The Influence of Socioeconomic Status and quality of education on School Children's Academic Performance in South Africa

Natasha Maswikiti
Department of Psychology
University of Cape Town

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Co-Supervisor: Helen Ferrett
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ABSTRACT

Previous international research suggests there is a relationship between socioeconomic status (SES) and children's IQ scores and academic achievement. The aim of this study was to determine whether, in a sample of South African children, quality of education as well as SES affected IQ scores and academic performance. Participants were 79 children between the ages of 12 and 15 years from various Cape Town schools. The sample included children from both high and low SES families, and with varying qualities of education. The most meaningful measure of SES for us was the average income for the area in which the child lives or is educated (as articulated in the latest Census). Quality of education was estimated based on, whether the school was previously disadvantaged or previously advantaged. The child's general intellectual functioning was measured using the Wechsler Abbreviated Scale of Intelligence (WASI). The child's academic achievement was measured using the two most recent school reports. As predicted, results showed that children from high SES families and with a high quality of education scored better on the WASI than did children from low SES families and with a low quality of education. The data also revealed an interesting interaction between SES and quality of education: Participants from low SES families but with a high quality of education scored significantly better on WASI performance IQ measures than did participants from low SES families and with a low quality of education. These findings suggest that children from low SES families in South Africa might be at a grave disadvantage in terms of their ability to succeed academically, but that quality of education might be a more important factor than SES in determining levels of general intellectual functioning.

Keywords: children; academic achievement; intelligence testing; socioeconomic status; quality of education; South Africa

RATIONALE FOR RESEARCH

A large body of research has shown that, alongside such variables as culture, ethnicity, and general cognitive ability (or *g*), quality of education and socioeconomic status (SES) has a significant effect on children's IQ scores, academic performance and, ultimately, school success (Richardson, 2002). The relationship between SES and cognitive ability in children appears to be a global, cross-cultural phenomenon: Research in Australia, America and also in African countries like Nigeria and Uganda have confirmed that SES has an impact on IQ and academic achievement (Overton & Chapell, 2002; Considine & Zappala, 2002; Heyneman, 1976). Although the effects of quality of education on IQ and academic achievement have not been explored as thoroughly, it seems reasonable to suggest that, because of the sociopolitical history of South Africa and the fact that there is still wide economic disparity and educational inequalities in this country, children of low SES and/or with low qualities of education will be at risk of performing more poorly than their high SES/high quality of education counterparts on measures of general intellectual functioning and academic performance.

The current study therefore focused on the influence of a child's SES and quality of education on their general intellectual functioning (as measured by a standardized IQ test) and on their academic achievement (as measured by school reports). Two crucial issues to address before one can delve into such an investigation, however, are controversies around the definitions of SES and quality of education. An understanding of what these terms mean, and how they can be measured, gives a clearer perspective on previous studies that have examined their influence on a school children's academic and intellectual functioning.

LITERATURE REVIEW

SES: Indicators

There are numerous definitions of SES and there are a number of indicators that are pieced together, such as financial and social resources. SES constitutes assessment of capital such as financial capital, human capital (resources like education), and social capital (resources attained through social connection), which all have to do with peoples well-being (Bradley & Corwyn, 2002). The American Psychological Association (APA) Dictionary of Psychology (2007, p.871) definition of SES includes all the types of capital stating that:

> Socioeconomic status is the position of an individual or group on the socioeconomic scale, which is informed by a combination or interaction of social and economic

> factors, such as income, amount and type of education, kind of prestige and occupation, place of residence and in some society's even ethnic origin and religious background.

This definition is valuable as it applies to the South African context, in that these factors are what separate high SES groups from low SES groups. Magnuson and Duncan (2006) point out that a number of researchers tend to adopt different definitions of SES and because of this there are often some discrepancies in their measures and results.

Some researchers use SES and social class interchangeably while some see it as two different terms. If one looks at the definition of social class you will notice that it tends to contain similar characteristics as SES. Social Class for example is defined as, "a major group or division of society that shares a common level of status, income, power, and prestige" (APA, 2007, p.862). Scholars often use social class or social stratification as a measure of SES (Magnuson & Duncan, 2006), and a number of studies on children's academic performance have often used social class in the place of SES. When one looks at these definitions of SES and social class they will see how similar they are, so for the purpose of this paper social class will be considered in the definition of SES.

Social scientists' commonly use either parent's income, occupation or education; while others adopt all three in the measure for SES (Magnuson, & Duncan, 2006). A study done in South Africa on the influence of SES on educational achievement for example used indicators like whether the house had a television or radio, type of dwelling, the father's educational level, number of people sharing a bedroom, cooking mode used, and the household income (Themane et al., 2006). The justification for using these indicators was that they formed the home environment that was conducive to a child's learning.

SES: Relationship to IQ and Academic Achievement

Although a large body of literature has established that 'g', or general cognitive ability, is the single biggest source of variance in intelligence (Richardson, 2002), a similarly large body of literature has investigated the impact of family background on academic performance and on tests of general intelligence functioning. Rather than accepting a purely genetic explanation for variance in intellectual functioning, researchers contributing to this latter body of literature suggest a socio-cognitive understanding of this variance.

Richardson (2002) argued that IQ variance is not just explained by cognitive variance, but rather by socio-cognitive affective factors which inform an individual's preparedness for

IQ testing and their scores. The sociocognitive affective factors include how different groups or cultures and social classes acquire forms of knowledge. This includes the general ways in which these families motivate and interact with each other. The argument here is that in our homes we are taught certain reasoning skills (categorisation skills); ways on how to tackle problems or obstacle in our lives; skills on how to answer questions appropriately, and psycholinguistic skills, and that what middle class children are taught matches what IQ measurements measure (Richardson, 2002).

With regard to SES, what this means is that higher SES families socialise their children in a way that betters their performance in IQ measurements which also informs the way they perform academically. SES thus shows a strong association to children's cognitive abilities and achievements determined by IQ scores and academic achievements. Research has shown how SES influences IQ and academic performance, and the literature presented below will show us the SES mediators and moderators that effect children's IQ and academic performance.

A number of studies show the association of SES with school children's cognitive ability and academic achievement (Bradley & Corwyn, 2002; Anderson, Case and Lam, 2001). These studies have gone as far as asking what part or parts of SES actually have an influence. Social scientists often argue that there are specific indicators of SES that have more of an effect on children's cognitive development, which in effect informs their academic and IQ performance. It has also been argued that the strongest indicators are the parent's level of education, followed by their income and then their occupation; they however make a stronger effect when they are all used in a measure (Bradley & Corwyn, 2002).

The parent's education is important as a factor for SES because there is a correlation between high parental education and higher school attainment for the child (Anderson, Case and Lam, 2001). Anderson, Case and Lam (2001) argued that this correlation could be due to educated parents being better able to assist their children with their school work, or it could be due to educated parents being able to afford putting their children in better schools, with a high quality of education. It is assumed that parents with a higher education have a high paying job, which allows them to be able to send their children to better schools, with a high quality of education. This also correlates with the parents income, which as it was stated above is one of the SES indicators used in this type of research. Parent's income is noted as having a significant effect on a child's cognitive development in relation to the family being able to afford not just good education or effective pre-primary schools that allow for

beneficial cognitive development, but also nutrients which allow for full development. We can then conclude that parent's level of education and income has a strong association to how children will perform at school and on IQ measures; which shows the effects of SES.

Herbst and Huysamen (2000) identified that early school and play activities at home are found to be very vital for a child's development and academic performance. Pre-school activities and play materials for children differ for those more advantaged, which in turn has been found to assist them to perform better and more effectively in school than disadvantaged children; as their cognitive and motor skills are more developed (Herbst & Huysamen, 2000). These include motor skills like knowing how to write, colouring in, and cutting out shapes. Barnett's (1998) study showed that persistent early childhood educational programmes, before a child turns five is good for their cognitive development, which has been shown to have long lasting positive effects on IQ scores and school success as a whole. This shows that socioeconomic status can affect a child's school performance, as parents from Low SES groups often do not have the resources to ensure that their child obtains this type of early childhood education for their cognitive development.

SES also has more of an indirect effect on children's IQ scores and academic performance. SES has an influence on other areas of a child's life which then influences their performance at school (Bradley & Corwyn, 2002). This can include stressful life events, such as lack of food unsafe neighbourhoods, poor health, or even depression due to life circumstances. Themane, et al. (2006) study also identified a positive association between type of dwelling children lived in and the cooking mode (having to collect wood to cook) used on the child's educational achievement. Magnuson and Duncan (2006) for example argued that the association between SES status and achievement may also stem from poor health and developmental problems of the child, which could reduce a child's academic achievement. Low SES children's environment and neighbourhood have shown to also have some effect on children's performance (Magnuson & Duncan, 2006). There are clearly a few indirect SES indicators that seem to have an effect on a child's performance, as they are not conducive to learning and academic progression.

Suzuki and Valencia (1997) indicated that another indirect SES effect which is a stronger indicator of children's performance is the way in which parents raise their children; like the ways they motivate and push them (Richard, 2002). Mackintosh's showed that parental attitude to education and achievement is more of a predictor of children's IQ scores than SES (as cited by Richard, 2002). The question to ask then is what informs parent's

attitudes to education and achievement? The answer to this question is that parents from a high socioeconomic background are more involved in their children's cognitive development and experience, as they read and converse with them more and provide more teaching and cultural experiences, where as parents from low SES often suffer from mental health (depression and stress) which can in turn negatively impact how they interact with their children (Bradley & Corwyn, 2002). Teacher's attitudes are also a factor, in that their expectations of low SES children tends not to be as positive and reinforcing as that given to high SES children, which influences a child's performance (Richardson, 2002). These studies have indicated that SES does not just have a direct influence on a child's academic performance, but also an indirect one.

The literature clearly shows that SES has both a direct and indirect effect on children's IQ and academic performance. The direct influence is through opportunities of early cognitive development and stimulation; such as a broader cultural learning experiences and quality of education. The more indirect effect would be the child's home environment, and also the various attitudes teachers have; such as not encouraging children from different SES groups in the same way due to pre-existing attitudes about low SES children. Studies showed that SES does tend to inform the way parents interact with their children, the way children interact with their environment whether at home or in the neighbourhood, the quality of education they obtain; which in turn influences their performance on general intelligence tests and academic performance. This is an important study to conduct in South Africa for the simple fact that majority of its people belong to low SES groups, which means that majority of the children in South Africa are at risk of not being as academically successful as their high SES counterparts.

Quality of Education: Indicators

The purpose of this section of my discussion is to highlight the indicators that have been adopted in the measure of quality of education. This is very important because South Africa has a very sensitive history in relation to the education system, and how quality of education is measured still today. Previously disadvantaged schools in South African are not up to the same standard one would find in private schools/ previously advantaged schools. The school quality has been found to be the bases for the inequalities in South Africa (Anderson, Case, & Lam, 2001). This is a clear indication that quality of education needs to be further assessed as a mediator on children's performance in IQ measures and school achievements. Several

research studies have used various indicators for quality of education such as school fees, average financial allotment per student and schools resources, average attendance, pupil-teacher ratio, teacher's competence and quality of teaching style, level of implementation of the curriculum being taught in the schools and schools annual pass rate or percentage of students meeting the State's requirements. There are clearly many indicators that have been adopted in measuring quality of education on academic achievement which has not affected the assumption that there is clearly a correlation

Anderson, Case and Lam (2001) argue that in South Africa school quality has an effect on both grade attainment, and also an important indicator of the racial gap in schooling. A strong correlation between school fees and quality of education has been found in South Africa, where children who are a year behind in school (school advancement) are found to pay fewer fees. This index is valuable because in South African schools for instance there is a definite disproportion in what a child attending a school with a high quality of education would be paying to a child in a low quality of education pays. How much fees are paid to a school and a school's funding has a direct influence on how many resources a school has for their student's education, hence its importance as a measure. Research has also explored school funding, and the schools available resources for the students (pupil-teacher ratio, books, and desks).

Case and Deaton's empirical analysis of quality of schools (as cited by Anderson, Case, & Lam, 2001) used pupil-teacher ratio and they found it to have a strong effect on enrolment, educational achievement and on test scores for numeracy. Noble, McCandliss, and Farah (2007) along with other measures such as average attendance, percentage of students meeting the State's requirements, also used average financial allotment per student as an index and they found that these variables account for variance in different cognitive systems which effect children's academic performance.

Children's actual academic achievements are also a very popular indicator of what quality of education a school produces. A study done in the Cape Peninsula showed that what was affecting the children's performance in mathematical achievement was the teacher's competence and quality in teaching style, and also the quality and level of implementation of the curriculum being taught in the schools (Reeves, 2003). It has been noticed that different schools often teach different curriculums which has an effect on the children's performance and academic achievement. Manly et al. (as cited by Shuttleworth-Edwards et al., 2004) conducted a study in America where they used reading scores as an estimate of quality of

education. Van der Berg, Wood, and Le Roux's (2002) South African study measured quality of education with the student's numeracy and literacy test scores. Another common factor often used to measure the quality of performance of a school is the schools annual pass rate and all this basically measures the kind of product a school produces.

In South Africa a vital thing to look into when assessing school quality is the actual history of the school. Shuttleworth-Edwards et al. (2004) research on the influences on the WAIS-III test scores, investigated the effect of quality of education, and how they measured the quality of education was by categorising schools into Private/ Modal C (indicating a high quality school) and schools formally run by the Department of Education and training/ Public schools (indicating a low quality school). This system has changed but one will still find that previous Public schools still do not produce the quality of education that Private schools do. Quality of education is therefore a problem today and it is important to establish what it is about the quality of education which negatively effects children's academic performance.

Quality of Education: Relationship to IQ and Academic Achievement

Van der Berg, Wood, and Le Roux's (2002) study in South Africa focused on the association between socioeconomic stratification and educational differentiation (quality of education). They found that black children from high SES groups performed better than their less fortunate counter parts. The arguments that have been addressed are that these results could be due to a better quality of education in more metropolitan and urban areas, which supersede that of rural areas, or also the separate effect of ones SES background on the ability to benefit from education. Van der Berg, Wood, and Le Roux (2002) also conclude by suggesting that by improving the quality of education in historically black schools, it will prevent differentiation in SES background from becoming an ongoing feature of the academic outcomes of black learners. The argument here is basically stating that quality of education along with SES is a mediator for academic performance, and that if improvements are made in the quality of education then there will be some definite changes, by reducing the effects of SES.

Shuttleworth-Edwards et al. (2004) research on the WAIS-III, also illustrated that Black African first language Private/Model C grade 12s and graduates who had a high quality of education performed comparably to the USA standardization, and those who had a poor quality education displayed significantly lower performance across all the subtests. This

study tried to establish whether IQ performance could be affected by ones level of education and quality of education. The data showed that there was a significant effect, which means that there is a direct correlation between ones level and quality of education and ones IQ scores. It was identified that poor quality of education is likely to negatively effect ones verbal performance on the WAIS-III; where those who have received a high quality of education will perform more closely to the U.S standardization (Shuttleworth-Edwards et al., 2004). Quality of education does not just have an effect on academic achievement, but it has also had a positive effect on the probability of employment for both men and woman in South Africa (Anderson, Case, & Lam, 2001). Quality of education has been identified as not just having an effect on differing areas of a child's academic career, but it also has a long term effect on a child's life.

There is a clear relationship between what a school puts into their students and what their student produces at the end of the day. Case and Deaton (1999) put this perfectly when they state that educational inputs should be important determinants of educational outcomes. They set off proving this point by showing that there are strong and significant effects of pupil-teacher ratios on enrolments, educational achievement, on test scores for numeracy. They found that the bigger a class was the higher an effect on test scores and also the higher absenteeism due to a lack of motivation. They also found that the children progress more rapidly when there are more teachers per student. This is a very vital area to look at especially in South Africa as one will find that rural schools or more public schools will have plus 20 students to a teacher, while private schools may have plus, minus 12 per teacher. This disproportion is problematic because if a teacher has a large class it is easy for some students to slip through the cracks, due to not receiving the attention they need.

Quality of education has shown to have a strong correlation with children's academic performance and IQ scores. A number of findings have been highlighted above and from these findings the general consensus is that quality of education tends to have significantly strong effect on children's academic achievement and success. There are many social and physical factors which interact with each other to affect a child's academic progress and success. Majority of South Africa does not have a choice to what schools their children will attend due to their SES, and because of this their children attend schools in which they can afford (Case and Deaton, 1999), which are usually schools with a low quality of education. What this then means is that there is a huge disproportion in academic achievements between children obtaining a high quality of schooling and those obtaining a low quality of education.

SPECIFIC AIMS AND HYPOTHESES

The research highlighted above clearly shows that there are some gaps, debates, and conflicting evidence regarding the influence of SES and quality of education on a child's academic performance and intelligence test scores. This research is very vital in our context as it was stated earlier that the sensitive sociopolitical history of South Africa which affected education, and the fact that there is wide economic disparity and educational inequalities are still a fact of life in this country, and due to this there is concern that low SES children continue to be at risk of performing more poorly than their high SES counterparts on measures of general intellectual functioning and academic performance. The aim of my study was to apply a multidimensional approach to the definitions of SES and quality of education, and to thus try and capture a holistic understanding of their effects on (a) children's performance on standardized IQ tests, and (b) children's classroom performance.

The specific predictions guiding my study are:

1. Low SES children, regardless of which school they attend, will perform more poorly than high SES children on measures of academic achievement and of general intellectual functioning (i.e., standardized IQ tests).
2. Schools that deliver a high quality of education (which are normally high SES schools) will produce children with higher levels of academic achievement and of general intellectual functioning than will schools that deliver a low quality of education (which are normally low SES schools).
3. Low SES children in a school that provides a high quality of education (previously advantaged school) will perform more similarly to high SES children in the same school than they will to low SES children at a school that provides a lower quality of education (previously disadvantaged school).

DESIGN AND METHODOLOGY

Research Design and Setting

The currently proposed study is of the kind described by Rosenthal and Rosnow (2008) as a quasi-experimental design; that is, it is something like an experimental group, but instead there is no random assignment used to create comparisons as there would be in randomised designs. This study did not randomly assign children into their respective groups, such as low and high SES. My study was part of a larger research project that aimed to collect normative

data on numerous neuropsychological tests for South African adolescents. The setting for the study was mostly schools in the Western Cape; some participants where, however, tested at settings outside their schools.

Participants

The currently proposed study involved 79 English speaking children between the ages of 12 and 15 years. We attempted to recruit equal numbers of 12-, 13-, 14-, and 15-year-olds; within these groups, there is roughly equal numbers of boys and girls, as well as roughly equal numbers of low- and high-SES individuals. This sample was recruited from private and public schools in the Western Cape. These schools represent a range of educational quality, as well as a range of socioeconomic strata.

Table 1
Demographic Characteristics of the Current Sample

	Age (years)			
	12	13	14	15
Boys	9	13	8	6
Girls	18	8	10	7
High SES	18	15	2	2
Low SES	9	6	16	11

A key informant (teacher, social worker, school psychologist, or guidance counsellor) at each school identified suitable candidates. We then used a structured clinical diagnostic interview to screen out participants with any form of psychopathology or psychiatric disorder (e.g., major depression, attention-deficit/hyperactivity disorder, substance abuse/dependence, etc.).

Materials

As mentioned above, the *Mini International Neuropsychiatric Interview for Children and Adolescents* (*MINI Kid*; Sheehan, Shytle, Milo, Lecrubier, & Hergueta, 2006) is used to determine whether potential participants were currently diagnosed with any psychopathology or psychiatric disorder. The MINI KID is a short, structured diagnostic interview for *DSM-IV* child and adolescent psychiatric diagnoses (Sheehan et.al, 2006). It was designed after the adult Mini-International Neuropsychiatric Interview (MINI) for DSM-IV (Sheehan et.al, 2006). The MINI KID is used to assess the presence of 24 DSM-IV child and adolescent psychiatric disorders as well as the risk of suicide, and it takes 15 minutes to administer. This

instrument is frequently used in research studies (e.g. Silver et.al 2001; Sheehan, & Janavs, 2008); it is currently being used in a South African study of functional impairment in adolescent obsessive-compulsive disorder (Hoppe, Bowles, & Thomas, 2008).

Parents of participants were asked to fill out a *biographical and demographic questionnaire* enquiring about, among other areas, their child's developmental milestones (e.g., when did the child start sitting, crawling, walking, and talking) and their own education and employment history (see Appendix A).

Participants themselves were asked to complete a *demographic questionnaire* enquiring about things like, the neighbourhood in which they live, type of dwelling, the size of their house, who they live with and provides for the household, and how things generally are at home and also their educational history (see Appendix B).

The neuropsychological test battery that was used in the larger research project of which my study was a part includes tests of general intellectual functioning, visual and verbal learning and memory, working memory, visuospatial abilities, executive function, motor coordination, information processing speed, and effort. For the purposes of my research question, however, only the tests of general intellectual functioning are important, and so I only describe those here.

The *Wechsler Abbreviated Scale of Intelligence* (*WASI*; The Psychological Corporation, 1999) provides an estimate of intelligence, and it can be administered to people between the ages of 6 and 89 years of age. The WASI has both verbal and non-verbal tasks. The WASI is a short, four-subtest version of the Wechsler Adult Intelligence Scale (WAIS). The WASI takes approximately 30 minutes to complete (Strauss, Sherman & Spreen, 2006). By using Vocabulary, Similarities, Block Design and Matrix Reasoning subtests, this instrument provides a reliable and valid estimate of WAIS Verbal (VIQ), Performance (PIQ) and Full Scale IQ (FSIQ) scores. It is used extensively in research that requires an overall IQ measure (see, e.g., Saltzman, Weems, & Carrion, 2006), and is currently being used in South Africa to test local adolescents with traumatic brain injuries (Schrieff & Thomas, 2008). This measure was beneficial to my study not only because it assesses general intelligence which is related to education, but because it has also been used in research within the South African context.

We obtained *school reports* in order to measure each child's level of academic achievement. From these reports we obtained the children's first language (English) mark,

second language (Afrikaans) mark, and mathematics mark. These reports were obtained from one of the key informants mentioned earlier.

Procedure

Once the key informant had identified potential participants, the parents of those children were contacted and provided with a consent form (see Appendix C). If the parent agreed to allow the child to enrol in the study, an appointment was made to conduct a screening session at either Tygerberg Hospital or at the child's school, depending on the location of the key informant.

At the *screening session*, the child was given an assent form to sign which would give him/her an opportunity to ask any questions and decide if he/she wants to be involved in the study. The parents were asked to fill out the biographical and demographic questionnaire while the child was interviewed using the MINI Kid. We then set up days for mass screening days, where we administered the MINI Kid interview to our participants at their schools. At the end of these sessions, an appointment was then made for the follow-up neuropsychological test session.

At the *neuropsychological test session*, which lasted for approximately 3 hours, a researcher administered the complete test battery (including the WASI) described above. The test session was divided into two sections, each lasting about 90 minutes; between sections, the child would take a 15-minute break. Most of these test sessions were scheduled in the morning to ensure that the children were enthusiastic and not fatigued. Additionally, parents where informed that they should ensure the child gets a good night's sleep prior to the test session. At the end of this session, the child was presented with a music voucher as compensation for their participation. They where also informed of the option to return for a feedback session during which the findings from the neuropsychological test battery would be explained to them.

Data Analysis

Once data collection from the participant, his/her parent, and the school representative was completed, we then entered the questionnaire responses and test scores into a database. The questionnaire responses allowed us to derive the SES categorization (high or low) and quality of education (low or high) for each participant. The most meaningful measure of SES for us was the average income for the area in which the child lives and is educated (as articulated in

the latest Census). We then calculated the median of the SES scores and those that fall under the median were allocated to the low SES group, and those that fell above the median were allocated to the high SES group. Quality of education was indicated by the various schools' history; where previously disadvantaged schools were classified as producing a poor quality of education, and previously advantaged schools were classified as producing a high quality of education. With regard to test scores, the first assessment included descriptive analysis of my data which allowed me to derive measures of central tendency and of variance, to plot the distribution of test scores, and to identify any outliers. I then tested each of the hypotheses listed above, comparing different groups against one another, using a *t*-test for independent group variables, and a one-way ANOVA analysis for the a composite variable including SES and quality of education. Unless otherwise stated, all decisions about statistical significance were made using $p = 0.05$.

RESULTS

My first hypothesis was that, regardless of which school the participants attended (i.e., regardless of quality of education) low-SES children would perform more poorly than high-SES children on measures of academic achievement and of general intellectual functioning. To test this hypothesis, I conducted five separate independent samples *t*-tests with SES as the independent variable in each and, respectively, WASI VIQ, WASI PIQ, English marks, Afrikaans marks and Mathematics marks, as the dependent variables. A Bonferroni correction ($p = 0.01$) was used to correct for potentially inflated familywise error rate.

Before beginning the inferential statistical analysis, I ran descriptive analyses to obtain measures of central tendency and variance on the IQ and academic achievement outcome variables. These data are shown in Table 2. Inspection of the raw data indicated the need for transformation of some of the outcome variables. Once the necessary variables were transformed, Levene's test was run and found to be non-significant ($p > 0.01$); therefore, the assumption of homogeneity of variance was upheld for all the outcome variables. A further analysis was conducted to establish the distribution of variables. Two types of normal probability plots were run (normal p-p and histograms), and they both proved robust, showing the variables to be normally distributed.

As shown in Table 2, participants in the Low SES group performed more poorly than participants in the High SES group on all of the outcome variables. The prediction derived from Hypothesis 1 was therefore confirmed.

Table 2
Hypothesis 1: Descriptive statistics and between-group comparisons

	SES				
	Low	High			
	n = 42	*n* = 37	*t*	*p*	Cohen's *d*
WASI					
Verbal IQ	86.45 (17. 23)	107.35 (16.72)	-5.4541	0.00001	1.23
Performance IQ	87.86(12.64)	108.08 (10.69)	-7.6219	0.00001	1.72
Academic Achievement					
English	60.15 (14.55)	69.71 (10.44)	-3.7301	0.00037	0.75
Afrikaans	57 (15.44)	65.57 (13.27)	-2.626	0.01042	0.59
Mathematics	53.46 (15.44)	71.05 (13.27)	-5.2808	0.00001	1.36

Note. Means are presented with standard deviations in parentheses. The test statistic is reported for 77 degrees of freedom.

My second hypothesis was that, regardless of SES, children who attended low quality of education schools would perform more poorly on tests of academic achievement and of general intellectual functioning than would children who attended high quality of education schools. To test this hypothesis, I conducted five separate independent samples *t*-tests with quality of education as the independent variable in each and, respectively, WASI VIQ, WASI PIQ, English marks, Afrikaans marks and Mathematics marks, as the dependent variables. A Bonferroni correction ($p = 0.01$) was used to correct for potentially inflated familywise error rate.

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As shown in Table 3, participants in schools that deliver a low quality of education performed more poorly than participants in schools that deliver a high quality of education on

all of the outcome variables. The prediction derived from Hypothesis 2 was therefore confirmed.

Table 3
Hypothesis 2: Descriptive statistics and between-group comparisons

	Quality of Education				
	Low	High			
	n = 36	*n* = 43	*T*	*p*	Cohen's *d*
WASI	M (SD)	M (SD)			
Verbal IQ	85.17 (17.60)	105.51 (16.81)	-5.2429	0.00001	1.72
Performance IQ	86.22 (12.03)	106.62 (11.43)	-7.7168	0.00001	1.74
Academic Achievement					
English	59.03(16.00)	69.25 (8.83)	-3.9635	0.00002	0.81
Afrikaans	57.64 (15.75)	63.83 (13.91)	-1.9568	0.06717	0.42
Mathematics	48.75 (21. 04)	69.33 (12.37)	1.1047	0.00001	1.22

Note. Means are presented with standard deviations in parentheses. The test statistic is reported for 77 degrees of freedom.

My third hypothesis was that low-SES children attending a school that provides a high quality of education would perform more similarly on measures of academic achievement and general intellectual functioning to high-SES children in the same school than they would to low-SES children attending a school that provides a low quality of education. The hypothesis further stated that high-SES children attending a high quality of education school would outperform all others.

Unfortunately, given the disparity between cell sizes and the fact that some cells were sparsely populated (see Table 4), this hypothesis could not be fully tested. Instead, I split the sample into three groups (High (consisting of children from high SES families receiving a high quality of education), Low (consisting of children from low SES families receiving a low quality of education, Medium (a merging of low SES/high quality of education participants and high SES/low quality of education participants).

To test this hypothesis, I conducted five separate independent one-way ANOVA with the above factor as the independent variable in each and, respectively, WASI VIQ, WASI PIQ, English marks, Afrikaans marks and Mathematics marks, as the dependent variables.

Table 4
Hypothesis 3: Group differentiations

	Quality of Education	
SES	High	Low
High	36	1

Low	7	35

Before beginning the inferential statistical analysis, I ran descriptive analyses to obtain measures of central tendency and variance on the IQ and academic achievement outcome variables. These data are shown in Table 5. Inspection of the raw data indicated the need for transformation of some of the outcome variables. Once the necessary variables were transformed, Levene's test was run and found to be non-significant ($p > 0.05$); therefore, the assumption of homogeneity of variance was upheld for all the outcome variables. A further analysis was conducted to establish the distribution of variables. Two types of normal probability plots were run (normal p-p and histograms), and they both proved robust, showing the variables to be normally distributed.

Table 4 shows there were statistically significant between-group differences on all of the dependent variables. Post-hoc pairwise comparisons, using Tukey's test, attempted to determine where the significant relationships lay.

Table 5
Hypothesis 3: Descriptive statistics and between-group comparisons

Variable	Group Low (n = 35)	Medium (n = 8)	High (n =36)	F	p	η^2
WASI						
VIQ	85.11(17.86)	92.37(11.83)	107.92 (16.60)	16.567	0.0001	0.3
PIQ	85.83(11.97)	98.25(10.82)	108.31 (10.75)	35.023	0.0001	0.47
Academic						
English	57.91(14.17)	59.38(10.62)	69.96(8.96)	9.909	0.0003	0.19
Afrikaans	57.91(15.90)	51.88(12.11)	66.06(13.12)	4.662	0.0123	0.11
Mathematics	47.03(19.55)	62.75(11.18)	70.39(12.39)	17.68	0.0001	0.32

Note. Data presented are mean scores with standard deviations in parentheses. For WASI variables, data presented are derived from index scores (population mean = 100, SD = 10). For academic variables, data are derived from percentages.

I then conducted five separate Tukey HSD post hoc tests to determine between which pairs of groups the major differences were. It is vital to mention once again that there is a disparity in the group sizes, as the Medium group is far smaller than both the High and Low

groups. The findings, as shown in Table 6, were very interesting and somewhat informative, however, which is why this analysis was included.

Table 6
Hypothesis 3: Post-hoc pairwise comparisons using Tukey's test

		Group			
Test / Comparison #		Low	Medium	High	*p*
WASI VIQ					
	1	85.11 (17.86)	92.38 (11.83)	----	0.5157
	2	85.11 (17.86)	----	107.92 (16.60)	0.0011**
	3	----	92.38 (11.83)	107.92 (16.60)	0.0531
WASI PIQ					
	1	85.83(11.97)	98.25(10.82)	----	0.0177*
	2	85.83(11.97)	----	108.31 (10.75)	0.0011**
	3	----	98.25(10.82)	108.31 (10.75)	0.0659
English					
	1	57.91(14.17)	59.38(10.62)	----	0.9904
	2	57.91(14.17)	----	69.96(8.96)	0.0004***
	3	----	59.38(10.62)	69.96(8.96)	0.0528
Afrikaans					
	1	57.91(15.90)	51.88(12.11)	----	0.5331
	2	57.91(15.90)	----	66.06(13.12)	0.0501
	3	----	51.88(12.11)	66.06(13.12)	0.0356*
Mathematics					
	1	47.03(19.55)	62.75(11.18)	----	0.0968
	2	47.03(19.55)	----	70.39(12.39)	0.0001***
	3	----	62.75(11.18)	70.39(12.39)	0.2857

* $p < .05$, ** $p < .01$, *** $p < .001$

The analysis indicated significant differences in Verbal IQ scores, Performance IQ scores, English marks, and Mathematics marks between the Low and High groups, with the High group achieving better scores. Additionally, participants in the Medium group achieved statistically significantly better Performance IQ scores than did participants in the Low group. Finally, participants in the High group achieved statistically significantly better Afrikaans marks than did participants in the Medium group.

The final part of the analysis explored the relationship between the predictor variables of SES, level of education, and quality of education and the outcome variables (verbal IQ, performance IQ, and English, Afrikaans and mathematics marks) on five separate multiple regression analyses. Table 7 indicates that there is a moderately strong and statistically significant positive relationship between the loaded independent variables and the respective

outcome variables (*r* values ranging between 0.4 and 0.7), except for the Afrikaans mark which had a small but still significant relationship with the independent variables (*r* = 0.36).

Table 7
Regression Analysis

Variables	R^2	Adj R^2	*F*	*p*
WASI VIQ	0.343	0.317	13.046	0.0001
WASI PIQ	0.479	0.459	23.026	0.0001
English marks	0.184	0.151	5.568	0.002
Afrikaans marks	0.130	0.094	3.679	0.016
Mathematics marks	0.330	0.303	12.158	0.0001

The regression analysis as indicated in Table 7 also indicates how much variance the independent variables explain. The magnitude of the relationship between the independent variables and Verbal IQ is substantial, with about 34% of the variance explained by it. The relationship between the independent variables and Performance IQ is also substantial, with about 47% of the variance explained by it. The relationship between the independent variables and English mark is present, with about 18% of the variance explained by it. The same can be said for Afrikaans, with about 13% of variance being explained by. The Mathematics outcome variable also has a substantial relationship with the independent variables, with about 33% of the variance in it being explained by them. One might strongly argue, then, that a conclusive relationship can thus be drawn between the independent variables and the respective dependent variables.

DISCUSSION

The main objective of the current study was to investigate the influence of SES, and quality of education on children's academic performance; measured with the WASI scale and children's school reports. Three main hypotheses were posed for the purpose of this study, and they are as follows: Low SES children, regardless of which school they attend, will perform more poorly than high SES children on measures of academic achievement and of general intellectual functioning. Schools that deliver a high quality of education (which are normally high SES schools) will produce children with higher levels of academic achievement and of general intellectual functioning than will schools that deliver a low quality of education (which are normally low SES schools). Low SES children in a school that provides a high quality of education will perform more similarly to high SES children in

the same school than they will to low SES children at a school that provides a lower quality of education.

The results indicated that there is a significant difference between high SES children and low SES children in general intelligence tests and academic achievements. The data indicates that children from a high SES group generally perform better academically and on general intelligence measures than their low SES counterparts. The WASI measures and the academic marks obtained from two of the latest school reports of the child, conclusively confirmed the hypothesis that Low SES children, will perform more poorly than high SES children on measures of academic achievement and general intellectual functioning. This study confirms previous research findings like Bradley and Corwyn (2002) and several other researches like Magnuson and Duncan (2006) who have argued there are both negative indirect and direct effects of SES on low SES children, such as lack of resources and culturally diverse experience like educational recreational activities and learning materials from early on, such as trips to the library, theatre and museum or even educational or cultural trips, which in turn limits their cognitive growth and impacts on their school performance. They argue that various cultural experiences, environments, resources, ways of motivation and type of schooling broaden a child's intellectual horizons early on in their development and low SES children lack this exposure which puts them at a disadvantage. In South Africa for instance low SES children face several obstacles such as exposure to gangs, drugs and a home front that is not conducive to learning and higher academic performance, which puts them at a grave disadvantage to their high SES counterparts. The current study and previous findings thus confirm that SES is a vital and strong indicator of a child's general intellectual functioning and academic outcomes.

The results also indicated a significant difference between children attending schools with a high quality of education to those attending schools with a low quality of education. The statistical analysis showed that children attending a previously advantaged school perform better in WASI scales and academically to children in previously disadvantaged schools. The data confirmed the second hypothesis that schools that deliver a high quality of education (normally where high SES children attend) will produce children with higher levels of academic achievement, and general intellectual functioning than will schools that deliver a low quality of education (normally where low SES children attend). This data also confirms previous literature with the general consensus that quality of education tends to have significant effect on children's academic achievement and success (Case and Deaton, 1999;

Anderson, Case, & Lam, 2001; & Shuttleworth-Edwards et al., 2004). Some researchers like Van der Berg, Wood, and Le Roux (2002) even go as far as to suggest that by improving the quality of education in historically disadvantaged Black schools, the negative effects of SES on academic achievements will be reduced. This will be discussed further when we look at the third hypothesis.

The final hypothesis that was investigated in this study was whether low SES children in a school that provides a high quality of education will perform more similarly to high SES children in the same school than they will to low SES children at a school that provides a lower quality of education. The results indicated that generally children from high SES families and with a high quality of education scored better on the WASI scores and academic achievement reports than children from low SES families obtaining a low quality of education. This confirms the literature that SES and quality of education play a vital role in children's general intellectual functioning and academic achievements. The results however were not able to show whether low SES children in a school that provides a high quality of education will perform more similarly to high SES children in the same school than they will to low SES children at a school that provides a lower quality of education, in WASI verbal IQ scores, English marks, Afrikaans marks and mathematics marks. Assessment of the means of this analysis only indicated that low SES group who attend a school with a high quality of education do generally obtain higher marks than then the low SES who attend a school with low quality, but these higher marks were not significantly different. These inconclusive findings could be a direct result of the unequal samples size used, or they could mean that quality of education is not as strong a predictor as studies have argued. The results did however indicate that children in a low SES group who attend a school with a high quality of education perform more like high SES children attending a school with a high quality of education in the WASI performance IQ score. This aspect of the research supports the argument that quality of education may have a stronger effect in academic achievement than SES (Van der Berg, Wood & Le Roux 2002). This can not be conclusively argued however as it has been mentioned above, that the data did not show significant differences between the low SES groups who attend a school with a high quality of education and low SES children attending a school with a low quality of education in the

The most interesting finding in this third analysis however was a significant difference between low SES families with a high quality of education scored significantly different to low SES families with a low quality of education in the WASI performance IQ

scores instead of the WASI verbal IQ scores, as it is generally assumed. Research indicated that poor quality of education is likely to negatively influence ones verbal performance on the WAIS-III; where those who have received a high quality of education will perform more closely to the U.S standardization (Shuttleworth-Edwards et al., 2004). The assumption as literature shows is motivated by the idea that children from a high SES group have more exposure to greater reading material and vocabulary due to the vast resources available to them both at home, at school and in their communities. This as one can see was not the case in this study, but instead it showed to be true for the WASI performance IQ scores, it would be interesting to explore this more and find out why it is that the performance IQ showed to have a substantial difference between all three of the groups.

Limitations and Direction for Future Research

The current study set out to show that SES and quality of education have an effect on school children's performance in South Africa. The first two hypotheses were confirmed by the study; however a conclusive confirmation of the third hypothesis was not clearly indicated. This conclusion as it was indicated earlier could be explained by the fact that the sample sizes between the medium group and the low and high group was highly disproportional, which the biggest limitation of the study. The other point to be made is that even though the first and second hypothesis was met these results can not be adequately generalised to the rest of the population, as the sample did not meet a suitable racial mix that represents South Africa racial dynamics appropriately.

The limitations of this study can be addressed by future researchers who wish to explore more clearly the effects of SES and quality of education in school children's academic performance and achievements. The first thing that future research could address is the disparity of sample sizes indicated in the analysis for the third hypothesis. If future research addresses this problem area, we could obtain results that could conclusively show whether children from a low SES group attending a high quality of education school with perform more like a high SES child attending a high quality of education school, or more like a low SES child attending a low quality of education school. This analysis is very important as literature indicates that advancement in quality of education may be able to curb the negative effect of SES, which is vital information for this country because majority of the children in South Africa belong to these low SES groups.

The current study was able to indicate a strong relationship between the quality of education and school children's performance, however the study was not able to fully indicate which indicators of quality of education within the South African context have a stronger effect on academic performance. Research in South Africa has established that pupil-teacher ratio affects academic outcome (Anderson, Case, & Lam, 2001), but we still need to asses what else it is about low quality of education that still has a significant effect on children's academic performance and outcomes. It is difficult to measure quality of education directly and in South Africa there are many dynamics that influence the quality of education such as South Africa's sociopolitical history and also resources available in the schools for the children's learning. In this study for example quality of education was measured by categorising schools into those that were previously disadvantaged as producing a poorer quality of education to those schools that were previously advantaged who produce a higher quality of education. This may be true however it is a simplistic measure as the schools history is not the only indicator that characterises the quality of education, as shown by researchers like Van der Berg, Wood, and Le Roux's (2002) who used the students numeracy and literacy scores. It is thus vital for future research to determine which indicators of quality of education play the most vital role in South African schools today so future plan can be put forward to improve the quality of education and SES problems,

Conclusion

The current study has confirmed the assumption that SES and quality of education have a great influence on school children's academic performance and performance on general intellectual functioning. This current study along with a number of studies conducted, indicates first of all that high SES children perform significantly better in general intellectual measures and academically, and second of all that children attending a school with high quality of education perform significantly better than children attending a school with a low quality of education. These findings are very concerning because as it was stated earlier low SES and poor quality of education is a reality amongst majority of South African children and youth, which means that some change needs to be happen to better this situation. One can only hope that studies such as this one and future studies can encourage policy changes which will allow progress to transpire within low SES communities and schools with a low quality of education, creating an environment that is more conducive to learning.

REFERENCES

American Psychological Association. (2007). *APA Dictionary of Psychology*. Washington, DC: Author.

Anderson, K, Case, A, & Lam, D. (2006) Causes and consequences of schooling outcomes in South Africa: Evidence from survey data. *Populations Study Centre University of Michigan. (PSC Research report. No. 01-490)*.

Barnett, W. S. (1998). Long-term cognitive and academic effects of early childhood education on children in poverty. *Preventive Medicine, 27,* 204–207.

Bowey, J. A. (1995). Socioeconomic status differences in preschool phonological sensitivity and first-grade reading achievement. *Journal of Educational Psychology, 87*, *476-487.*

Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology, 53, 371–399*.

Case, A., & Deaton, A. (1998). Large cash transfers to the elderly in South Africa. *Economic Journal, 108, 1330-1361*.

Chase, C. I. & Pugh, R. C. (1971). Social class and performance on an intelligence test. *Journal of Education Measurement, 8, 197-202*.

Considine, C., & Zappala, G. (2002). The influence of social and economic disadvantage in the academic performance of school students in Australia. *Journal of Sociology, 38, 129-148*

Herbst, I., & Huysamen, G. K. (2000). The construction and validation of developmental scales for environmentally disadvantaged preschool children. *South African Journal of Psychology, 30, 19-24*.

Heyneman, S. P. (1976). A brief note on the relationship between socioeconomic status and test performance among Ugandan primary school children. *Comparative Education Review, 20, 42-47*.

Hoppe, L. J., Bowles, S., & Thomas, K. G. F. (2008). Functional impairment in South African children and adolescents with Obsessive-Compulsive Disorder. *African Journal of Psychiatry, 11,* 56-75.

Magnuson, K. A., & Duncan, G. J. (2006). The role of family socioeconomic resources in the black-white test score gap among young children. *Developmental Review 26, 365-399.*

Malecki, C. K., & Demaray, M. K. (2006). Social support as a buffer in the relationship between socioeconomic status and academic performance. *School Psychology Quarterly, 21, 337-395*.

Malefo, V. (2000). Psycho-social factors and academic performance among African women students at a predominantly white university in South Africa. *South African Journal of Psychology, 30, 40-45*.

Noble, K. G, McCandliss, B. D., & Farah, M. J. (2007). Socioeconomic gradients predict individual differences in neurocognitive abilities. *Developmental Science, 10, 464-480.*

Overton, W. F., & Chapell, M. S. (2002). Development of logical reasoning and the school performance of African-American adolescents in relation to socioeconomic status, ethnic identity, and self-esteem. *Journal of Black Psychology, 28, 295-317*.

Reeves, C. (2005, April). *Can schools reverse social disadvantage by pedagogy opportunity to Learn?* Paper presented at the Consortium for Research on School Quality.

Richardson, K. (2002). What IQ tests test? *Theory & Psychology, 12, 283-314*.

Schrieff, L., & Thomas, K. G. F. (2008, March*). Establishing a neuropsychological rehabilitation service for children with traumatic brain injury.* Paper presented at the annual convention of the South African Clinical Neuropsychological Association, Durban.

Sheehan, D., Shytle, D, Milo, K. Lecrubier, Y, Herguetta, T. (2006). Mini International Neuropsychiatric Interview for children and adolescents (MINI): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry, 59, 20-33.*

Shuttleworth-Edwards, A. B., Kemp, R. D., Rust, A. L., Muirhead, J. G. L., Hartman, N. P., & Radloff, S. E. (2004). Cross-cultural effects on IQ test performance: A review and preliminary indications on WAIS-III test performance in South Africa. *Journal of Clinical and Experimental Neuropsychology, 26, 903–920.*

Silver, A. A., Shytle, R. D., Sheehan, K. H., Sheehan, D. V., Ramos, A., & Sanberg, P. R. (2001). Multicenter, double-blind, placebo-controlled study of mecamylamine monotherapy for tourette's disorder. *Journal of American Academy Child and Adolescent Psychiatry, 40, 1103-1110.*

Strauss, E., Sherman, E. M. S., & Spreen, O. (2006). *A Compendium of neuropsychological Tests*. (3rd. ed) NY: Oxford University Press.

Themane, M. J., Koppes L. L. J., Monyeki, K. D., Twisk, J. W. R., & Kemper, H. C. G. (2006). Relationship between socio-economic status and educational achievements of Ellisras rural primary school children, South Africa. *African Journal for Physical, Heath Education Recreation and Dance, 12, 298-309.*

The Psychological Corporation. (1999). *Wechsler Abbreviated Scale of Intelligence.* San Antonio, TX: Harcourt Brace.

Van der Berg, S., Wood, L., & Le Roux, N. (2002). Differentiation in black education. *Development in Southern Africa, 19, 289-306.*

APPENDIX A

Parental Biographic and Demographic Questionnaire

PAR – PARENT INTERVIEW

Name of interviewer:	
Date of interview:	

GENERAL INFORMATION

Full name:	
Date of birth:	Day Month Year
Age	
Gender:	M F
Home Language:	
Telephone:	Work: ( ) Home: ( ) Cell:
How would you describe your ethnicity / race?	1. Black 2. Coloured 3. White 4. Asian 5. Other(specify): 6. Refuse to answer
How would you describe your religion?	1. Christian 2. Hindu 3. Buddhist 4. Jewish 5. Muslim /Islamic 6. Other (specify): 7. None
Household income per year:	1. Less than R10 000 2. R10 000 – 20 000 3. R20 000 – 40 000 4. R40 000 – 60 000 5. R60 000 – R100 000 6. More than R100 000
Do you live with anyone that has a current alcohol	Y N If yes, specify what substance(s):

problem or uses other drugs?	

SIBLINGS (of participant): (including half-siblings, step-siblings)	Gender	Age	History of drug or alcohol use
Names of siblings			
1.			
2.			
3.			
4.			
5.			
6.			

DEVELOPMENTAL MILESTONES

How old was your child when they did the following tasks for the first time?	sitting	months
	crawling	months
	walking	months
	talking	months
	saying words	months
	speaking in sentences	months

PARENTAL EDUCATION:

	Biological mother	Biological father	Guardian
Highest level of education reached? Mark one response for each person as follows: 1. 0 years (No Grades / Standards) = No formal education (never went to school)	1. 2. 3. 4.	1. 2. 3. 4.	1. 2. 3. 4.

2. 1-6 years (Grades 1-6 / Sub A-Std 4) = Less than primary education (didn't complete primary school) 3. 7 years (Grade 7 / Std 5) = Primary education (completed primary school) 4. 8-11 years (Grades 8-11 / Stds 6-9) = Some secondary education (didn't complete high school) 5. 12 years (Grade 12 / Std 10) = Secondary education (completed senior school) 6. 13+ years = Tertiary education (completed university / technikon / college) 7. Don't know	5. 6. 7.	5. 6. 7.	5. 6. 7.

PARENTAL EMPLOYMENT:

Hollingstead categories:	Biological mother	Biological father	Guardian
1. Higher executives, major professionals, owners of large businesses)	1.	1.	1.
2. Business managers of medium sized businesses, lesser professions (e.g. nurses, opticians, pharmacists, social workers, teachers)	2.	2.	2.
3. Administrative personnel, managers, minor professionals, owners / proprietors of small businesses (e.g. bakery, car dealership, engraving business, plumbing business, florist, decorator, actor, reporter, travel agent)	3.	3.	3.
4. Clerical and sales, technicians, small businesses (e.g. bank teller, bookkeeper, clerk, draftsperson, timekeeper, secretary)	4.	4.	4.
5. Skilled manual – usually having had training (e.g. baker, barber, chef, electrician, fireman, machinist, mechanic, painter, welder, police, plumber, electrician)	5.	5.	5.
6. Semi-skilled (e.g. hospital aide, painter, bartender,	6.	6.	6.

bus driver, cook, garage guard, checker, waiter, machine operator) 7. Unskilled (e.g. attendant, janitor, construction helper, unspecified labour, porter, unemployed) 8. Homemaker 9. Student, disabled, no occupation	7. 8. 9.	7. 8. 9.	7. 8. 9.

HISTORY OF MATERNAL SUBSTANCE ABUSE:

Have you *ever* tried one of the following substances? *Note the usual or most recent route. For more than one route, choose the most commonly used alternative:*
1. Oral (ingestion), 2. Nasal (sniffing/snorting), 3. Smoking (inhalation), 4. Non-Intravenous injection, 5. Intravenous injection

Drug	When pregnant (with participant) *(Specify amount used per day/week)*	Past 30 days *(Specify amount used per day/week)*	Lifetime (years) *(Specify amount used per day/week)*	Route of administration
Alcohol				1. 2. 3. 4. 5.
Heroin				1. 2. 3. 4. 5.
Methadone				1. 2. 3. 4. 5.
Other Opiates / Analgesics				1. 2. 3. 4. 5.
Barbiturates				1. 2. 3. 4. 5.
Sedatives/Hypnotics/ Tranquilizers (including Methaqualone)				1. 2. 3. 4. 5.
Cocaine				1. 2. 3. 4. 5.
Amphetamines				1. 2. 3. 4. 5.

Cannabis				1. 2. 3. 4. 5.
Hallucinogens				1. 2. 3. 4. 5.
Inhalants				1. 2. 3. 4. 5.
More than 1 substance a day (including alcohol)				1. 2. 3. 4. 5.

APPENDIX B

Child Demographic Questionnaire

DEM – DEMOGRAPHIC QUESTIONNAIRE (participant) **(CLINICIAN ADMINISTERED)**

Name of interviewer:	
Date of interview:	

GENERAL INFORMATION

Full name:	
Date of birth:	Day Month Year
Age	
Gender:	1. Male 2. Female
Handedness:	1. Left 2. Right 3. Ambidextrous
Contact numbers:	Home: Cell: Mother: Father: Other:
Address:	
How would you describe your ethnicity / race?	1. Black 2. Coloured 3. White 4. Asian 5. Other(specify): 6. Refuse to answer
Are you actively religious?	1. Yes 2. No 3. Somewhat
How would you describe your religion?	1. Christian 2. Hindu 3. Buddhist 4. Jewish 5. Muslim /Islamic 6. Other (specify): 7. None

EDUCATION

Home Language:	1. English 2. Afrikaans 3. Bilingual 4. Other		
Language of Education:	1. English 2. Afrikaans 3. Bilingual 4. Other		
Age at starting school:			
Details of Primary School/s attended:	School	Area	Grades
Name and area of Current School:	School: Area:		
School Telephone Number:			
Contact Person at Current School:			
Current Grade:	1. Grade 8 2. Grade 9 3. Grade 10 4. Grade 11 5. Grade 12		
Last Grade passed:			
Grades repeated:			
Reason for repeating Grades:			
How many days were you absent from school in the last year?			
Do you think you will complete your schooling up to Grade 12?	1. Yes 2. No 3. Unsure		

What do you think you will do when you finish secondary school? (Choose one option).	1. Attend university, technikon or other tertiary institution 2. Go to trade school (e.g. plumbing, carpentry) 3. Do some vocational training (e.g. learn on the job) 4. Get a paid job 5. Start a business

	6. I will probably be unemployed for a long time 7. I don't know 8. Other (specify):

RESIDENTIAL INFORMATION

Have you ever lived away from home for more than 3 months?	1. Yes 2. No	
If you have lived away from home for more than 3 months, where did you live, and how old were you at the time?	Place	Age
	1. Foster home(s)	
	2. Group home(s)	
	3. Shelter	
	4. Residential setting	
	5. Hospital	
	6. Home of a relative	
	7. Home of a friend	
	8. Detention centre	
	9. Other (specify):	
How long have you lived at your current address?		
How would you describe your dwelling?	1. Shack 2. Wendy house or backyard dwelling 3. Tent or traditional dwelling 4. Flat / apartment 5. Town house / semi-detached house 6. Freestanding brick house 7. Other (specify):	
How many rooms does your dwelling have?	1. one 2. two 3. three 4. four 5. five 6. more than five	
Which of these items do you have in your home? (mark as many as necessary)	A. Tap water B. Flush toilet inside home C. Electricity D. Telephone (landline) E. Television F. Computer F.	

<table>
<tr><td></td><td colspan="2">Car</td></tr>
<tr><td>Which ONE of the following best describes how things are in your home?</td><td colspan="2">1. We don’t have enough money for food
2. We have enough money for food, but not for other basic items
such as clothes
3. We have enough money for food and clothes but are short of
many other things
4. We have the most important things, but few luxury goods
5. We have money for luxury goods
6. We have money for luxury goods and extra things
7. Not applicable</td></tr>
<tr><td>Who lives with you? (mark all)</td><td colspan="2">1. Mother 2. Father 3. Stepmother 4. Stepfather
5. Grandmother 6. Grandfather 7. Foster parent(s)
8. Sibling(s) No.__ 9. Half-sibling(s) No.__
10. Step-sibling(s) No. __ 11. Other family member(s) No.__ 12. Boyfriend / girlfriend 13. Other No. ___</td></tr>
<tr><td>Who takes care of you at home?</td><td colspan="2"></td></tr>
<tr><td>How many people sleep in the same room with you at night when you are at home?</td><td colspan="2">1. one 2. two 3. three 4. four 5. five
6. more than five 7. none</td></tr>
<tr><td>Are you satisfied with these arrangements?</td><td colspan="2">1. Completely satisfied 2. Fairly satisfied 3. A little dissatisfied
4. Very dissatisfied 5. Desperately unhappy</td></tr>
<tr><td rowspan="4">Do you live with anyone that has a current alcohol problem or uses drugs?</td><td colspan="2">1. No 2. Yes</td></tr>
<tr><td>Specify relationship</td><td>Specify substance/s abused</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
</table>

Do you live with anyone that used to have an alcohol problem or used drugs in the past?	1. No 2. Yes	
	Specify relationship	Specify substance/s abused

FAMILIAL INFORMATION

Who is your primary care-giver?	
If your mother or father or not your primary care-givers, how old is your guardian?	
What is your relationship with your BIOLOGICAL MOTHER?	1. Unknown 2.Known, but irregular contact 3. Known and regular contact 4. Living with child 5. Deceased
How old is she? (If deceased, specify age and reason of death)	
What is your relationship with your BIOLOGICAL FATHER?	1. Unknown 2.Known, but irregular contact 3. Known and regular contact 4. Living with child 5. Deceased
How old is he? (If deceased, specify age and reason of death)	
What is your parents' marital status?	1. married 2. co-habiting 3. widowed 4. divorced & living apart 5. divorced & living together 6. separated 7. remarried 8. other (specify):

GLOBAL VALIDITY RATING OF INTERVIEW:

Estimate of the overall validity of	1. Excellent, no reason to suspect invalid responses

responses: (Consider factors such as compliance with the interview, mental status, comprehension of items, and evidence to exaggerate or minimize symptoms.)	2. Good, factors present that may adversely affect validity 3. Fair, factors present that definitely reduce validity 4. Poor, substantially reduced validity 5. Invalid responses, severely impaired mental status or possible deliberate “faking bad” or “faking good”

APPENDIX C

Consent and Assent form

PATIENT INFORMATION AND CONSENT LEAFLET

Effects of Heavy Alcohol Abuse on Adolescent Brain Structure and Function

Investigators: Dr. P. Carey, Mrs. H Ferrett, N Maskwikiti, T Petousis, Dr Kevin Thomas

Principal Investigator: Prof. D.J. Stein

Dear Volunteer

DESCRIPTION AND PURPOSE OF THE STUDY

You/your child are/is being invited to take part in a study carried out by the Anxiety and Stress Disorders Research Unit in the Department of Psychiatry at the University of Stellenbosch, and the Department of Psychology at the University of Cape Town. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff or doctor any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how your child could be involved. Also, your child's participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you or your child negatively in any way whatsoever. You are also free to withdraw him/her from the study at any point, even if you do initially agree to let him/her take part. The study has been approved by the Committee for Human Research of the University of Stellenbosch and the ethics and research committee of the Department of Psychology at Cape Town University. . It will be conducted according to Medical Research Council guidelines on good clinical practice (2003) as well as the Declaration of Helsinki Guidelines (Edinburgh, 2000), which provide detailed guidelines that relate to the ethical conduct of studies involving human subjects.

Why are we doing this research?

The broader context for this work is the examination of the effects of heavy use of alcohol on the brain and whether these effects may be damaging. We are at present unsure as to how serious these effects may be in young people. This study will try and answer some of these questions by studying the effects of heavy alcohol use in young people (adolescents) during this time of important brain growth and development. It may be that you have been requested to participate as a suitable candidate, or as someone who matches other young people for age and education, but who does not use or uses only a very limited amount of alcohol – i.e. a normal control.

We will be asking young people between the ages of 12 and 18 years who are heavy users of alcohol and a similar control group who do not use/use only limited amounts of alcohol, to participate. We plan to enroll a total of 300 people in this study which will be conducted at the MRC Unit on Anxiety Disorders of the University of Stellenbosch and the Department of Psychology at Cape Town University. Much of the testing however for the normal control group will be completed in the schools from which the young people are drawn.

If you decide to take part in this study and you are using/abusing alcohol, you will be asked not to drink alcohol before each of the study sessions.

STUDY PROCEDURES

Your involvement in the study will require you to visit the study doctor/team on two occasions. At a screening visit with the study doctor or psychologist we will interview you, much like a normal visit to your family doctor to assess whether you are eligible for our study. This visit will include questions on your emotional and physical health as well as your school and home environment. If, following this initial examination you appear to be suitable for the study, we will invite you to go through this information and consent form to ensure that you understand all of what the study will involve. Once we have addressed any questions you may have and you and your parent/guardian provide written consent (permission) to your participation, we will proceed with the study.

At the second visit you will undergo a series of tests called a neuropsychological evaluation. This study visit with the psychologist will take the form of a number of pencil and paper tests which will involved some writing and drawing as we test your memory, concentration and mental flexibility. Many of these are like a normal IQ test that you may have done at school before. All of these tests are important and will help us determine if alcohol has any effects on these aspects of your brain's functioning. This will take about 2 ½-3 hours.

DISCOMFORT ASSOCIATED WITH THE STUDY

There are only low or minimal risks associated with your participation in this study. If you feel tired at any point in any of the visits, you should please ask your study doctor/psychologist for a rest. If for some reason you are unable to complete a visit on a particular day we may reschedule to complete the assessments at another time.

POTENTIAL BENEFITS

There may be no direct benefits to you for participating in this study. However, you will be making an important contribution to this research that may benefit others in the future. We expect that the results of this study will help us understand the effects of heavy alcohol use on brain development in young people.

COMPENSATION FOR STUDY PARTICIPATION

While you will not be paid to take part in this study, all evaluations will be provided at no cost to you or your medical aid. We will however offer you a voucher to the value of R150 in appreciation of your involvement in this work.

CONFIDENTIALITY

Your participation is regarded as strictly confidential. The results of the study will be published in the professional literature and made available to of the Committee for Human Research of Subcommittee C at the University of Stellenbosch, but your identity will not be revealed at any time to people outside of the study team.

THE RIGHT TO ASK QUESTIONS/WITHDRAW FROM THE STUDY

You have the right to ask questions at any time about any aspect of the study. If you have any queries, you can contact Dr. Carey at 021-9389623, or Mrs Helen Ferrett 021-9389189 during office hours. You will also be given 24 hour contact details should you need to contact us in the event off an emergency.

Your participation in the study is entirely voluntary. You have the right to withdraw at any time. If you decide to withdraw from the study, it will not jeopardize you or any future treatment you may require in any way.

You are entitled to a signed copy of this document.

If you agree to take part, please complete the following section.

Assent of minor

I (*Name of Child/Minor*)…… have been invited to take part in the above research project entitled Effects of Heavy Alcohol Abuse on Adolescent Brain Structure and Function.

- The study doctor/psychologist and my parents have explained the details of the study to me and I understand what they have said to me.
- They have also explained that this study will involve 2 assessments which include interviews, filling questionnaires, and a neuropsychological evaluation
- I also know that I am free to withdraw from the study at any time if I am unhappy.
- By writing my name below, I voluntary agree to take part in this research project. I confirm that I have not been forced either by my parents or doctor to take part.

.....

Name of child

(To be written by the child if possible)

Declaration by parent/legal guardian

By signing below, I *(name of parent/legal guardian)* ……..…… agree to allow my child (name of child) …… who is ……. years old, to take part in a research study entitled: **Effects of Heavy Alcohol Abuse on Adolescent Brain Structure and Function**

I declare that:

- I have read or had read to me this information and consent form and that it is written in a language with which I am fluent and comfortable.
- If my child is older then 7 years, he/she must agree to take part in the study and his/her ASSENT must be recorded on this form.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to let my child take part.

- I may choose to withdraw my child from the study at any time and my child will not be penalised or prejudiced in any way.
- My child may be asked to leave the study before it has finished if the study doctor or researcher feels it is in my child's best interests, or if my child does not follow the study plan as agreed to.

Signed at (*place*) .....…..…….. on (*date*) ……..…….. 2005.

.....

Signature of parent/legal guardian

Declaration by investigator

I *(name)* ……..……. declare that:

- I explained the information in this document to ……..
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understand all aspects of the research, as discussed above
- I did/did not use a interpreter

Signed at (*place*) .....…..…….. on (*date*) ……..…….. 2005.

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Signature of investigator