the lack of current research on the link between verbal IQ in the specific age group of 10-12-year old’s and delinquency using a nationally representative sample. Therefore, the focus of this study is to examine how intelligence is related to delinquency through the exploration of various statistical research and analysis.
Significance of Study

This study is important because it will contribute to biological research on verbal IQ by adding to the existing knowledge base concerning predictors of delinquency. Delinquency prevention and intervention efforts center on identifying the criminological risk factor or factors and determining when, during development, they emerge. Intervention endeavors must be targeted to a youth’s age. By identifying this important criminological risk factor or factors in juvenile delinquency, age specific effective prevention strategies can be developed.
CHAPTER 2
REVIEW OF THE LITERATURE

Overview

There has been a substantial volume of etiological research that tries to expose the causes of general delinquency. The purpose of this chapter is to review and present a representative sample of previous research on the effect on each of the factors (i.e., the proposed independent variable verbal IQ and the control variables of age, race, and gender) on a composite measure of delinquency.

Intelligence and Delinquency

Discoveries arising from empirical research consistently indicate an association between intelligence (IQ) and delinquency. For years, studies from multiple disciplines have presented that, on average, individuals with lower IQ scores are more likely to engage in delinquency comparative to individuals with higher IQ (Beaver & Wright, 2011; Herrnstein & Murray, 1994; Jolliffe & Farmington, 2004; Schwartz, Savolainen, Aaltonen, Merikukka, Paananen & Gissler, 2015).

Intelligence studies have been able to account for variance in criminal behavior from the differences in IQ scores, meaning those who score higher on IQ tests were least likely to engage in lower levels of criminal behavior (Moffit 1993; Raine, Steinhauer, Stouthamer-Loeber, Gatzke-Kopp & Loeber 2002). However, scholars continue to deliberate the exact processes by which IQ should influence delinquent behavior.

Langdon, Clare, and Murphy (2011) held that the relationship is indirect in that deficits in IQ may inhibit individuals’ understandings of right and wrong which would also have led some to
inadvertently engage in crime inadvertently. Other scholar’s contended that the general lack of intelligence among offenders was evidence of a direct link between intelligence and crime (Goddard, 1914, McGloin, Pratt & Maahs, 2004). Regardless of their differences, each of these earlier perspectives shared the underlying premise that variations in individual-level factors, such as intelligence, were responsible for criminal behavior.

Research by Wright and Boisuert (2009) has shown that delinquents are more likely to score lower on measures of verbal IQ than on measures of performance IQ. Explanations for this pattern have to do with deficits in the language centers of the brain, specifically the superior temporal gyrus in the left hemisphere area (Wernicke) and the frontal lobe of the dominant hemisphere of the hominid area (Broca) (Wright & Boisuert, 2009).

While a large number of criminogenic factors have been recognized to extend multiple levels of measurement (Beaver & Wright, 2011; Beaver, Schwarz, Nedelec, Connolly, Boutwell, & Barnes, 2013), individual level factors have come to light as robust and as the most constant predictors of delinquency. Out of all the individual level factors that have revealed an association with delinquency, verbal IQ has appeared as one of the most cited common factors (Beaver et al., 2013).

The huge majority of earlier studies examining the IQ delinquency association depend either on a comprehensive, single measure of intelligence (Herrnstein & Murray, 1994; Mears & Cochran, 2013) or a single subscale (Beaver et al., 2013). Although previous studies have stated that essentially all standardized measures of intelligence are inclined to use the same construct, which commonly relates to general intelligence (g), the outcome from a current meta-analysis
proposes that verbal intelligence (VIQ) could predict delinquency and offending better than other subscales (Nisbett, Aronson, Blair, Dickens, Flynn, Halpern, & Turkheimer, 2012; Isen, 2010).

Age and Delinquency

Fagan, Van Horn, Antaramian, and Hawkins (2011) state that age is one of the most important predictors of involvement in delinquency. Empirical research has shown a consistent relationship between age and delinquency, thereby delinquency increases sharply from around age 10 through ages 17, after which it falls off suddenly (Gottfredson & Hirschi, 1990; Hirschi & Gottfredson, 1983; Moffitt, 1993; Scott & Steinberg, 2008). Previous research has consistently found adolescence to be a time of increased risk-taking, sensation seeking and delinquent behavior (Gottfredson & Hirschi, 1990; Hirschi & Gottfredson, 1983; Moffitt, 1993; Scott & Steinberg, 2008; Steinberg, 2009).

More recent research has identified two predictable processes that may motivate this relationship. A neurologically determined spike in reward-seeking behavior that often expresses itself in an increase in sensation-seeking and risk-taking in early adolescence that peaks in middle adolescence and diminishes rapidly through late adolescence is the first process (Steinberg, 2009). The second process is the slow neural development of self-regulation, a process that does not appear to be fully matured until the early 20s (Scott & Steinberg, 2008; Steinberg, 2009).

These two neurological processes that underlie normal neuro-psycho-social development parallel one of the most persistent relationships found in the social sciences: the age–crime curve (Scott & Steinberg, 2008). Echoed in both the age–crime curve and research on neuro-psycho-social development, the relationship between age and delinquency follows a curvilinear pattern in
which the percentage of youth in each age group increases linearly through mid-adolescence, then drops in the later-adolescent (Sickmund, Sladky, Kang, & Puzzanchera, 2011).

**Race and Delinquency**

Research in the study of race in the juvenile justice system has attempted to identify the contexts in which race matters. To some extent race effect is mediated by other social-demographic factors. Black juveniles are more likely than white juveniles to be reared in single parent impoverished families, and to live in urban disadvantaged urban neighborhoods (Leiber, Mack, & Featherstone, 2009). These are all well-known risk factors for delinquency. Nevertheless, research on the net effects of race is somewhat limited controlling for these variables.

According to Farrington et al., (2003) using UCR data and victimization surveys is a problem because they have incomplete information on the demographic characteristics of offenders. Surveys based on self-reports have more significant information on offenders, but these studies find that violence and crime are either unrelated or only weakly related to race and other demographic factors (Farrington et al., 2003).

Bellair and McNulty (2005) found a small relationship between race and involvement in fights. When controlling measures for other demographic variables the relationship in their longitudinal analysis was no longer statistically significant. In their 2013 study, McNulty, Bellair and Watts found that sociological variables explain the race disparity, in juxtaposition with neighborhood disadvantage, verbal ability decreases the Black-White gap in violence to zero.
Gender and Delinquency

In a review of the literature, it extensively acknowledged that males are more often involved in offending behavior than females (Steketee, Junger & Jungar-Tas, 2013). Females not only commit lesser offenses, but also commit less serious ones. This concurs with other literature, which posits that females are less often involved in aggressive behavior (Card, Stucky, Sawalani, & Little, 2008; Steketee et al., 2013).

A recent study examined if there existed any gender differences in delinquent behavior. This study concentrated on the vulnerability theory which postulates that among females and males both genders are vulnerable differentially to risk factors (Wong, Loeber, Slotboom, & Bijleveld, 2012).

The relationship between parental bond and delinquency was stronger among females than males, and when there was family disruption, females were more likely to engage in delinquency than males (Steketee et al., 2013). The study reported that, usually, females have lower scores on risk factors. When they had higher scores, it appeared that they were strongly more affected, which in turn led to relatively higher rates of delinquency in females compared to males who were subjected to an equal level of risk (Steketee et al., 2013).

Other studies conveyed that the same level of risk can lead to a disproportional increase in delinquency in female in contrast with males (Fagan, Van Horn, Antaramian, & Hawkins, 2011). Analogize with the previous findings; the one risk factor that related the most strongly to delinquency among males was self-control (Steketee et al., 2013).
**Gap in Research**

However, there is a limitation with the existing literature that must be addressed to ascertain more persuasively that IQ is a criminogenic risk factor. Most of the samples that have been analyzed to assess the association between IQ and crime are comprised of non-nationally representative groups of individuals, psychiatric patients, sex offenders, and prison inmates (Diamond et al., 2012; Guay, Ouimet, & Proulx, 2005; Nisbett, Aronson, Blair, Dickens, Flynn, Halpern, & Turkheimer, 2012). The principal exception however, is the National Longitudinal Survey of Youth, which is comprised of a nationally representative sample (McNulty et al., 2013). This data was examined by Herrnstein and Murray (1994) who detected a significant inverse association between IQ scores and criminal association. A more recent study by Mears and Cochran (2013) discovered a clearly curvilinear link in which offending rates were lower among respondents within the highest and lowest IQ categories.

It is difficult to establish whether IQ is associated with delinquency involvement in 10 to 12 year old’s during recent times without substantiation generated from a more current, nationally representative sample. These analyses of the current study will attempt to help fill this gap in research by addressing the research question: What could cause juveniles to be delinquents?
CHAPTER 3
METHODOLOGY

Overview

There is a large amount of literature on what factors can contribute to juvenile delinquency. Nevertheless, there are no current studies on verbal IQ and delinquency that target the specific age group of 10 to 12-year old’s using a nationally representative sample. The current analysis will attempt to help fill this gap.

Hypotheses

Constructed on the current literature, this study developed one hypothesis for the main independent variable IQ and one hypothesis for each of the other three control variables (age, race and gender). H1: IQ has a negative relationship with delinquency, H2: Older juveniles are more likely to be delinquent than younger ones, H3: Race has a relationship with delinquency, and H4: Males are more likely than females to commit delinquency.

Application to the Human Subject Review Committee

Before the starting of data collection, an application to the Human Subject Review Committee was submitted. A copy of the application was then emailed to advisor Dr. Cho. A completion of the Responsible Conduct of Research training certification was required before approval of the application.

This course focuses on the protection of human subjects and the important ethical issues in the United States regulating the conduct of research. Violated ethical standards from past research were discussed and how it contributes to the protection of human subjects today. There were
discussions on critical aspects of defining human subjects research, federal regulations, privacy informed consent and factors of consent. The certification was completed and the application was approved. The letter of approval is in Appendix 1.

Data

 Secondary data drawn from the Children of the National Longitudinal Survey of Youth 79 (C-NLSY79) were used in this current study to examine the relationship between the main independent variable (verbal IQ) and the dependent variable (juvenile delinquency). The control variables (age, race, and gender) were examined with the dependent variable (juvenile delinquency).

The data gathering for the NLSY was funded by the United States Department of Labor and has been administered yearly since 1979 to a national household probability sample of individuals. These individuals range from 14 to 21 years of age at the beginning of the survey. The original NLSY sample was designed to oversample economically disadvantaged Hispanics, Blacks, low income non-Hispanic White groups, and military youth (Connolly & Beaver, 2014). Reflecting budget constraints, the NLSY have largely deleted the latter two from the main Youth sample. The oversample included 3,652 Hispanic and African American juveniles. The remaining sample, however, retains its national representation.

With appropriate weights, the NLSY79 may be considered as representative of the living members of a national sample of men and women. With appropriate weights, the children of the female respondents in this sample may be considered a representative sample of children who have been born to this national sample of women.
A separate data collection process was introduced in 1986 to gather information about all the children in the original NLSY79 cohort. This greatly expanded the extensiveness of the child-specific information collected. Data includes valuable measures of psychologically oriented variables, repeated measures of youth’s behavior and home observations (McGloin, Pratt, & Maahs, 2004).

Survey Instrument

A unique set of multiple field instruments have been used in the collecting of information about the NLSY79 children in both paper and computer-administered format. Using these instruments, such as questionnaires, questionnaires supplements, household interviews forms or household record cards, there is access to the children’s reports about health, aptitudes, attitudes, achievements, behaviors and relationships. The Child Supplement questionnaire is administered every survey year, to each NLSY79 child eligible for interview.

Questionnaire item or question number is a generic term which refers the user to the printed source of data for a given variable. A questionnaire item may be a question, a check item, or an interviewer’s reference item that appears within one of the survey instruments. Each questionnaire item has been assigned a number or a combination of numbers and letters within the documentation system to assist the user in linking each variable to its location in a survey instrument.

Sample Design

The NLSY79 Child sample consists of all children born to NLSY79 mothers. In 1986, the children have been interviewed and assessed biennially to follow their physical, socio-emotional,
and cognitive development. Beginning in 1994, children who had reached the age of 15 at the end of the survey year were no longer assessed as children. When reaching the age of 15, the NLSY79 children became part of the NLSY79 Young Adult sample by complete personal interviews like those given to their mothers during late adolescence and into adulthood.

As of the most recent survey 2012, a total of 11,512 children have been identified as having been born to the original 6,283 NLSY79 female respondents mostly during the years that they have been interviewed. A small number of children were born prior to 1979, the first main Youth interview round. Obviously, an unknown number of additional children have been born to women who have left the survey, after their attrition from the sample. As of 12/31/2012, 515 children under age 15 were assessed and 5,808 were interviewed as young adults.

The number of children assessed during a given child survey year is a function of the number of children born to interviewed NLSY79 mothers, the number of children living in the home, and finally, the number of those children that were interviewed. Of the 5,842 NLSY79 females eligible for the first child interview in 1986, more than 2,900 mothers and 4,971 children were interviewed. From this sample of eligible children, assessment data were collected for 4,786.

**Sample Size**

The year 2004 is the round of interviews documented and is the wave that was used for the predictor variables of the present research. Although there has been a total identified in the NLSY79 data set of over 11,000 children born from the original 6,283 NLSY79 female respondents, the current research limited the analysis to youth who are 10 to 12 years old during
the 2004 interview. The total sample size of 10 to 12 year olds evaluated for this current study was 422.

**Dependent Variable**

The dependent variable in the current study is delinquency. The delinquency variable was drawn from the 2006 wave of the C-NLSY data. Delinquency was measured at ages 10-12 years of age through a 3-item delinquency scale. Youth were asked to report how frequently (never=0, once or more=1) if they participated in the following in the last twelve months (1) “taken something from a store without paying for it,” (2) “had to bring parents to school,” and (3) “how many times skipped school without permission.” So, a score of 0 indicated no delinquency, which means each research subject was not engaged in any of the three delinquent behaviors; whereas, a score of 1 indicated participation in any of the three items.

**Independent Variable**

The independent variable in the current research is verbal intelligence. Verbal intelligence was measured with the Peabody Picture Vocabulary Test (PPVT-R). The PPVT-R was designed for use with individuals aged 2 ½ to 40 years. This revised edition measures receptive (hearing) vocabulary of an individual for Standard American English and delivers, at the equivalent period, rapid approximation of “verbal ability or scholastic aptitude” (Dunn & Dunn, 1981 p.31).

The English version of the PPVT-R comprises 175 vocabulary items of increasing complexity. The PPVT-R has been administered, with some exclusions, to NLSY79 children between the ages of 3-18 years of age until 1994, when children 15 and older progressed into the Young Adult survey (Dunn & Dunn, 1997). The PPVT-R was administered in the current survey.
round to children aged 4-5 and 10-11 years of age, including some children with no prior valid PPVT scores.

The PPVT-R is among the most well recognized indicators of childhood verbal intelligence (Baker, Keck, Mott, & Quinlan, 1993). Therefore, the PPVT-R has been found to be an acceptable substitution for the Wechsler Adult Intelligence Test-Revised (WAIS-R) and as a predictor of performance on the Wechsler Preschool and Primary Scale of Intelligence for young children (Ingram, Caroselli, Robinson, Hertzel, Reed, & Masel, 1998). Another study by Pasnak, Willson-Quayle, and Whitten, (1998), emphasized its convergent validity with the Peabody Individual Achievement Test with a correlation of .77, and its reliability, with a stability coefficient of .84.

The PPVT-R contains 175 stimulus words and 175 equivalent image plates. These image plates have 4 black-and-white drawings, one of which best represents the meaning of the corresponding stimulus word (Dunn & Dunn 1981). Also, there are five image plates and training words.

The assessment of the PPVT-R was administered only in English in 1986. The version of the PPVT-R Spanish version, the Test de Vocabulario en Imagenes Peabody (TVIP), in 1998 was introduced into the children’s survey and extended through the 2000 survey round for a small group of children who chose to answer the version in Spanish (Dunn & Dunn, 2007). Post-1986 assessment results may be less culturally biased for this reason than the 1986 version. The Spanish version of the PPVT, was no longer administered after 2000.

In the assessment, children can point, utter, or select one of four pictures that best explain a specific word’s meaning. The assessment is given using a basal and ceiling procedure (Baker et al.,
1993). When the child correctly identifies eight consecutive items before the first error, a basal is then documented. The basal is defined as the last item in the highest series of eight and then when the child incorrectly identifies six of eight consecutives items a ceiling is established (Baker et al., 1993). If, however, the child gives an incorrect response before eight consecutive correct answers have been made, testing proceeds backwards, beginning at the item just before the starting point, until eight consecutive correct responses have been made (Baker et al., 1993). If a child does not make eight consecutive responses even after administering all the items, he or she is given a basal of one. If a child has more than one series of eight consecutive correct answers, the highest basal is used to compute the raw score (Baker et al., 1993).

A ceiling is established when a child incorrectly identifies six of eight consecutive items. The ceiling is defined as the last item in the lowest series of eight consecutive items with six incorrect responses. If more than one ceiling is identified, the lowest ceiling is used to compute the raw score. The assessment is complete once both a basal and a ceiling have been established (Baker et al., 1993).

The ceiling is set at 175 if the child never makes six errors in eight consecutive items. The raw score is calculated by adding the number of correct responses the individuals makes between the basal and the ceiling to the basal score (Baker et al., 1993). All answers below the highest basal are counted as correct, even if the child answered some of these incorrectly.

On a nationally representative sample of children and youth, the PPVT-R was standardized. The norming sample include-specific standard scores of 4,200 children from 1979, and norms development took place in 1980 (Dunn & Dunn, 1981). Children’s IQ’s are usually higher as they
age, so well-normed IQ scores are age adjusted. In 1990, the procedure used to create the NLSY79 Child PPVT-R normed scores were refined in two important ways. The first, children with raw scores that translated into standard scores between 20 and 39 are now normed using the PPVT-R Supplementary Norms Tables (Dunn & Dunn, 1997).

Then secondly, raw scores that translated to normal standard scores above the maximum provided are assigned standard scores of 160, and raw scores translating to standard scores below the minimum are now assigned scores of 20 (Dunn & Dunn, 1997). Before 1990, children with these scores were assigned a standard score of zero. Therefore, the standardized score from the PPVT-R is representative of the measure verbal intelligence.

Control Variables

Age, race, and gender were selected as control variables to measure a true effect of the independent variable (verbal IQ) on delinquency. Age was a continuous control variable measured in years based on the birth year of the research subject. Gender was recoded as 0 =Female and 1=Male. Race was recoded as 0= White, 1= Non-White.

Plan of Analysis

The present analysis attempted to answer the research question: What could cause juveniles to commit delinquency? It is hypothesized that H: Verbal IQ has a negative relationship with delinquency, H2: Older juveniles are more likely to be delinquent than younger ones, H3: Race has a relationship with delinquency, H4: Males are more likely than females to be delinquent.

The present study used a cross-sectional design utilizing the 2006 wave of data for delinquency and the 2004 wave of data for verbal IQ, age, gender, and race. A sample of youth
between the ages of 10 and 12 from the Children’s National Longitudinal Survey of Youth were used. This modeling was implemented by using SPSS Version 22.

Logistic regression analysis was used in the current study to test for the existence of predictable relationships among the variables. The objective of logistic regression is the same as many other types of model-building techniques. Hosmer and Lemeshow (2000) stress that the use of logistic regression is to find the “best fitting and most parsimonious, yet biologically reasonable model to describe the relationship between an outcome (dependent) variable and a set of independent (predictor) variables” (p. 1).
CHAPTER 4

RESULTS

Overview

Sample characteristics are summarized in Table 1. Reviews of the relationships of the main independent variable (verbal IQ) and the three control variables (race, gender and age) on the dependent variable (delinquency) are in Table 2. Next, the logistical analysis is discussed. Finally, a model in Table 3 of the factors of statistical significance.

Sample Statistics

Table 1. Sample Characteristics (N=422)

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<td>10</td>
<td>91</td>
<td>21.6</td>
</tr>
<tr>
<td>11</td>
<td>211</td>
<td>71.6</td>
</tr>
<tr>
<td>12</td>
<td>120</td>
<td>28.4</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>248</td>
<td>58.8</td>
</tr>
<tr>
<td>Non-White</td>
<td>174</td>
<td>41.2</td>
</tr>
</tbody>
</table>

Table 1 above shows that the sample characteristics. By gender, males (N=200 or 47.4%) were slightly outnumbered by females (N=222 or 52.6%). As for age in the year of 2004, the final sample of the present study consisted of 91 (21.6%) ten year olds, 211 (71.6%) eleven year olds,
and finally 120 (28.4%) twelve year olds. By race, there were 248 (58.8%) whites, and 174 (41.2 %) non-whites.

**Correlation Test**

Table 2. Pearson Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td><strong>-0.199</strong></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.073</td>
<td>0.04</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td><strong>0.114</strong></td>
<td>0.014</td>
<td>-0.022</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td><strong>0.283</strong></td>
<td><strong>-0.398</strong></td>
<td>0.014</td>
<td>0.024</td>
<td>1</td>
</tr>
</tbody>
</table>

**p<0.01, one-tailed test

[Legend] 1 = Delinquency in 2006; 2 = IQ in 2004; 3 = Age in 2004; 4 = Gender; 5 = Race

Table 2 above shows that verbal IQ is negatively related to delinquency at -0.199, and is statistically significant at the 0.01 level. Age is not related to delinquency and is not statistically significant (p>0.01). As for race, the correlation test showed that it has a relationship with delinquency (0.283) and is statistically significant (p<0.01). Gender has a relationship with delinquency at 0.114 and is statistically significant (p<0.01).

**Logistic regression analysis**

The current research design employs a binary logistic regression analysis for several reasons. In this study, logistic regression analysis was employed to predict an outcome coded as “0” (non-delinquent) or “1” (delinquent) using one main independent and three control variables.
For this study, there are distinct advantages of using logistic regression rather than discriminate analysis or multiple regression analysis. First, no assumptions about the distributions of the predictor variables need to be made. This assumption means that the predictors do not have to be normally distributed nor do they need to have equal variances within each group or be linearly related (Mertler & Vannatta, 2010). Next, logistic regression does not produce negative predictive probabilities, meaning that all probability values will be positive and will range from zero to one. Finally, logistic regression has the capacity to analyze predictor variables of all types (i.e., continuous, discrete, and dichotomous).

Table 3. Logistical regression model for factors of statistical significance associated with delinquency in 2006

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>SE</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IQ in 2004</td>
<td>*-0.011</td>
<td>0.005</td>
<td>0.989</td>
</tr>
<tr>
<td>Age in 2004</td>
<td>0.268</td>
<td>0.165</td>
<td>1.307</td>
</tr>
<tr>
<td>Gender</td>
<td>*0.546</td>
<td>0.232</td>
<td>1.727</td>
</tr>
<tr>
<td>Race</td>
<td>**1.09</td>
<td>0.246</td>
<td>2.976</td>
</tr>
<tr>
<td>Constant</td>
<td>-3.660</td>
<td>1.900</td>
<td>0.026</td>
</tr>
<tr>
<td>N</td>
<td>422</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log Likelihood× (-2)</td>
<td>458.201</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cox &amp; Snell R Square</td>
<td>0.103</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nagelkerke R Square</td>
<td>0.147</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<0.05; **p<0.01

The present study, using the binary logistic regression, completed three purposes. First, the current model measured whether or not each of the predictor variables was related to the level of delinquency at the 0.05 or 0.01 significance level. Second, this analysis calculated the probability
of each predictor variable that made the sample subjects delinquent. Finally, this present analytical
tool computed how accurately the resulted model fitted with collected data.

Table 3 above displays the results of running the logistic regression analysis. The main
independent variable (verbal IQ) and the three control variables (age, race, and gender) and the
dependent variable (delinquency) were included in the current analysis. Delinquency was
regressed on verbal IQ, age, race, and gender to measure whether or not each of the predictor
variables was related to the level of delinquency at the 0.05 or 0.01 significance level.

The mean of the dependent variable (delinquency in 2006) in the current study was 0.3, and
its standard deviation was 0.45, with a minimum of 0, and a maximum of 1.0. On the other hand,
the mean of the main independent variable (verbal IQ) was 97.8, and its standard deviation was
23.01, with a minimum of 20, and a maximum of 160. The IQ in 2004 was negatively significant
at -.011. This negative relationship means that juveniles with higher verbal IQ score are more
likely to have a value of 1. In other words, the higher IQ value Youth have, the lower probability
of committing delinquency.

Age was not statistically significant. Race was positive at 1.09 and more likely to have a
value of 1, or delinquent. Non-Whites are about three times more likely to commit delinquency
than their counterparts, which are Whites. Gender was positively related to delinquency at the 0.05
significance level. This significant relationship means that the males in the current study are 1.7
times more likely than females to be delinquent.

To evaluate the goodness of fit of the logistic regression model, Cox & Snell R Square as
well as Nagelkerke's R square were measured. According to Cox & Snell R Square, 10.3% of
variance in the dependent variable was explained by a set of four predictor variables. The value of Nagelkerke's R square was 0.147, which means that around 15% of variance is the delinquency level in 2006 was accounted for by the predictive variables (verbal IQ, age, race, and gender). As such, the current logistic regression model explained 10% to 15% of the variability in delinquency.
Chapter 5
DISCUSSION AND CONCLUSION

Overview

This chapter briefly discusses what the current study found, to fill the research gap, on the effect of verbal IQ on delinquency. It also examines the implications of the study for juvenile policy and makes recommendations for future research. Finally, a discussion of the limitations of the study is followed.

Discussion

The primary purpose of this study was to add to the existing knowledge base concerning predictors of delinquency. More specifically, the present study focused on whether or not verbal IQ is a predictive factor for delinquency in 10 to 12-year old’s. The hypothesis 1, (Verbal IQ has a negative relationship with delinquency) was accepted, and this finding was consistent with previous research.

Herrnstein and Murray’s (1994) criminological theory hypothesized that intelligence is the most potent predictor of delinquency and then found a significant inverse association between intelligence and delinquency. Verbal IQ was well established as having an inverse relation with delinquency at r = -.33 (Lynam et al., 1993). Menard and Elliott (1993), also concluded that verbal IQ had a correlation coefficient of -.08 for non-serious offenses and -.16 for serious offenses. Additionally, having a high verbal IQ may serve as a protective factor against delinquency among high-risk males (Menard & Elliot, 1993).
Even though the data showed that delinquency risk increased 31% with each year, that increase was not statistically significant. In other words, there was some relationship between age and delinquency, but the relationship was found to be not meaningful in the statistical terms. So, hypothesis 2, which states that older juveniles are more likely to be delinquent than younger ones, was rejected. This empirical result was contrary to the current literature. Previous studies have reported consistent cross-sectional along with longitudinal relationships between age and delinquency (Gottfredson & Hirschi, 1990, Hirschi & Gottfredson, 1983, Moffitt, 1993, Scott & Steinberg, 2008).

The key to figuring out why there was no significance in this current study for age could possibly be found in Moffitt’s (1993) criminological developmental theory. She hypothesized that various juveniles are stuck in a maturity gap characterized by the difference between their biological and social age (Moffitt, 1993). The current sample, being predominantly 11 years of age, might not have been stuck in this maturity gap and have not been involved in risk-taking behaviors intended to demonstrate their independence.

The next control variable (race), had a relationship with delinquency, among the sample subjects of the current study. As such hypothesis 3 (race has a relationship with delinquency) was accepted. The current literature, however, had mixed results. Studies found that violence and crime are either unrelated or only weakly related to race (Farrington et al., 2003; Bellair et al. 2005; McNulty et al., 2013).

The last control variable (gender), showed that males were more likely than females to commit delinquency. So, hypothesis 4 was accepted. This outcome of the present study about the
link, between gender and delinquency was somewhat consistent with the current literature. Previous research has extensively acknowledged that males are more often involved in offending behavior than females. Females committed not only lesser offenses, but also less serious ones than their counterparts (Card, et al., 2008; Steketee et al., 2013).

**Implications**

There are plausible policy implications that could help to improve verbal intelligence. One such program is the computerized music training program developed for preschool children. Training in music-listening skills transferred to verbal ability. After the short music-training program, children exhibited enhanced performance on a measure of vocabulary knowledge reflecting verbal intelligence (Moreno, Bialystok, Barac, Schellenburg, Cepeda, & Chau, 2011). These results that verbal performance can be improved suggest that music and language are closely related. One possible explanation for this finding is that music processing intersects with mechanisms used in other cognitive activities (Patel, 2009). The content of the training integrates training in rhythm, pitch, melody, voice, and basic musical concepts (Moreno et al., 2011). This training relied primarily on listening activities and was not instrumental.

Children demonstrated better performance on a measure of verbal intelligence with 90% of the sample showing improvement in 20 days of training (Moreno et al., 2011). Moreno’s research (2011) has confirmed a link between music training and specific brain structures, especially in the regions that involve language processing such as the Broca’s and Wernicke’s area. Improvements in verbal IQ were positively correlated with brain plasticity. This association is evident at both low and high levels of intelligence.
Another policy implication, focuses on early nutrition. Prolonged breastfeeding has many benefits, and increased IQ appears to be one of the most important. A study by Kramer, Aboud, Mironova, Vanilovich, Platt, Matush, Igumnov, and Shapiro (2008) of 13,889 mothers who breastfed their infant for six months or longer had a mean IQ of almost six points higher than children than the control group children. These results, were based on the largest randomized trial ever conducted and provided strong evidence that prolonged and exclusive breastfeeding improves children's cognitive development (Kramer et al., 2008).

**Study Limitations and Future Research**

The research findings of the current study should be interpreted with caution due to several shortcomings of the research design of this study. First, the validity of being representative of the dependent variable, delinquency, might well be mentioned. This study used the following three items to operationalize the construct of delinquency: (1) “taken something from a store without paying for it,” (2) “had to bring parents to school,” and (3) “how many times skipped school without permission.”

Some scholars may argue that these three questions are not enough to measure the delinquency validly as well as reliably. Although this study used secondary data which the current author could not control its operationalization process, future studies should take this criticism into account seriously by using more composite measures instead of utilizing only three items to measure a general delinquency.

Secondly, future research might address issues related to generalizability by examining the current studies variables in multiple-nation based juvenile samples to depict delinquency on a
global perspective. The reasoning behind this recommendation is that in most countries of the world, juvenile delinquency has been an increasing problem (Reichel, 2013).

Next, the study only examined juvenile from 10 to 12 years of age, but it would be valuable for future research to examine an even younger and older age group. Research with a wide range of age would help in the evaluating of policy for future childhood services.

Finally, perhaps future research should be comprised of more predictor variable then this study, allowing for conceivably more risk factors of delinquency to be discovered.
References


doi:10.1177/1541204008327144


Dear Tammy Nickell:  

Your research project, 'The Etiology of Intelligence on Juvenile Delinquency using a Multivariate Approach', was approved by the University of Central Missouri Human Subjects Review Committee on 9/28/2016.

If an adverse event (such as harm to a research participant) occurs during your project, you must IMMEDIATELY stop the research unless stopping the research would cause more harm to the participant. If an adverse event occurs during your project, notify the committee IMMEDIATELY at researchreview@ucmo.edu.

The following will help to guide you. Please refer to this letter often during your project.

- If you wish to make changes to your study, submit an “Amendment” through Blackboard under the “Amendment and Renewals” tab. You may not implement changes to your study without prior approval of the UCM Human Subjects Review Committee.
- If the nature or status of the risks of participating in this research project change, submit an “Amendment” through Blackboard under the “Amendment and Renewals” tab. You may not implement changes to your study without prior approval of the UCM Human Subjects Review Committee.
- When you have completed your collection of data, please submit the “Final Report” found on Blackboard under the “Final/Renewal Report” tab.

If you have any questions, please feel free to contact me at researchreview@ucmo.edu.

Sincerely,

Kathy Schnakenberg

Program Administrator/Research Compliance Officer /Office of Sponsored Programs and Research Integrity, University of Central Missouri
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Protocol Number: 561