CHILDHOOD COGNITIVE FUNCTIONING AND LATER RISK FOR DEPRESSION IN ADULTHOOD

Valentin Matei*

Abstract:
Background: *There are strong evidences indicating that people with depression present a degree of cognitive impairment. It seems that the cognitive impairment in depression persist beyond recovery in depression, suggesting it is a trait-like of depression.*
Evidence has emerged from the rapidly evolving field of cognitive epidemiology that low IQ is related to risk of other psychiatric conditions, including – although not across all studies – depression. The association between specific pre-morbid cognitive functions and depression has not been yet fully investigated.
Aims: *To investigate the association between specific cognitive functions measured in childhood and depressive symptoms in adult life.*
Methods: *This study builds on the 1970 British cohort study (BCS70). The BCS70 is a cohort study that enrolled all babies born in England, Scotland, and Wales on 5-11 April 1970. We used data collected on study participants at age 5 (cognitive functioning) and 30 (depression).*
Results: *People with depression at 30 years performed statistically significant poorer on cognitive functioning at cognitive tests administered at 5 years. Patients with depression at age 30 performed poorer than controls at cognitive test evaluating verbal intelligence (p=0.001), constructional performance praxis (p=0.009) and visual-motor coordination (p=0.001).*
Conclusions: *We replicated recent findings showing an association between poor premorbid cognitive functioning and depression. The premorbid cognitive deficits are evident already at age 5 and involve both language and visual perceptual abilities, representing a putative risk for depression (still, other hypothesis regarding relationship between cognitive impairment and depression cannot be excluded).*
Key words: *Early cognitive impairment, depression*
Rezumat:
Introducere:*Există în prezent suficiente dovezi ce sugerează că persoanele cu depresie prezintă un grad de afectare cognitivă. Dovezile sugerează că afectarea cognitivă în depresie persistă după remisiunea terapeutică a pacienților cu depresie, reprezentând aşadar o caracteristică trait-like a depresiei. De asemenea date din studiile de epidemiologie cognitive arată că un IQ redus este asociat cu numeroase afecțiuni psihiatrice inclusiv (deşi nu toate datele întaresc acest lucru) depresia. Asocierea dintre reducerea premorbidă a funcționării cognitive şi riscul ulterior de a dezvolta depresie reprezintă un domeniu încă insuficient cercetat.*
Obiectiv:*De a studia asocierea dintre anumite funcții cognitive evaluate în copilarie şi riscul de aparțtie al depresiei la adulți.*
Metoda: *În prezenta lucrare am utilizat datele din studiul de cohortă început în 1970- British Cohort Study (BCS70) . În cadrul acestui studiu au fost evaluați toți copiii născuți în Anglia, Scoția şi țara Galilor în perioada 5-11 aprilie 1970. Am folosit în lucrarea de fața datele colectate la varsta de 5 ani (funcționarea cognitivă) şi la varsta de 30 de ani (depresia).*
Rezultate:*Persoanele care la vârsta de 30 de ani aveau depresie, au avut la vârsta de 5 ani o afectare statistic semnificativă la testele cognitive administrate la acea vârstă. Pacienții care au prezentat depresie la varsta de 30 de ani au performat mai slab la testele ce au evaluat inteligența verbală (p=0.001), abilitățile construcționale (p=0.009) şi coordonarea vizuo-motorie (p=0.001) la vârsta de 5 ani comparativ cu grupul de control (indivizi fără depresie la 30 de ani), reprezentând un posibil factor de risc pentru apariția ulterioară a depresiei.*
Concluzii:*În studiul nostru am confirmat rezultate recente ce au arătat că există o legatura între afectarea premorbidă a funcționării cognitive şi apariția ulterioară a depresiei. Afectarea cognitivă era prezentă deja la vârsta de 5 ani şi a implicat atât abilitățile lingvistice cât şi pe cele vizuo-perceptuale, reprezentând aşadar un posibil factor de risc pentru apariția ulterioară a depresiei la aduți (dar alte ipoteze privind relația dintre funcționarea cognitivă şi depresie nu pot fi de asemenea excluse).*
Cuvinte cheie: *Afectare cognitivă precoce, depresie.*

INTRODUCTION

There is ample evidence that, overall, compared to controls, patients suffering from psychiatric disorders perform less well on cognitive functions tests (1, 2). Patients with depression are subject to multiple neuropsychological deficits, affecting most notably the attention and executive functions (3, 4, 5, 6). When their depression is successfully treated with modern antidepressants, they perform better on the cognitive tests than the untreated patients, but not as well as controls (7). In a study, patients with remitted major depressive disorder have performed poorer than controls on tests of sustained attention, mnemonic and strategic aspects of working memory, and on psychomotor functioning (8).

An important question is if cognitive

**MD Psychiatrist, Clinical Hospital of Psychiatry „Prof dr Al. Obregia", Bucharest, email: vm_matei@yahoo.com*

impairments are to be seen only in the acute phase of depression (i.e. state like) or are an enduring aspect of depression (trait like). It is widely accepted that the disease is characterized by cognitive impairment in the acute state (9, 10). An important number of longitudinal studies existing on this field indicate that cognitive impairment seen during episodes of illness also persists during episodes of symptom reduction (11,12) and even in remission (13, 13, 15) although some studies report no such findings (16). The increasing indications in the recent literature that symptom reduction in depressions is not followed by cognitive improvement to a similar degree would suggest that cognitive impairments in depression are enduring characteristics of this disease (17). It seems also that cognitive impairments precede for a long time later development of depression (18) suggesting a neurodevelopmental implication of depression.

The putative correlations between cognitive functioning and depression are manifold. For example, the presence of cognitive impairment before the development of depression may represent either a risk factor or an indication that cognitive impairment and depression may together signify distinct manifestation of a unique disease. Another alternative hypothesis is that depression and cognitive impairment can both be directly linked with various common risk factors such as genetic factors, brain injury or insult, or early adversary psychosocial factors, lying directly on the causal path.

On the other hand, the depression itself might cause cognitive impairment, either by straight effects on cognitive systems or indirectly through effects on behaviors which can lead to cognitive impairments (poor lifestyle including poor diet, lack of exercise, substance misuse, or possibly because of unwanted side effects of treatment). By studying as early it may possibly be the cognitive functioning of future depressed people we can narrow to a certain degree the above hypothesis. Demonstrating the presence of very early cognitive impairments in people destined to later depression we can speculate that it is more plausible that cognitive impairments are more possible to be risk factor for depression or to represent the manifestations of a single disease. The purpose of our study was to analyze the cognitive functioning at a very early age (5 years) of people with depression at 30 years.

METHODS

Subjects

Data used in our paper were drawn from the 1970 British Cohort Study (BCS70).

The 1970 British Cohort Study (BCS70) is a cohort study that enrolled 16 567 babies born in England, Scotland, and Wales on 5-11 April 1970 (19, 20). The original study focused on health and has successively expanded to examine physical, educational and social development. Individuals participating in this cohort study were assessed at birth with a 96.7% response rate and in ongoing follow-ups using a multi-method, multi-informant approach. Participants were followed up at 5 (n = 13 135, in 1975), 10 (n = 14 875 in 1980), 16 (n = 11 622 in1986), 26 (n= 9003, in 1996), 30 (n = 11 261 in 2000) and 34 (n=9656, 2004) years of age. At 30 years, marked efforts were made to recruit difficult-to-reach subjects (21). For our study we used data collected at 5 years for cognitive functioning and 30 years for depression.

Cognitive tests

The cognitive tests applied at age 5 selected in our analysis are: Copying Designs Test (CDT), Human Figure Drawing (HFD) (Draw-a-Man TEST) and The English Picture Vocabulary Test (EPVT).

Copying Designs Test (CDT) represents a test which assesses constructional abilities, visual-motor coordination and was designed at testing children's ability to copy designs as a means of assessing their visual-motor coordination (theoretical range: 0-8). The Copying Designs Test score was calculated by adding the correct response to each of the 8 designs of the test.

Human Figure Drawing (HFD) (Draw-a-Man TEST). This is also a test evaluating constructional performance praxis, including visual and spatial perception and motor response. The Human Figure Drawing Test used in the present study was a modified version of the Draw-a-Man Test originally developed by Florence Goodenough and later developed by Dale Harris which permits consideration of children's concepts of the human figure as an index or sample of their concepts generally, intellectual maturity and it is considered to correlate relatively well with conventional IQ tests (Binet, Wechsler, etc.) with a theoretical range of 0-30. The drawings produced by the children were scored using an adapted version of the Harris–Goodenough scale, based on 30 developmental items. Human Figure Drawing was calculated using Harris method .

The English Picture Vocabulary Test (EPVT) which is an adaptation by Brimer and Dunn of the American Peabody Picture Vocabulary Test represents a tool designed to estimate the vocabulary level (which represent an excellent guide to the general mental ability of intact people and IQ in general) developed as a quick, easy-to-administer test of verbal intelligence for use with children between the ages of two-and-a-half and 18 (theoretical range 0-60). The EPVT raw score is the total number of correct items occurring before the ceiling item (the final item achieved after the child made 5 consecutives mistake).

Inter-scorer reliability was .94 for Human Figure Drawing .7 for Copying Designs Test and .96 for EPVT. Intrascorer reliability was .9 or more for all the above tests. The above mentioned tests were administered by the health visitor during her visit to the child at home.

Measure of depression

At age 30, data was collected on the severity of depressive symptoms using The Malaise Inventory. An overall Malaise score for a cohort member is the sum across the individual variables, yielding a minimum score of 0 and a maximum of 24. A score of 8 or higher is a recommended cut-off for a depressive episode (25).

Statistical analyses

We created 2 groups, the first one comprised of people considered controls (overall Malaise score less or equal 7), the second one assumed to have depression (Malaise score of 8 or over). We used t-test to compare the 2 groups concerning cognitive functioning age 5 using

cognitive tests (EPVT, HDS, CDS) as dependent variable. All analyses were carried out with SPSS 15 software package.

RESULTS

A total number of 11101 people responded to Malaise Inventory Questionnaire. 9694 persons (87.3%) qualified as controls (total score </=7) and 1407 (12.7%) scored equal or over 8 on Malaise Inventory being considered depressed (**table 1**).

Controls	**9694 (4807 males-49.59%, 4887 females-50.41%)**
Depression	**1407 (574 males 40.80% 833 females 59.20%)**

Table 1: Number and percent of people analyzed

We found a greater proportion of females being depressed but the difference wasn't so important (14.6% depressed females comparing to 10.7% depressed males) as it is usually reported in literature.

Data about cognitive functioning at age 5 of people with or without depression at 30 years are presented in **table 2**

	EPVT	HFD	CDS
Controls (N=7934)	35.74 (+/-15.98)	10.36 (+/-3.54)	4.87 (+/-2.01)
Depression (N=1138)	31.65 (+/-16.30) **p=.001**	10.06 (+/-3.56) **p=.009**	4.39 (+/-1.97) **p=.001**

Table 2: Cognitive measurement of people analyzed

People with depression at 30 years performed statistically significant poorer on cognitive functioning at each test administered at 5 years.

We then carried out the same analyses by sex in order to evaluate if there are any differences in cognition in childhood between females and males with depression. Data are presented in **table 3**.

	EPVT	HFD	CDS
Controls (males, N=3947)	37.17 (+/-16.38)	9.89 (+/-3.64)	4.87 (+/-2.05)
Control (females, N=3987)	34.32 (+/-15.45)	10.82 (+/-3.38)	4.87 (+/-1.97)
Depression (males, N=464)	33.06 (+/-16.51) **p=.001**	9.59 (+/-3.69) p=.103	4.50 (+/-2.02) **p=.001**
Depression (females, N=674)	30.67 (+/-16.10) **p=.001**	10.38 (+/-3.43) **p=.002**	4.31 (+/-1.95) **p=.001**

Table 3: Cognitive measurement of people analyzed-by sex

People from both sexes afflicted by depression at 30 years performed poorer in childhood on cognitive functioning. The sole exception is for HFD for male, where the depressed people perform poorer than controls, but the difference wasn't significant.

DISCUSSION

Our study replicates some data already existent in literature. The finding of our study is that people destined to depression in adulthood (30 years) present cognitive impairment as early as 5 years. The domains of impairment cover vocabulary level and verbal intelligence (as measured with EPVT), visual-motor coordination (assessed with CDS), praxis, including visual and spatial perception and motor response (as evaluated by HFD). The same stand true when we analysed the data separated by sex, with the exception of HFD in male where the difference between depressed and controls (even if present) weren't significant on HFD test. This can suggest that, at least in some characteristics there may be differences in relationship among cognitive functioning and depression (whatever this relationship may be) between sexes.

The differences in cognitive functioning in future depressed people compared with controls seemed to appear very early. According to our study these differences are already present at 5 years, strongly indicating a neurodevelopmental implication of depression.

The plausible hypothesis which can explain such a relationship between cognitive functioning and later appearance of depression remain that the presence of cognitive impairment before the development of depression represent either a risk factor for depression, a suggestion that cognitive impairment and depression may together signify distinct manifestation of a unique disease (even if with different manifestations at different times) or that similar risk factors (genetically, environmentally or both) exist for both cognitive dysfunction and depression. On the basis of present study we cannot refute neither of the above hypotheses.

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