The relationship between intelligence, ethnicity and school problems among delinquent adolescents

Lysanne van Loenen
The relationship between intelligence, ethnicity and school problems among delinquent adolescents

Abstract

Research has shown that delinquent adolescents often have a low IQ and is often influenced by different factors, such as ethnicity and school problems. The aim of this study was to test if ethnicity and school problems are related to intelligence in criminal-justice involved adolescents. Besides, it was investigated whether there is one subtest in an intelligence test which can be a good estimator for the Total IQ.

The 94 participants in this study were male adolescents (aged 14-20) detained in the juvenile justice Institutions Forensic Teylingereind and Intermetzo. The adolescents were tested with the Wechsler Intelligence Test (WISC-III and WAIS-III), and assigned to a Dutch and non-Dutch group. Grade retention is selected as variable for the factor school problems. Also this is divided in two groups: yes or no school problems. (Multiple) Analysis of Variance was used to investigate the relationship between ethnicity, school problems and intelligence. Correlations between the subtests and the Total IQ were used to explore a possible estimator for Total IQ.

It has been found that non-Dutch delinquent adolescents with school problems score lowest on an intelligence test. If specific IQ profiles are considered, the subtests Digit Span, Comprehension and Coding are only related to school problems. Finally, there is no good estimator of all the subtests which gives a good representation of the Total IQ.
For a long time the relation between intelligence and delinquency has been a subject of scientific debate. In the 19th and 20th century a low IQ was seen as an important risk factor for criminal behavior (Kaal, 2014). Criminal behavior is a social problem, because it entails inconvenience to citizens, leads to great material damage and requires a lot of commitment for police and security services (Meeus, De la Rie, Luijpers, & De Wilde, 2001). Loeber, Slot, & Sergeant (2001) mention that adolescents are involved in crime at an increasingly younger age. Therefore, an early detection is important. The sooner a low intelligence is determined, the sooner intervention and treatment programs can be tailored to a greater extent to the cognitive capacities of the child. When a low intelligence is noticed in the Juvenile Justice Institution (JJI), the better the treatment can be geared toward the delinquent adolescents, which could reduce recidivism. Because the relationship between intelligence and delinquency is complex, further research is needed. Apparently there is more going on in this relationship, because other variables seem to be related to intelligence and delinquency. This research aims to scrutinize the relation between IQ and school problems in detained male adolescents and to test if this relation varies across youth from various ethnic origins.

Delinquency is part of the broader term of antisocial behavior. Criminal or delinquent behavior is behavior that is punishable by the law, such as offenses and crimes (Van der Laan & Blom, 2005). Delinquency is a collective term for various types of criminal behavior that are punishable by the law (Van der Laan & Blom, 2011). The most common criminal offences in adolescents are (shop) theft, burglary, fighting with a weapon and assault (Moffitt, Lynam, & Silva, 1994; Van der Laan & Blom, 2011). Adolescents who show this kind of antisocial behavior can be arrested by the police, and subsequently detained.

Many studies have examined the intelligence of delinquent populations. It is known that delinquent populations often have a lower intelligence than the non-delinquent population (Beaver et al., 2013; Isen, 2010; McGloin & Pratt, 2003). A review by Hirschi and Hindelang (1977) shows that delinquents score eight points lower on a standard intelligence test than non-delinquents. Delinquents with intellectual disability, such as an IQ below average, have more difficulties in detention than delinquents without intellectual disabilities (Glaser & Deane, 1999). Once in prison, they often have difficulty understanding what is happening to them and what the authorities present are expecting of them (Kaal, Negenman, Roeleveld, & Embregts, 2011). The frustration that arises and the feelings of being misunderstood, combined with limited social skills, often lead to more behavioral problems.
Studies investigating intelligence in delinquent populations predominantly use IQ estimators instead of a Total IQ (Bartels, Ryan, Urban, & Glass, 2010; Isen, 2010). The subtests Vocabulary and Block Design of the Wechsler intelligence tests (Wechler 2005a; Wechsler 2005b) can give an estimate of the level of intelligence of the adolescent (Legerstee, Van der Reijden-Lakeman, Lechner-Van der Noort, & Ferdinand, 2004). Several studies used these IQ estimators (Haynes, 1983; Herrera-Graf, Dipert, & Hinton, 1996; Legerstee et al., 2004; Ryan, 1981; Watkins, 1986). The population of these studies were different, such as child psychiatry, children with school- and behavior problems and male delinquents. One study show that these IQ estimators are good predictors for the Total IQ (TIQ) (Legerstee et al., 2004). Some of these studies show that these IQ estimators are not a accurate predictor of the Total IQ (TIQ) score (Herrera-Graf et al., 1996; Watkins, 1986). Other studies show that the predictors can be perfect for screening, but not for predicting TIQ (Haynes, 1983; Ryan, 1981). If there is a comparison made with the study with the male delinquents (Hanyes, 1983), there is expected a predictor for screening, but not for the whole IQ. In these studies the IQ estimator can be unreliable, because many adolescents may have a disharmonic profile where they score lower on the Verbal IQ (VIQ) than on the Performance IQ (PIQ). Studies also show erratic profiles within the VIQ and PIQ subtests (Isen, 2010). In a review of Isen (2010), delinquent adolescents were found to perform worst on explaining the meaning of words (the Vocabulary subtest) and general knowledge (the Information subtest) (see table 1). However, they performed best on naming a missing part of a picture (the Picture Completion subtest) and composing a picture (the Object Assembly subtest). These findings may indicate that delinquent adolescents have limited acquired knowledge, perhaps because of limited schooling, but exhibit a better visual perception and understanding of social situations (Isen, 2010). In addition to these findings Famularo et al. (1992) found that delinquent adolescents, in comparison with non-delinquents, also obtained lowered scores on answering practical questions (the Comprehension subtest) on the Wechsler Intelligence Scale for Children-Revised (WISC-R) (see table 1). These same delinquents scored highest on repeating numbers in the same and reversed order (the Digit Span subtest). However, studies also yield mixed findings (Chae, Jung, and Noh, 2001; Famularo et al., 1992, see table 1). Possible explanation for these aforementioned mixed findings and discrepancies between VIQ and PIQ may be related to differences in cultural background and school performance.

Research shows that Black people score about 15 points lower on an intelligence test than White people (Fagan & Holland, 2002). An explanation for this is that some subtests rely
The relationship between intelligence, ethnicity and school problems among delinquent adolescents

on language skills. Ethnic minorities may have more difficulty with these subtests, because they are less proficient in the language (e.g. Fasfous et al., 2013). Other subtests of the intelligence tests are more related to school performance. For example, the verbal scale is related to education results. Adolescents with a low verbal ability often fail at school (Isen, 2010).

Table 1

Lowest and highest scores on subtests on an intelligence test

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Lowest</th>
<th>Highest</th>
<th>Age</th>
<th>Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>WISC, WAIS</td>
<td>Vocabulary</td>
<td>Picture Completion</td>
<td>Different ages</td>
<td>WISC, WAIS</td>
</tr>
<tr>
<td>WISC-R</td>
<td>Information</td>
<td>Object Assembly</td>
<td>13-15</td>
<td>KEDI-WISC, K-WAIS</td>
</tr>
<tr>
<td>WISC</td>
<td>Vocabulary</td>
<td>Digit Span</td>
<td>12-18</td>
<td>KEDI-WISC, K-WAIS</td>
</tr>
<tr>
<td>WAIS</td>
<td>Information Comprehension</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KEDI</td>
<td>Vocabulary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WISC</td>
<td>Information</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WAIS</td>
<td>Arithmetic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WISC-R</td>
<td>Digit Span</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WAIS</td>
<td>Picture Arrangement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KEDI</td>
<td>Coding</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ethnic minority often faces problems in school, such as suspension and grade retention (Kaushal & Neponmyaschy, 2009). In fact, school can have the function of social control, in which the elements school attachment and commitment are important. It is known that in the Black population there is a lack of adequate social control, so that they are less corrected and feel no need to adapt to others (Lynam et al., 1993). Black adolescents do not regularly participate in school, so they will learn less, which their intelligence can be lower than in White adolescents (Duncan, Brooks-Gunn, & Klebanov, 1994; Emerson, 2012). Missing school may be a reason why the Black adolescents score lower on a verbal intelligence test than the White adolescents (Fagan & Holland, 2002; Rowe, 2002).

An example of the variables which makes the intelligence complex at a delinquent population is school performance. Delinquents often have had rudimentary schooling, due to truancy, suspensions, poor school performance and grade retention (De Jonge & Van der Linden, 2007; Katsiyannis, Thompson, Barrett, & Kingree, 2013; Savolainen et al., 2012). The less an adolescent does in school, the more frustrated he is at school, the less attached he becomes to school, and the more likely he is to show delinquent behavior. The same applies
to the situation in which an adolescent does little at school, making it less likely for him to develop a strong commitment to education, which makes him more apt to participate in delinquent acts (Lynam, Moffitt, & Stouthamer-Loeber, 1993). Also poor school performance can lead to delinquent behavior. Poor school performance can lead to frustration and a negative attitude towards school (Hirschi & Hindelang, 1977; Ward & Tittle, 1994). Adolescents who have a poor disposition in areas that are emphasized in school will receive less positive reinforcement for their academic efforts and are more likely to affiliate with delinquent peers (Lynam et al., 1993; Rhodes & Reiss, 1969). Therefore, there may be an indirect effect between intelligence and the delinquent population (Hirschi & Hindelang, 1977). In a study by Ward & Title (1994) it is even shown that the relationship completely disappears when only the direct effect between intelligence and the delinquent population will be investigated. An example of school problems is grade retention. A review by Foley (2001) shows that delinquent adolescents have often repeated a class. For different reasons it is therefore important to take schooling into account in this study when we examine the intelligence of delinquent adolescents.

Another variable that makes the intelligence in a delinquent population complex, is ethnicity. Male adolescents of foreign ethnicity are over-represented in prison (Coid, Kahtan, Gault, & Jarman, 2000). Studies of the relationship between intelligence, delinquency and ethnicity have different outcomes. Research that is controlled for several variables, such as ethnicity, makes the relation between intelligence and the delinquent population weaker, but some relation is still found after correction for these influences (Levine, 2011; Moffitt et al., 1981). A study by Lynam et al. (1993) shows that IQ is the same for Black and White people within a delinquent population.

School performance and ethnicity among a delinquent population seem to have a relationship. Because school can have the function of social control, as described above, it is known that in the Black population there is a lack of adequate social control (Lynam et al., 1993). When social commitment is lacking, school problems can arise and the adolescent may contact with delinquent adolescents. In the study by Lynam et al. (1993) the relationship between intelligence, delinquency and school applies only to Black adolescents and not to White adolescents. However, IQ has similar effects on school performance in both Black and White adolescents. School performance is only different in delinquent adolescents. Therefore, Black adolescents can be more present in the JJI than White adolescents. Even if they function both low on an intelligence test.
As previously mentioned, the relationship between intelligence and delinquency in adolescents is complex and can be affected by several variables (Bartels et al., 2010; Ward & Title, 1994). Such as different IQ-profiles, school performance or ethnicity. Often there is an indirect effect of these different variables (Hirschi & Hindelang; Kaal, 2014; Levine 2011; Moffit: Gabrielli, Mednick, & Schulsinger, 1981). Unfortunately, this relationship has little been investigated. As described above, several studies investigated the intelligence of delinquent adolescents. However, the existing literature has some limitations. Little thorough research has been done to find out whether other factors, such as school performance or ethnicity, are related to the intelligence of delinquent populations (Beaver et al., 2013). For example, the focus has often been on the offence the adolescent has committed. However, we should find out more about the characteristics of these adolescents (Loeber et al., 2001).

Therefore, in this study we investigate the intelligence of delinquent adolescents and take into account the factors ‘school problems’ and ‘ethnicity’. In addition, we investigate whether there are any estimators for IQ at all.

Given that school problems and ethnicity are related (Kaushal & Neponmyaschy, 2009) and that both are related to IQ (Fagan & Holland, 2002; Rowe, 2002; Ward & Tittle, 1994), in this study we test whether ethnicity and school problems are related to IQ in a delinquent population. Ethnicity has a relationship with IQ and school problems also have a relationship with IQ. And both are related to each other. Therefore it is expected that ethnicity and school problems are both related to IQ in a delinquent population: Ethnic minority groups and adolescents who show school problems will have a lower IQ than majority groups and adolescents without school problems. Second, it will be investigated whether there is still a relationship between ethnicity and IQ after controlling for school problems. Based on the provided information, it is expected that there is still a relation between these two variables. Third, it will be investigated whether ethnicity and school problems are related to different IQ profiles in a delinquent population. And if so, whether still can there be spoken of good estimators for TIQ? Is there a subtest that gives a good representation of TIQ for all these groups (yes/no school problems, Dutch/non-Dutch)? Based on the information described above, it is expected that ethnicity and school problems are related to different IQ profiles. Then, there is not a good estimator for the TIQ.

This research is important, because it may provide information for their treatment and schooling plans (Isen, 2010; Manninen et al., 2013). In this way, adolescents with vulnerable profiles may be detected more quickly and treatment and schooling programs may be adjusted.
The relationship between intelligence, ethnicity and school problems among delinquent adolescents

or developed to support them better. The results of this study may help to put an end to the cycle of hostility, violence, and misunderstanding between (cognitive impaired) delinquent adolescents and (parts of) the justice system, thereby perhaps reducing recidivism (Teeuwen, 2012).

Method

Participants

The sample consists of 94 participants, aged between 14 and 20 years, who were imprisoned between 2009 and 2014 in JJI Teylingereind and Intermetzo. Most delinquents participated in the routine mental health care procedure of the institute, starting with a short mental health screening upon entrance to the facilities. Juvenile delinquents that refused to participate or were insufficient in command of the Dutch language did not participate. The participants were divided in groups by ethnic background. To define their ethnicity it is examined whether the delinquent or the father/mother was born in another country. Among the participants there were 19 Dutch delinquents and 75 non-Dutch delinquents. To determine whether the delinquent ever had repeated a class, the adolescent had to take part on the DISC-IV (Diagnostic Interview Schedule for Children Version IV). Finally, 47 participants have ever repeated a class.

Instruments

Wechsler Intelligence Scale for Children-III-NL (WISC-III-NL). The WISC-III-NL was used for participants under 16 years. The test consists of 13 subtests, but only 12 subtests were administered (the optional subtest Mazes was not administered). The results of the test can be divided into two IQ scales: VIQ (subtests Information, Similarities, Arithmetic, Vocabulary, and Comprehension), PIQ (subtests Picture Completion, Coding, Picture Arrangement, Block Design, and Object Assembly) that add up to a Total IQ score: TIQ (VIQ and PIQ). The reliability for the WISC-III-NL is α=0.93 (Wechsler, 2005a).

Wechsler Adult Intelligence Scale-III-NL (WAIS-III-NL). The WAIS-III-NL was used for participants aged 16 years and older. The test consists of 14 subtests, but only 13 subtests were administered (the optional subtest Object Assembly was not administered). The results of the test can be divided into two IQ scales: VIQ (subtests Vocabulary, Similarities, Arithmetic, Digit Span, Information, Comprehension, and Letter-Number Sequencing), PIQ (subtests Picture Completion, Coding, Block Design, Matrix Reasoning, Picture Arrangement,
The relationship between intelligence, ethnicity and school problems among delinquent adolescents

and Symbol Search) that add up to a Total IQ: TIQ (VIQ and PIQ). The reliability for the WAIS-III-NL is $\alpha = 0.97$ (Wechsler, 2005b).

**WISC and WAIS subtests.**

*Picture Completion.* In this subtest, colored pictures of ordinary objects and situations in which an important element is missing are presented. The adolescent has to name this missing part. Visual recognition is important. In addition, there is an appeal to the visual long-term memory. The subtest measures the basic perceptual and conceptual skills. In fact, the test measures whether someone can distinguish essential and non-essential details (Wechsler, 2005a, 2005b, 2005c).

*Information.* The subtest consists of questions by which the knowledge of the adolescent about events, things, places, and people is checked. The performance in this section may provide insight into the general knowledge and the alertness of the adolescent in relation to the world and the social environment in which he resides. Previously acquired knowledge can be used. Therefore, the long-term memory is important (Wechsler, 2005a, 2005b, 2005c).

*Coding.* In this subtest, the adolescent should copy symbols that are associated with numbers. Within two minutes, as much symbols as possible must be copied. The speed and accuracy of someone in doing this serve as a measure of intelligence. The results of this test are consistent with the ability to analyze aspects and the use of the visual short-term memory. Attention and concentration are also important. Finally, the ability to work under pressure in the implementation of the process is important as well (Wechsler, 2005a, 2005b, 2005c).

*Similarities.* In this subtest, the adolescent has to explain the similarities between pairs of words describing everyday objects and concepts. The subtest measures in particular the ability of verbal conceptualization, which involves the classification of concepts and the insight of connections, even those that are not immediately obvious (Wechsler, 2005a, 2005b, 2005c).

*Picture Arrangement.* Colored pictures, presented in a random order, which the adolescent should arrange in such an order that a logical story is created. The subject not only has to recognize the images on the cards, but also has to discover the chronological order of the pictures. This subtest measures the power to understand situations in their overall context. The subtest calls for flexibility in thinking, where different options should be placed side by side. Finally, it concerns the application of general intelligence in social situations (Wechsler, 2005a, 2005b, 2005c).
The relationship between intelligence, ethnicity and school problems among delinquent adolescents

**Arithmetic.** The adolescent has to solve arithmetic tasks without pen and paper. In the WISC-III, the first four statements relate to operations with figures that rely on numerical ability. The following statements and the statements in the WAIS-III are problems the adolescent should solve by heart, and they rely on more comprehensive mathematical skills, related to academic skills. It is important that the adolescent understands the semantic structure of the problem and that he is able to turn it into the correct schedule. The attention and concentration that the adolescent can/should yield is a significant factor, because all tasks must be solved in a certain time (Wechsler, 2005a, 2005b, 2005c).

**Block Design.** The adolescent has to arrange down two-dimensional geometric patterns by using two-colored cubes. In doing so, different types of attitudes and emotional reactions from the adolescent come forward. This subtest relies on visual-motor coordination and spatial awareness (Wechsler, 2005a, 2005b, 2005c).

**Vocabulary.** In this subtest the adolescent should give the meaning of words. In the WAIS-III words are offered both visually and orally. The number of words someone knows can be considered as the ability to learn things. The responses may provide clues about the level of abstract thinking or may indicate incoherent speech (Wechsler, 2005a, 2005b, 2005c).

**Comprehension.** In this subtest the adolescent has to answer practical questions related to social situations. The answers may provide insight into the general knowledge, worldview and social relationships of the adolescent (Wechsler, 2005a, 2005b, 2005c).

**Symbol Search.** In this subtest the adolescent has to compare paired groups of symbols and has to indicate whether both groups have a common symbol. The subtest is mainly about the speed of processing the visual information, but also measures the concentration on the task, attention to detail, the focus on new stimuli, visual-motor control, reflexivity, and impulsivity (Wechsler, 2005a, 2005b, 2005c).

**Digit Span.** In this subtest the adolescent has to repeat some numbers in the right sequence, at first in the same order, then in reverse order. The subtest can provide information about intellectual functioning, concentration, and short term memory. The subtest measures the ability to remember numbers and work with them (Wechsler, 2005a, 2005b, 2005c).

**Object Assembly.** This subtest is only administered to the WISC-III. This subtest consists of five problems in which the adolescent should compose a figure of pieces of a puzzle within a time limit of 120, 150 or 180 seconds. The way the task is performed gives clues about the way of thinking and the attitude of the adolescent. This involves the way in
The relationship between intelligence, ethnicity and school problems among delinquent adolescents

which the presented problem is handled, whether or not targeted, or by means of trial-and-error is operated and whether the adolescent will respond to errors (Wechsler, 2005a).

*Matrix Reasoning.* This subtest is only administered to the WAIS-III. In this subtest, the adolescent has to complete incomplete images, presented in a matrix, by choosing the right solution from five alternatives. This subtest measures the processing of visual information and abstract thinking processes (Wechsler, 2005b, 2005c).

*Letter-Number Sequencing.* This subtest is only administered to the WAIS-III. In this subtest, the adolescent has to repeat some orally presented disordered digit and letter sequences, according in respectively ascending and alphabetical order. With this component, an estimate can be made of the memory and concentration ability of the adolescent (Wechsler, 2005b, 2005c).

*Diagnostic Interview Schedule for Children Version IV (DISC-IV).*

The DISC-IV is a structured interview to explore possible psychiatric disorders in children and adolescents. The interview includes many one-axis psychiatric diagnosis from the DSM-IV and ICD-10. The DISC-IV has a number of new features compared to previous versions, including the introduction. The DISC-IV begins with this introductory module that includes demographic data. There is also a question whether the adolescent have ever repeated a class. Most of the questions in the DISC-IV are short and relatively simple. Questions should be read exactly. The interview can be conducted by well-trained non-clinicians (Colins, Grisso, Mulder, & Vermeiren, 2015; Schaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000). For the variable school problems this study takes the measure grade retention. The DISC-IV indicate whether the participant had ever repeated a class.

*Ethnicity.* The ethnicity is divided into two groups: Dutch and non-Dutch delinquents. This decision is based, according to the Dutch standard classification of ethnic groups (Dutch Central Bureau of Statistics). The participants were assigned to the group non-Dutch when the adolescent or at least one parent was born in another country. Participants were assigned to group Dutch when both parents and the adolescent himself was born in the Netherlands (Colins et al., 2015).

**Procedures**

This study is part of a larger multi-center project "Screening & Diagnostics" which was first implemented at JJI Teylingereind and JJI LSG-Rentray in 2008 (Vahl, Colins, Markus, Doreleijers, & Vermeiren, 2010) as part of routine mental health care. The project "Screening & Diagnostics" is currently part of the Academic Workshop Forensic Care Youth
The relationship between intelligence, ethnicity and school problems among delinquent adolescents

(AWFZJ). This is a cooperation between two Dutch research institutes, two educational institutions for applied sciences, two mental health institutions, and two JJI’s. The aim of the screening and diagnostics project is to develop a method for detecting psychiatric problems experienced by juvenile delinquents at an early stage of detention. Data gathered for this project between 2009 and 2014 were used for this study.

In the weeks following mental health screening, the adolescent received an intelligence test as part of the routine mental health procedure. Reasons not to take part in this procedure were: insufficient understanding of the Dutch language, a contraindication by the adolescent’s psychologist (for example when a delinquent was too confused at the time the test was planned), departure from the JJI before all instruments could be administered, refusal by the participant, or in case the participant had already taken part in an intelligence test in the past two years (for example at their school or another institute). Court-ordered psychological reports and evaluation reports of the Dutch Institute for Forensic Psychology (NIFP) were checked to see whether an intelligence test was conducted in the preceding two years. If this was the case, the intelligence test was not administered. The mental health screening and intelligence test was conducted in a separate room by a trained research assistant or a master student of psychology.

**Statistical analysis**

The analysis was executed using IBM SPSS Statistics 19.0 for Windows. To see whether ethnicity and school problems are related to IQ differences, ANOVA was executed. In this analysis the TIQ score was a dependent variable and were measured on a ratio scale. The ethnicity and grade retention were independent variables and were measured on a nominal scale. A post-hoc test was executed to investigate the interaction effect. Also ANOVA (with covariate) was performed to see whether there is still a relationship between ethnicity and IQ if school problems is taken as a covariate, assuming that ethnicity is related to IQ. In this analysis the TIQ score was a dependent variable and were measured on a ratio scale. The ethnicity and grade retention were independent variables and were measured on a nominal scale. To see whether ethnicity and school problems are related to different IQ profiles, MANOVA was executed. In this analysis the TIQ score was a dependent variable and were measured on a ratio scale. The ethnicity and grade retention were independent variables and were measured on a nominal scale. A correlation is also executed to confirm the MANOVA and to see whether there may be a estimator for TIQ.
The relationship between intelligence, ethnicity and school problems among delinquent adolescents

**Results**

The characteristics of the 94 participants are shown in table 2 and 3.

### Table 2

**Demographics grade retention**

<table>
<thead>
<tr>
<th>Participant N = 87</th>
<th>Grade retention</th>
<th>Grade retention</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>Grade retention</td>
<td>Grade retention</td>
<td>Total</td>
</tr>
<tr>
<td>n (%)</td>
<td>47 (54)</td>
<td>40 (46)</td>
<td>87 (100)</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>17.04 (.99)</td>
<td>16.85 (.66)</td>
<td>16.95 (.86)</td>
</tr>
<tr>
<td>Range</td>
<td>14-20</td>
<td>16-18</td>
<td>14-20</td>
</tr>
<tr>
<td>IQ</td>
<td>n (%)</td>
<td>45 (52.9)</td>
<td>40 (47.1)</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>84.73 (9.05)</td>
<td>88.60 (7.85)</td>
<td>86.55 (8.68)</td>
</tr>
<tr>
<td>Range</td>
<td>63-108</td>
<td>75-101</td>
<td>63-108</td>
</tr>
</tbody>
</table>

### Table 3

**Demographics ethnicity**

<table>
<thead>
<tr>
<th>Participant N = 94</th>
<th>Dutch</th>
<th>Non-Dutch</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>Grade retention</td>
<td>Grade retention</td>
<td>Total</td>
</tr>
<tr>
<td>n (%)</td>
<td>19 (20.2)</td>
<td>75 (79.8)</td>
<td>94 (100)</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>17.11 (.66)</td>
<td>16.92 (.87)</td>
<td>16.96 (.83)</td>
</tr>
<tr>
<td>Range</td>
<td>16-19</td>
<td>14-20</td>
<td>14-20</td>
</tr>
<tr>
<td>IQ</td>
<td>n (%)</td>
<td>19 (20.7)</td>
<td>73 (79.3)</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>89 (10.92)</td>
<td>86.63 (8.78)</td>
<td>87.12 (9.25)</td>
</tr>
<tr>
<td>Range</td>
<td>75-113</td>
<td>63-103</td>
<td>63-113</td>
</tr>
</tbody>
</table>

**Relation ethnicity and grade retention to IQ in a delinquent population**

In this study we expected that ethnicity and grade retention are both related to IQ in a delinquent population. We expected that the Non-Dutch adolescents and the adolescents who have repeated a class will have a lower IQ than the Dutch adolescents and adolescents who have repeated a class. An ANOVA is executed to investigate this. Total IQ is used as the dependent variable. The independent variables were ethnicity and grade retention. The ANOVA showed that the main effect of grade retention was not significant \( F(1,81) = .043, p > .836 \) and neither was the main effect of ethnicity \( F(1,81) = .007, p > .935 \).

However, there was a significant interaction effect \( F(1,81) = 5.426, p < .022 \). The interaction plot is shown in diagram 1. The averages of the group are shown in table 4. When
The relationship between intelligence, ethnicity and school problems among delinquent adolescents

looking at the interaction plot and the table with the group averages, we can see that the effect of grade retention on intelligence is stronger among non-Dutch delinquent adolescents than Dutch delinquent adolescents. The direction of the effect reveals that Dutch delinquent adolescents who never repeated a class score lower on an intelligence test than non-Dutch delinquents who never repeated a class. The effect of grade retention on intelligence is stronger among non-Dutch delinquent adolescents than non-Dutch delinquent adolescents. Dutch delinquent adolescents who have ever repeated a class score higher on an intelligence test than non-Dutch adolescents who have repeated a class.

*Diagram 1 Interaction effect between grade retention and ethnicity among delinquent adolescents*

![Diagram 1](image)

*Table 4 Group averages of intelligence among delinquent adolescents with grade retention and different ethnicity*

<table>
<thead>
<tr>
<th>Grade retention</th>
<th>Ethnicity</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Dutch</td>
<td>84.29</td>
<td>6.34</td>
</tr>
<tr>
<td></td>
<td>Non-Dutch</td>
<td>89.52</td>
<td>7.91</td>
</tr>
<tr>
<td>Yes</td>
<td>Dutch</td>
<td>89.22</td>
<td>9.91</td>
</tr>
<tr>
<td></td>
<td>Non-Dutch</td>
<td>83.61</td>
<td>8.61</td>
</tr>
</tbody>
</table>
The relationship between intelligence, ethnicity and school problems among delinquent adolescents

A post-hoc test was conducted to see whether there are differences in intelligence at the interaction effect between ethnicity and grade retention. This post-hoc test for the interaction effect showed that there is only a significant difference effect of grade retention on IQ for non-Dutch adolescents. There is only an IQ difference between non-Dutch adolescents who repeated a class and non-Dutch adolescents who never repeated a class. Non Dutch adolescents have a lower IQ when they have ever repeated a class than when they have not repeated a class, $M_{\text{difference}} = 5.90, p < .004$. There is no difference is IQ in grade retention for Dutch adolescents, but there is for non-Dutch adolescents. Non-Dutch adolescents with a lower IQ have more grade retention than non-Dutch adolescents with a higher IQ.

Relation between ethnicity and IQ when “school problems” is included

Next is investigated whether there is still a relationship between ethnicity and IQ if grade retention were included in the analysis. Based on the provided information in the introduction, it is expected that there is still a relation between these two variables. An ANCOVA was executed to investigate this. TIQ was used as the dependent variable. The independent variable is ethnicity. Grade retention was used as the covariate. It has already been revealed that there is no significant effect between IQ and ethnicity. The ANCOVA also revealed that there was no significance between IQ and ethnicity when school problems were included ($F(1,82) = .110, p > .741$).

Relation ethnicity and grade retention to different IQ profiles

Subsequently is investigated whether ethnicity and school problems are related to different IQ profiles in a delinquent population. If so, can there still be spoken of good estimators for TIQ? Is there a subtest that for all these groups (yes/no grade retention, Dutch/non-Dutch) gives a good representation of TIQ? Based on the information described above, it is expected that ethnicity and grade retention are related to different IQ. It is also expected that there are no good estimators for TIQ. A MANOVA is executed to investigate this. The different subtests (Picture Completion, Information, Coding, Similarities, Picture Arrangement, Arithmetic, Block Design, Vocabulary, Comprehension, Symbol Search, Digit Span, Object Assembly, Matrix Reasoning, Letter-Number Sequencing) are used as the dependent variables. The independent variables were ethnicity and grade retention. The MANOVA showed that there is only a significant result for grade retention (Wilks Lambda = .712, $F(13,67) = 2.086, p = .026$). Therefore, grade retention have an effect on the various...
The relationship between intelligence, ethnicity and school problems among delinquent adolescents

subtests. Ethnicity and the interaction-effect do not have that effect. There is no significant difference found for ethnicity (Wilks Lambda = .768, $F(13, 67) = 1.554, p = .121$). Also for the interaction-effect between ethnicity and grade retention, no significance is found (Wilks Lambda = .766, $F(13, 67) = 1.576, p = .115$).

Therefore, we investigate the univariate effect of grade retention on the different subtests. Only the F-tests for Digit Span ($F(1, 83) = 5.530, p = .021$), Comprehension ($F(1, 83) = 4.899, p = .030$) and Coding ($F(1, 83) = 4.396, p = .039$) are significant. Group averages are shown in table 5. Delinquent adolescents who never repeated a class score higher on the Digit Span subtest, than adolescents who have repeated a class. The reverse is true on the subtest Comprehension. Adolescents who never repeated a class score lower on this subtest than adolescents who have ever repeated a class. Adolescents who never repeated a class score higher on the subtest Coding, than adolescents who ever repeated a class. An IQ profile occurs of grade retention and Digit Span, Comprehension and Coding. Therefore, we expected that a good estimator for TIQ is not available. To investigate this, we examine the correlation between TIQ and the subtests. The correlations are displayed in table 6. In this study a strong correlation is been marked off .8 (De Vocht, 2009). The table shows no strong correlations between the subtests and TIQ. Therefore, we can say that no subtest gives a good representation of TIQ. There seems to be no good estimator.

Table 5 Group averages of subtests among delinquent adolescents with grade retention and different ethnicity

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Grade retention</th>
<th>Mean</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digit Span</td>
<td>No</td>
<td>9.022</td>
<td>.422</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>7.625</td>
<td>.418</td>
</tr>
<tr>
<td>Comprehension</td>
<td>No</td>
<td>6.989</td>
<td>.505</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>8.563</td>
<td>.501</td>
</tr>
<tr>
<td>Coding</td>
<td>No</td>
<td>8.606</td>
<td>.566</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>6.933</td>
<td>.562</td>
</tr>
</tbody>
</table>
The relationship between intelligence, ethnicity and school problems among delinquent adolescents

Table 6
Correlations between Total IQ and the subtests

<table>
<thead>
<tr>
<th>Subtest</th>
<th>TIQ</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vocabulary</td>
<td>.747</td>
<td>.00</td>
</tr>
<tr>
<td>Similarities</td>
<td>.784</td>
<td>.00</td>
</tr>
<tr>
<td>Arithmetic</td>
<td>.698</td>
<td>.00</td>
</tr>
<tr>
<td>Digit Span</td>
<td>.369</td>
<td>.00</td>
</tr>
<tr>
<td>Information</td>
<td>.730</td>
<td>.00</td>
</tr>
<tr>
<td>Comprehension</td>
<td>.708</td>
<td>.00</td>
</tr>
<tr>
<td>Letter-Number Sequencing</td>
<td>.495</td>
<td>.00</td>
</tr>
<tr>
<td>Picture Completion</td>
<td>.663</td>
<td>.00</td>
</tr>
<tr>
<td>Coding</td>
<td>.403</td>
<td>.00</td>
</tr>
<tr>
<td>Block Patterns</td>
<td>.622</td>
<td>.00</td>
</tr>
<tr>
<td>Matrix Reasoning</td>
<td>.516</td>
<td>.00</td>
</tr>
<tr>
<td>Picture Arrangement</td>
<td>.667</td>
<td>.00</td>
</tr>
<tr>
<td>Symbol Search</td>
<td>.429</td>
<td>.00</td>
</tr>
</tbody>
</table>

Since there were still reasonable correlations, there may be multicollinearity. Therefore, the subtests with the highest correlations (Vocabulary, Similarities, Comprehension, Information) were extracted from the analysis. The correlations were found to remain the same. Also, when the subtests have been removed one by one from the analysis. As a result, there is no multicollinearity.

Discussion

Many studies have examined the intelligence of delinquent populations. Generally, delinquent adolescents score lower than average on an intelligence test (Beaver et al., 2013; Isen, 2010; McGloin & Pratt, 2003). However, few studies examined intelligence of delinquent adolescents while accounting for school performance and ethnicity (Beaver et al., 2013). The present study was designed to fill this void.

First, it was hypothesized that ethnicity and grade retention both are related to IQ in a delinquent population. It was expected that ethnic minority groups score lower on an intelligence test than majority groups. It was also expected that adolescents who have ever repeated a class were hypothesized to have a lower IQ than adolescents who never repeated a class. When both factors are considered individually in relation to the IQ, then there is no relationship. There is no relationship between ethnicity and IQ and between grade retention and IQ. The hypothesis is rejected. Non-Dutch adolescents do not have a lower IQ than Dutch adolescents. Also adolescents who ever repeated a class do not have a lower IQ than adolescents who never repeated a class. But it is found that non-Dutch adolescents who have ever repeated a class have a lower IQ than Dutch adolescents who have ever repeated a class.
The relationship between intelligence, ethnicity and school problems among delinquent adolescents

This difference in IQ between Dutch and non-Dutch adolescents was not present in adolescents without grade retention. The average IQ of these adolescents is below average (i.e. mean IQ = 83). Non-Dutch adolescents who have repeated a class have a lower IQ than Dutch adolescents who have never repeated a class. There is no difference is IQ in grade retention for Dutch adolescents, but there is for non-Dutch adolescents. Non-Dutch adolescents with a lower IQ have more grade retention than non-Dutch adolescents with a higher IQ. It should be taken into account in a treatment that non-Dutch adolescents who have ever repeated a class have more difficulty understanding matters. An explanation for this could be that non-Dutch adolescents are not completely good in the Dutch language. When this adolescent still has had difficulty in school, he has a great chance of a low IQ. However, previous research produced different outcomes. The study by Lynam et al. (1993) found the same as in this study: no difference in intelligence between Black and White people within a delinquent population. That study involved self-reported delinquency among boys from 12-13 years. Other studies did find a relation between intelligence and ethnicity in a delinquent population (Levine, 2011; Moffitt et al., 1981). In the study by Levine (2011) and Moffitt et al. (1981) not only ethnicity is examined, but also the factor SES is included. Ethnicity and SES are often related to each other, which makes the research more in-depth. This is a large difference with this study, so it is understandable that different results have emerged. Another difference in the study by Levine (2011) is that the research focuses on adults and not on adolescents. In a study by Fagan & Holland (2002) Black people score about 15 points lower on an intelligence test than White people. The big difference with our study is that their research has another target group and is not focused on delinquents. Therefore, this study is most similar to the study by Lynam et al. (1993), in terms of participants, but also in terms of results: no difference is found between ethnicity groups in intelligence.

Second, it was hypothesized that there is still a relationship between ethnicity and IQ if grade retention is included in the analysis. It was expected that ethnic minority groups and adolescents who have repeated a class would have a lower IQ than ethnic majority groups and adolescents who never repeated a class. In the first research question there is no relation found between IQ and ethnicity. There is no difference in IQ at different ethnicities among delinquent adolescents. The Dutch and non-Dutch delinquents score approximately the same on an intelligence test. In an ANCOVA, when grade retention is taken as a covariate, is found that there is still no relationship between IQ and ethnicity.
The relationship between intelligence, ethnicity and school problems among delinquent adolescents

Third, it was hypothesized that ethnicity and grade retention are related to different IQ profiles in a delinquent population. In addition, subtests were examined whether there is a good estimator for the Total IQ. When looking at the results, there is no difference found in subtests at the different ethnicities. The Dutch and non-Dutch adolescents score the same on the different subtests. However, grade retention is related to the subtests Digit Span, Comprehension and Coding. Delinquent adolescents who never repeated a class score higher on the Digit Span subtest, than adolescents who have repeated a class. The reverse is true on the subtest Comprehension: Adolescents who never repeated a class score lower on this subtest than adolescents who have ever repeated a class. Adolescents who never repeated a class score higher on the subtest Coding, than adolescents who have repeated a class. There is no interaction effect between ethnicity and grade retention on subtests scores. The hypothesis could only be confirmed for the relation between grade retention and the subtests Digit Span, Comprehension and Coding. An adolescent who repeated a class have the subtest Comprehension as a strength and the subtests Digit Span and Coding as a weak point. The reverse is true for those who never repeated a class: The strengths of them are the subtests Digit Span and Coding, the weaknesses is the subtest Comprehension. The different ethnicities score about the same on the different subtests.

Studies have shown that there are profiles within the subtests of an intelligence test, in which there may be discrepancies and internal inconsistencies (Isen, 2010). A good indication about the Total IQ can not be made by the major differences between the subtests. Therefore, when different IQ profiles are related to ethnicity and grade retention, there is no good estimator for the Total IQ. Because there is found strengths and weaknesses, an erratic profile exists. Therefore, a good estimator for the Total IQ is not available. The differences between the groups of grade retention is too large. When looking at the correlations, no strong correlations between the subtests and the Total IQ have been found. Although there are some reasonable correlations, such as Vocabulary and Total IQ (r = .75), there are no high correlations (r = .8). In this study a strong correlation has been marked off .8 (De Vocht, 2009). The hypothesis for the estimator can be confirmed. There is no subtest which gives a good representation of the Total IQ for all these groups (yes/no grade retention, Dutch/non-Dutch). But the study of Legerstee et al. (2004) does find estimators, such as Vocabulary and Block Design. Although there are reasonable correlations found in this study, in the subtests between Vocabulary and Total IQ and Block Design and Total IQ, they are not really high correlations, so they are not a good indication for the Total IQ. Legerstee et al. (2004) also found the same
The relationship between intelligence, ethnicity and school problems among delinquent adolescents

correlation between Total IQ and Vocabulary as in this study, but believe that it is a good estimator. We consider an estimator a good one when there is a really high correlation of .8 between the subtest and the Total IQ, based on the SPSS manual (De Vocht, 2009). The correlation between the Total IQ and Block Design is somewhat higher in the study of Legerstee et al. (2004) than in this study, but it is not a great difference. Other studies which did use an estimator for the Total IQ will not be completely reliable. In the delinquent population it is recommendable not to use an estimator, but to use the whole test.

In conclusion, ethnic minority groups do not have a lower IQ than majority groups on an intelligence test. Also, adolescents who have repeated a class do not have a lower IQ than adolescents who never repeated a class. However, there is an effect of ethnicity on IQ in adolescents who have repeated a class. In addition, there is no effect of ethnicity on IQ in adolescents who never repeated a class. Particularly, non-Dutch delinquent adolescents who have repeated a class score lowest on an intelligence test. If we consider specific IQ profiles, the subtests Digit Span, Comprehension and Coding are only related to grade retention. Adolescents who ever repeated a class score different on these subtests than adolescents who never repeated a class. The present study shows that there is no good estimator of all the subtests which gives a good representation of the Total IQ.

**Limitations**

This study has some limitations. Ethnicity is a difficult topic to discuss. In this study it was decided to divide the ethnicity into two groups: Dutch and non-Dutch delinquents. Among the non-Dutch delinquents are different nationalities. However, these nationalities are merged together into one group. A study of Boone, Victor, Wen, Razani, & Ponton (2007) shows that different nationalities also have different scores on cognitive tests. By putting the different nationalities in one group, the difference in intelligence between these different groups can not be demonstrated. Therefore, the intelligence of different nationalities is unknown.

Ethnicity can not really be taken as a single factor. Ethnicity occurs often in combination with other factors, such as SES. When SES are taken into account, the results would be more reliable. Unfortunately, that was not possible in this study.

Besides the factor ethnicity, the factor school problems also does have some limitations. In this study, we take the factor grade retention as a measure for school problems. But is this a good measure? School problems include more than just grade retention, such as
The relationship between intelligence, ethnicity and school problems among delinquent adolescents

truancy, suspensions and poor school performance (De Jonge & Van der Linden, 2007; Katsiyannis, Thompson, Barrett, & Kingree, 2013; Savolainen et al., 2012.). Not everyone who ever has had grade retention, does have also other problems at school. Further research may use different levels of school problems because it provides a more complete picture. In this study it is not taken into account in which class the adolescent has repeated. There is quite a difference between someone who repeated a class in kindergarten and someone who did that in high school.

Some subtests of the intelligence tests are related to school performance. For example, the verbal scale is related to education results (Isen, 2010). Therefore, the delinquent adolescents may have lower scores on the verbal subtests, because these delinquent adolescents often have problems at school (De Jonge & Van der Linden, 2007; Katsiyannis, Thompson, Barrett, & Kingree, 2013; Savolainen et al., 2012). This is not entirely consistent with the findings in this study. Digit Span, Comprehension and Coding are related to school problems. Digit Span and Comprehension are verbal subtests. However, the delinquent adolescents with school problems only score low on the subtest Digit Span.

Research has shown that delinquents score lower on an intelligence test, because they show oppositional behavior and often do not want to take the test (Lynam et al., 1993). The low IQ is not a result of the low capacities of the juvenile delinquents, but rather of other factors. Therefore, the question is whether delinquent adolescents do have a low IQ at all. In this study, it seems to coincide with oppositional behavior at the delinquents. There are some delinquents who do not want to take the test and therefore it must be taken into account that the IQ of these adolescents can be lower.

In JJI Teylingereind only boys are detained. Girls are imprisoned elsewhere. Therefore, the results tell us nothing about female delinquents. These results could be quite different. Concerning the differences in intelligence between delinquent boys and girls no statements can be made.

Suggestions for further research

If we consider the limitations of the study, further research is needed. In future research, it is particularly important that the factors ethnicity and school performance be taken more in-depth. In this study ethnicity is divided into two groups: Dutch and non-Dutch delinquents. In further research, it is important that ethnicity is divided into several groups, so that it is known how Turks, Moroccans, Antilleans etc. score on an intelligence test. At this
The relationship between intelligence, ethnicity and school problems among delinquent adolescents
/moment, there is no clear picture of these groups and they are taken together. In addition, the SES must also be taken into account. Ethnicity can actually not taken individually as a factor, because it has always a relationship with the SES. Also, the factor school performance must be taken more in-depth. Grade retention seems to be a somewhat meager size to measure the school performance. In further research truancy, suspensions and low performance could be considered. The real school problems are then showed and a better dividing is made from delinquents with or without school problems.

In this study research is done only with male delinquents. Many other research is focused on male delinquents as well. It would be interesting to see whether ethnicity and school problems are related to IQ in a female delinquent population. Earlier studies show different results when it comes to IQ differences between boys and girls. Some studies indicate that there is no difference (Halpern, 2012; Sternberg, 2014). Other studies show results which have show IQ difference (Ellis et al, 2008; Liu & Lynn, 2015; Lynn, 1994). Therefore, it is interesting to examine this IQ difference with delinquents.

Further research should also be done with the WAIS-IV. This study uses the WAIS-III, which is an older intelligence test. The WAIS-IV is more recent. The theoretical basis has been renewed and expanded. Also, the factor and index structure is changed and there is an improved measurement of 'fluid' reasoning, working memory and processing speed. In addition, the clinical usefulness of the instrument is augmented by, for example, facilitating the "language-level" of the instructions and the removal of the subtest 'Picture Arrangement'. Finally the psychometric properties are improved; there are new standards, enhanced Total IQ ranges, reduced floor and ceiling effects and improved factor scores (http://www.pearsonclinical.nl/wais-iv-nl-wechsler-adult-intelligence-scale, n.d). Through these innovations the WAIS-IV is better applied to the target group.
References


The relationship between intelligence, ethnicity and school problems among delinquent adolescents


The relationship between intelligence, ethnicity and school problems among delinquent adolescents


The relationship between intelligence, ethnicity and school problems among delinquent adolescents


26
The relationship between intelligence, ethnicity and school problems among delinquent adolescents
