THE ASSOCIATION BETWEEN SCHIZOPHRENIC PSYCHOSIS AND ACADEMIC PERFORMANCE AND THE ROLE OF COGNITIVE DEFICITS

Yasser Saeed Khan

ABSTRACT

The association of Schizophrenia with general intellect and academic performance remains unclear despite a reasonable amount of research work done in this area. Moreover, the association of structural abnormalities of the brain and cognitive deficits with this major mental illness has been questioned as it is assumed that people who suffer from the illness are usual high academic performers. This article aims to review the evidence linking schizophrenic psychosis with both high and low intellect, including the learning disability population. The evidence associating cognitive deficits with Schizophrenia and whether high academic performance is possible in the presence of such complications is also reviewed.

Key words: Schizophrenic psychosis, Academic performance, Cognitive deficits

INTRODUCTION

A lot of work that has been done over the years to establish links between being genius and "madness"[1-3] has concluded that genes for psychosis may be associated with beneficial effects. It further concluded that the beneficial effects of psychosis genes may explain their relatively stable prevalence in universal human populations. This suggestion was first made by Huxley et al[4] that psychotic disorders might be associated with some favourable effects, as this would explain their surprisingly high frequency in all human populations.

One of the major complications of a major mental disorder like Schizophrenia is the impact on the academic attainment of the affected individual amongst other effects on social functioning. One accepted view is that people with a relapsing schizophrenic illness generally do not do well academically. If this decline in intellectual functioning, as suggested by many, is due to the genetically inherited cognitive deficits and the overall development delay rather than the symptoms associated with active illness, then its effect on the academic performance of the suffering individual is something that could not be much prevented . On the other hand if this decline in academic performance is the outcome of the disabling symptoms associated with Schizophrenia or other psychosis then there is a possibility that this decline can be reduced, if not completely stopped, by the effective control of these symptoms. The ascertainment of the reason of academic decline in people with Schizophrenia or other psychosis is therefore of utmost importance, particularly in the context of early intervention in the affected individuals. The association of cognitive deficits and schizophrenia is also very interesting and whether people are born with these deficits, as suggested by the neurodevelopmental origin of the illness, or these arise during the course of the illness as one of its complications is another question which largely remains unanswered. Also, if individuals who suffer from Schizophrenia at some stage of their lives are born with these cognitive deficits then the impact of these deficits on the academic performance needs to be measured and established.

Correspondence:
Dr. Yasser Saeed Khan: Senior Specialist Registrar, Child & Adolesent Psychiatry, Bradford District Care Trust, Bradford - United Kingdom.
E-mail: yasser.khan@nhs.net

METHOD

Search Strategy for the Literature Review

During October 2011, the website "NHS ATHENS" was used and the electronic databases, Allied and Complementary Medicine (1985 – 2011), British Nursing Index (1985 – 2011), EMBASE (1980 – 2011), Department of Health' Library & Information services (1983 – 2011), MEDLINE (1950 – 2011), PsycINFO (1806 – 2011), CINAHL (1981 – 2011), The King's Fund Information and Library Service (1979 – 2011) and the Health Business Elite(1922 – 2011) were searched through an extended "NHS Evidence Healthcare Database".

The combination of keywords used to identify relevant articles were Intelligence and Psychosis, Academic performance and psychosis and Intelligence, Psychosis and learning disability.

Inclusion Criteria

The search was limited to English language and human studies. The studies were within the time limit 1806-2011 and those of a quantitative research design were only included. The studies were of clear relevance to the possibility of association between intelligence, academic performance and psychosis and also the role played by cognitive deficits and the presence of learning disability in this context.

Exclusion Criteria

Studies which focused on the associations between academic performance or intelligence and other psychiatric disorders e.g. depression were excluded. Also excluded were the studies which aimed at the associations between intelligence and psychosis other than Schizophrenia and with the sample having other comorbid conditions with Schizophrenia. Studies done outside the time period 1806-2011 and non-English articles were also excluded. Grey literature had to be excluded due to the difficulty of obtaining them and also due to time constraints.

Main Findings

Out of the 651 articles that were returned as a result of the first search, after excluding duplicate results, only 16 were identified as possibly related to the topic of interest. Only 8 results were selected from the second search process whereas there was no relevant article found out of the 6 articles returned as a result of the third search indicating the lack of research into the association between intelligence and psychosis.

An extended search was also performed manually for the references listed by the relevant studies to identify further studies that could have been useful for the review. Full text of the 16 and the 8 articles that were identified as a result of the first and second literature search processes respectively was obtained and analysed. This analysis resulted in identifying 2 out of 16 and 3 out of 8 studies from the two searches which were directly related to the topic of review. A summary of these 5 (five) studies is given below:

Appendix 1: SUMMARY OF SELECTED PAPERS:

	Level of Evidence(Sacket et al)	Author	Title and Year of Study	Where published	Aim
1)	3b	Karlsson J.L.	Psychosis and Academic Performance	BJPsych (2004), 184, 327-329	To investigate the relationship between academic success and the incidence of psychotic disorders
2)	1b	Szaboles Keri	Genes for Psychosis and Creativity	Journal of Psychological Science September 2009, 1070-1073)	Investigate the relationship between the Neuregulin 1 promoter polymorphism and creativity
3)	3b	M.V.D GAAG et al.	School performance in secondary education shows no decline before the onset of a first episode of psychosis in Schizophrenia	Journal of Mental Health (2003) 12, 6, 585-593.	To evaluate cognitive decline prior to the first episode of psychosis using school performance data.
4)	3b	T.E Goldberg et al.	Intellectual Impairment in Adolescent Psychosis (1988)	Schizophrenia Research (1988) 261-266	To study the relationship between cognitive impairment and the course of Schizophrenia
5)	2b	Michael Davidson et al.	Behavioural and Intellectual Markers for Schizophrenia in Apparently Healthy Male Adolescents	AMJ Psych (September 1999)	To determine if future psychiatric hospitalisation caused by Schizophrenia could be predicted from certain Behavioural and Intellectual markers

Critical Appraisal Of The Evidence

Karlsson's study aims at investigating the relationship between academic success and the incidence of psychotic disorders. It is an extension of a large research study published in 1974, which looked at the family risks of psychosis[5].

This was a retrospective case control study investigating high-scoring graduates of the university preparatory schools, evaluating the students' comparative risk, as well as that of their relatives, of eventually requiring hospital treatment for serious mental disorders. A unique opportunity existed in Iceland for such a study due to the unusually complete demographic and scholastic records which were used to locate academically accomplished individuals and assess the probability of previously identified patients with mental disorders and their relatives being among such groups. This investigation included the entire population born between 1851 and 1940 (surviving past the age of 15 years) and divided the material into three 30-year periods for statistical purposes. The records of Icelandic University preparatory schools were published annually and were available for inspection at the National library in Reykjavik (capital city). This included the names and dates of birth of all graduates and the actual grade point scores achieved in each subject by every individual in the final examinations at age 20 years. The parents, biological siblings and children of the graduating students, born between 1851 and 1940 were identified with records at the National archives. The rates for each generation ever having been admitted (by 1968) for treatment of exogenous psychosis to the single mental health hospital serving the whole country were established for the general population, ranging from 0.4% to 1.2%.

This study supports the hypothesis that stimulation associated with psychotic tendencies enhances academic performance. The rates observed in this study conclude that the risk of psychosis in high academic achievers and their first degree relatives is increased as compared to the risk of psychosis in general population. It also establishes the risk of psychosis as higher in graduates who excelled in mathematics compared to the humanities group which again supports the argument of associating higher rates of psychosis in high achievers. One major limitation of this study was mainly its geographical specific findings and the need of replicating such a study in other parts of the world, where possible and also the age specific findings of the study as it only looked for the rates of psychosis at age 20 only.

In order to examine the link between Psychosis and creativity, Szaboles Kéri of Semmelweis University in Hungary focused his research on Neuregulin-1, a gene that normally plays a role in a variety of brain processes, including development and strengthening communication between neurons[6]. However, a variant of this gene (or genotype) is associated with a greater risk of developing mental disorders, such as schizophrenia and bipolar disorder. In this study, the researchers recruited volunteers who considered themselves to be very creative and accomplished. The participants were recruited through newspaper advertisements, university email and personal networks. They underwent a battery of tests, including assessments for intelligence and creativity. To measure creativity, the volunteers were asked to respond to a series of unusual "Just Suppose" questions (a subtest of the Torrance Test of Creative Thinking- Torrance, E. P. (1974) The Torrance Tests of Creative Thinking) and were scored based on the originality and flexibility of their answers. They also completed a questionnaire[7] regarding their lifetime creative achievements before the researchers took blood samples for genotyping. The association between genotypes and creativity was determined with analyses of variance (ANOVAs) and hierarchical regression analyses.

The results showed a clear link between Neuregulin-1 and creativity. Volunteers with the specific variant of this gene were more likely to have higher scores on the creativity assessment and also greater lifetime creative achievements than volunteers with a different form of the gene. Kéri notes that this is the first study to show that a genetic variant associated with psychosis may have some beneficial functions. He observes that "molecular factors that are loosely associated with severe mental disorders but are present in many healthy people may have an advantage enabling us to think more creatively." In addition, these findings suggest that certain genetic variations, even though associated with adverse health problems, may survive evolutionary selection and remain in a population's gene pool if they also have beneficial effects. This study supports earlier findings that genes associated with psychosis can have beneficial effects by identifying a link between Neuregulin 1, creativity and high intellectual achievement. Neuregulin 1 is one of the most widely studied candidate genes for psychosis and the TT genotype has been associated with an increased risk of psychosis . However, this genotype has also been linked to lower pre-morbid I.Q[8-9] and lower working memory capacity[10], thus contradicting the previous view of Neureglin 1 being associated with creativity and high intellect. The study by Mark Van Der Gaag et al[11]. aimed at evaluating cognitive decline prior to the first episode of psychosis in Schizophrenia using school performance data. It examines retrospectively whether academic performance of pre-psychotic schizophrenic patients, their siblings and school-type matched controls in the years preceding first episode of psychosis has been stable or progressively declining.This study was done in Netherlands which had an added advantage of school records being very detailed in this region. The end of year school data, which is usually given out at the end of each year, was collected via a family member from Ypsilon (Association for families of people with Schizophrenia in Netherlands), by placing adverts in their bimonthly magazine.

No progressive decline in academic performance during secondary education was found in probands,

compared to siblings and controls. The probands showed continuous and stable, but more importantly mild, academic performance decrements over a reasonably long period of time in the pre-morbid stages. These cognitive deficits were observed to be quite subtle and did not seem to significantly affect school performance.

The case-control study, Intellectual Impairment in Adolescent Psychosis[12] was undertaken to address further the period of the intellectual decline in the course of psychosis. Two contrasting lines of evidence related to the timing of decline in cognitive and academic performance of the affected people i.e. whether the deterioration happens before or after the commencement of the disorder, have been reported. 39 psychotic adolescent patients who fulfilled DSM-III criteria for Schizophrenia, Schizophreniform psychosis or atypical psychosis were compared to 41 non-psychotic adolescent psychiatric controls who fulfilled DSM-III criteria for adjustment disorder(n=20), conduct disorder (n=13), dysthymia (n=7) and histrionic personality (n=1). The subjects were administered the WISC-R, the Peabody Individual achievement test, the Bender-Gestalt test and the Purdue Pegboard test approximately 2-3 weeks after admission. All patients were tested during a period of relative clinical stability so that they could comprehend the instructions and tasks and also be persistent in performing them. Statistical tests were done using the SAS (Stastical analysis system) programs. Multivariate analysis of variance, chi-square and t-test were also utilised.

This study yielded some interesting results. Performance IQ was significantly lower in psychotic inpatient adolescents as compared to the non-psychotic psychiatric patients. The IQ pattern in the adolescent psychotic patients at an early stage in the illness was strikingly similar to the pattern displayed in chronic adult schizophrenic patients. Also, Performance IQ was lower than verbal IQ in the psychotic group while the reverse was observed in the control group, a finding consistent with previous reports of IQ pattern in schizophrenic adults[13-15]. An interesting finding was regarding the relationship between IQ and academic achievement which was similar in both groups despite marked differences in performance IQ. This study, therefore, supports the notion that intellectual dysfunction exists early in the disease i.e. schizophrenic psychosis and the specific decrement lies in the performance rather than the verbal realm.

Davidson et al[16] investigated whether the subtle intellectual and behavioural abnormalities present in adolescents who later develop Schizophrenia can predict the vulnerability of these adolescents to develop the illness before the first psychotic episode. It also signifies the need of developing highly sensitive and specific tests with high reliability in predicting psychosis to treat at-risk individuals at an early stage, perhaps improving the prognosis of the illness.

This study confirms existing reports that individuals who develop schizophrenia manifest subtle behavioural and intellectual abnormalities before the symptoms required for diagnosis of the illness becomes evident. The main limitations of this study were the diagnosis being made by physicians rather than research based, results limited to male adolescents raising the possibility of over-representation of severely ill patients and the chance of missed patients who are never hospitalised or hospitalised at a later stage in life. The main strength of the study was its population-based, case-registry design which protected against selection and information biases and also enabled analysis of a low-prevalence disease with high statistical power.

Schizophrenia and Premorbid Intelligence:

The conclusion that intellectual decline does not precede the onset of the manifestation of illness Van Der[11] suggests the interesting possibility of Schizophrenia being associated with high intelligence before the onset and with low academic performance after the manifestation of the clinical illness.

NEED OF FURTHER RESEARCH

The association between Schizophrenic psychosis and academic performance has not been clearly established yet and therefore warrants further research. Previous research has shown both high and low intellect to be associated with Schizophrenia and the role of the cognitive deficits in this context is also not clear[11,14]. The number of studies looking into the possibility of such associations is limited and therefore there is a need of further studies to be done, preferably with bigger sample sizes, to establish a more clear association between Intelligence and Schizophrenic Psychosis. There is also a need of further research to ascertain whether the neurodevelopmental and cognitive deficits in people who develop Schizophrenia at a later stage in life, are severe enough to interfere with the academic ability of the affected individuals or do they become worse with the progression of the illness and therefore people who are destined to develop the illness do relatively well in the early stages of their lives but start to show decline after the manifestation of the illness. These future studies may also be able to explain why some young people, who when present with their first episode of psychosis (Schizophrenia), have already been performing poorly academically in their preceding years.

There is overwhelming evidence that mental illness in general and psychosis in particular, is significantly more common in the learning disabled population. The consistency of this finding would militate against notion of a chance association. Also, this finding opposes the view held by some people, as shown by Jon Karlsson (2004), that psychosis is the illness of high achieving people.

Another possibility is that the whole notion of an association between Schizophrenic psychosis and high intelligence is rather a myth which, with studies of adequate statistical power, will prove untrue.

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