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Neuropsychological Predictors of Treatment Outcome in Obsessive Compulsive Disorder (OCD)

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Ce mémoire intitulé :

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a été évalué par un jury composé de personnes suivantes :

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RÉSUMÉ

Contexte: En dépit de la preuve substantielle pour l'efficacité générale de la thérapie cognitivo-comportementale pour le trouble obsessionnel-compulsif (TOC), il existe une controverse à propos de l'amélioration de certains déficits neuropsychologiques dans ce trouble. **Objectif:** Le but de cette étude est d'évaluer: 1) la corrélation de la gravité du TOC et les résultats des tests neuropsychologiques et 2) l'amélioration clinique et neuropsychologique des patients souffrant de TOC qui ont terminé avec succès leur traitement. **Méthode:** Cette étude évalue les fonctions neurocognitives et l'état clinique de 27 participants du groupe TOC et 25 participants du groupe témoin. La fonction neurocognitive de chaque participant a été évaluée en utilisant le test de Rey-Osterreich Figure complexe (RCFT), le test de fluidité D-KEFS et l'essai Cardebat-D. Nous avons également, utilisé l'inventaire d'anxiété de Beck (IAB), l'Inventaire de dépression de Beck (IDB) et l'échelle d'obsession-compulsion de Yale-Brown (Y-BOCS) pour vérifier la présence de l'anxiété et de la dépression avec le TOC et la gravité des symptômes chez les patients souffrant de TOC. **Résultats:** Notre étude conclut qu'il y une différence significative de la fonction de la mémoire selon le score au sous test de copie entre les participants souffrant de TOC et le groupe témoin. De plus, nous avons constaté une différence considérable dans le score de rappel immédiat et différé du RCFT avant et après le traitement dans le groupe de TOC. **Conclusion:** En résumé, la présente étude a démontré que les patients atteints de TOC ont des troubles cognitifs spécifiques et que la thérapie cognitivo-comportementale serait un traitement qui pourrait améliorer, au moins, certaines dysfonctions neurocognitives.

Mots-clés: TOC, les tests neuropsychologiques, la thérapie cognitivo-comportementale, les facteurs prédictifs, comorbidité, anxiété, dépression

ABSTRACT

Background: Despite substantial evidence supporting the general efficacy of cognitive behavioral therapy for obsessive-compulsive disorder (OSD), there is controversy about improvement in some neuropsychological deficits in this disorder. **Objective:** The present study aim to evaluate: 1) correlation of severity of OCD and neuropsychological test scores and 2) clinical and neuropsychological improvement of patients with OCD who have successfully completed their treatment. **Method:** This study evaluates neurocognitive function and clinical condition of 27 participants of OCD group and 25 participants of control group. The neurocognitive function of every participant has been assessed using Rey-Osterreich Complex Figure Test (RCFT), D-KEFS fluency test and Cardebat- D test. We also, used Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI) and Yale-Brown Obsessive-Compulsive scale(Y-BOCS) to verify comorbidity of anxiety and depression with OCD and severity of symptoms in patients with OCD. **Results:** Our study concludes that a significant difference of function in copy score is present between OCD and control group. Also, we found considerable difference in score of immediate and delayed recall of RCFT before and after treatment in OCD group. **Conclusion:** In summary, the present study demonstrated that OCD patients have specific cognitive impairments and cognitive behavioral therapy could improve, at least, some neurocognitive dysfunction.

Keywords: OCD, Neuropsychological tests, Cognitive behavioral therapy, Predictors, Comorbidity, Anxiety, Depression

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LIST OF ABBREVIATION

OCD	Obsessive-Compulsive Disorder
ECA	Epidemiological Catchment Area
ADHD	Attention-Deficit/Hyperactivity Disorder
ERP	Exposure/Response Prevention Therapy
IBA	Inference-Based Approach
CAM	Cognitive Appraisal Model
Y-BOCS	Yale Brown Obsessive Compulsive Scale
CÉTOCT	Centre d'étude sur le spectre obsessif-compulsif et les tics
SCID	Structured Clinical Interview for DSM-IV Axis I Disorders
BAI	Beck Anxiety Inventory
BDI	Beck Depression Inventory
RCFT	Rey-Osterreich Complex Figure Test

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CHAPTER 1

INTRODUCTION

Obsessive-compulsive disorder (OCD) is a potentially chronic disabling condition characterized by recurring, intrusive, anxiety-provoking thoughts or images (obsessions) associated with repetitive, physical or mental rituals (compulsions) performed to relieve anxiety ([28,68]).An individual must exhibit either obsessions or compulsions to meet DSM-IV-TR criteria([65]) lasting more than one hour per day and have sufficient severity to cause marked distress or impairment ([13]).Patients with both obsessions and compulsions constitute at least 75 per cent of the affected patients, with most patients presenting with multiple obsessions and compulsions ([22]). The symptoms are typically recognized as being excessive or unrealistic, although insight may be limited in some adults and especially in children with the disorder ([64]).

The symptom presentation of OCD is heterogeneous. Factor and cluster analytical studies of symptom measures, such as the Yale Brown Obsessive Compulsive Scale(Y-BOCS), have identified a number of symptom dimensions that tend to be relatively stable over time within individuals. These include repeatedly washing hands or other parts of the body to free oneself from imagined contamination; repeated checking behaviors to ensure that nothing has been forgotten or missed that may result in harm to oneself or others; excessive concern with order or symmetry; and hoarding ([64]). Obsessions pertaining to religious, sexual or aggressive themes or health concerns are also reported. Obsessional doubt may manifest itself as slowness, indecisiveness, or rumination without any overt compulsion. It should be noted that while compulsive hoarding is currently listed as a symptom of OCD, there is evidence suggesting that it may represent a distinct subgroup or syndrome ([64]).

However obsessions and compulsions can also be found in a mild non clinical form in most individuals to a varying degree. In reality, obsessions and compulsions aren't exclusive to OCD ([13]). OCD is associated with significant disruption of psychosocial functioning, reduced quality of life in

patients and their relatives, as well as considerable economic cost to the individual and society. This is particularly concerning given the typically lengthy period of time taken by people with OCD to seek treatment ([64]).

Presenting problems among children and adolescents with OCD generally resemble the adult presentation. However, compared to adults, children are more likely to deny impairment ([65]).

1.2. Prevalence and incidence

For a long time researchers considered OCD rare but different studies show that this disorder is the fourth most prevalent mental illness after major depression, drug abuse and panic disorder ([62]). Studies show it can affect as many as 2-3% of children ([48]) and up to 3% population of many cultures ([60, 82, 67]). Also, the ECA (Epidemiological Catchment Area) study suggested that its 1-month and 6-month prevalence is 1.3% and 1.5%, respectively ([26]).While some authors believe this prevalence is underestimated([67,2]) others believe it is an overestimation([4]).Clark ([13])believes it is reasonable to place the lifetime prevalence for OCD between 1 and 2 % of the general population.

The incidence of OCD in women is higher than in men ([3, 31]), although men typically have an earlier age of onset than women ([13]).But, OCD is more common in males in pediatric samples ([64]). Different studies show that women displaying more washing and cleaning rituals and men have more sexual obsessions than women ([40, 70]).Usually this disorder start in childhood or adolescence and the symptoms will continue for many years ([79]). First-degree relatives of people with OCD are at considerably greater risk for developing the disorder than the general population. The onset of idiopathic OCD is typically insidious, although precipitating or stressors events such as childbirth have been reported ([64]). Age of onset has been reported to be bimodal, with one peak between 10 and 12 years of age and a second peak in the early to mid-20s ([16]). Age of onset may be especially relevant to the etiology and treatment of OCD as early onset has been associated with male gender predominance, greater symptom severity, a higher rate of tic disorders, poorer response to

treatment, and a greater likelihood of having a family history of OCD ([64]). OCD is chronic in most individuals. A meta-analysis of 22 longitudinal studies involving a total of 521 children with OCD, with follow-up periods ranging from 1 to 15.6 years, reported a persistence rate of 41% for full OCD and of 60% for full or subthreshold OCD ([64]).

1.3. Comorbidity

OCD often co-occurs with other mental disorders. Up to 75% of individual with OCD have at least one additional current disorder([13]).The most common comorbid disorders seen with OCD are anxiety disorder such as panic disorder and simple and social phobia, mood disorder, eating disturbance, tic disorder, depression, autism, and Tourette's syndrome, schizophrenia, alcoholism and substance abuse ([85 ,61, 26]). Epidemiologically, the OCD comorbidity risk for other major psychiatric disorders was found to be fairly high but nondistinctive ([30]). In a clinical sample of schizophrenic and schizoaffective patients, about 8% met criteria for OCD, highlighting the importance of screening for obsessive-compulsive symptoms in such populations where detection may be more difficult ([26]).

In childhood, psychiatric disorder co-occurring with OCD is the norm rather than exception. It has been estimated that as many as 50 percent of pediatric patients with OCD have two or more co-occurring diagnosis. The most common comorbid disorders include other anxiety disorders, depressive disorders, tic disorders, attention-deficit/hyperactivity disorder (ADHD), and disruptive behavior disorders ([65]).

1.4. Etiology and Classification

Until recently, the most common view was that OCD should be classified as an anxiety disorder ([9]) but some researchers have challenged this opinion ([75, 19]). Some believe that OCD is a belief disorder ([49]), while other authors suggest that it is better to categorize this disorder as a schizotypal disorder ([18]).Based on ICD-10 and DSM-5 classification, OCD is categorized separately from anxiety disorders as an independent category ([76], [17]).

The etiology of OCD remains unclear although both early socialization experiences and neurophysiological factors seems to contribute to its development ([49]) .Parental rearing style in particular dimensions of parental affection and parental control have been associated with OCD ([23]).

Researchers have categorized between four to seven subtypes of OCD ([80, 81, 58, 59]). The two most common symptom types, compulsive washing and checking, account for the majority of OCD cases ([13]). A large scale study of Rasmussen and Eisen was based on more than 1000 patients with OCD. Ranked from most common to least common, the subtypes are fear of contamination (50%), pathologic doubt (42%), somatic (33%), need for symmetry/precision (32%), aggression (31%) or sex (24%) and religious/blasphemy (10%). Regarding compulsions, the most common are checking (61%) and washing/cleaning (50%). Other types consist of, need to ask/confess (34%), symmetry/precision (28%) and hoarding (18%) ([58, 59]).

1.5. Treatments

The most established pharmacological treatment option for OCD patients is selective serotonin reuptake inhibitors, alone or in combination with other medications and cognitive behavior therapy such as exposure/response prevention therapy(ERP) ([5, 20, 43]).

Cognitive-behavioral therapies of OCD include the inference-based approach (IBA) and the cognitive appraisal model (CAM) ([53]) .The first behavioral therapy method developed was ERP. It includes prolonged exposure to obsessional cues and strict prevention of rituals ([76]). There are

different versions of this method varying in duration, frequency and manner of exposure. The cognitive appraisal model proposes that unwanted intrusive thoughts are a universal experience, but if they are appraised as holding negative implications for the person, the person will become preoccupied and try to ‘‘neutralize’’ or otherwise suppress the thought, so maintaining the preoccupation with the thought([51]). This method of treatment focus on faulty appraisals and beliefs of control, therefore; the goal of treatment is to guide the client toward termination of all activities that are aimed at reducing the frequency of the obsession and its associated distress ([13]).This method is usually carried and in combination with ERP.

IBA considers that in OCD the initial intrusion is actually an inference; hence it is part of the obsession. The initial doubt is considered the primary inference and is maintained by an idiosyncratic reasoning process that leads to the doubting inference, which subsequently spirals into secondary aversive consequences or secondary inferences. The IBA model does not detract from the important clinical role of appraisals, but instead of viewing the content of all intrusions as unproblematic, the inference- based approach conceptualizes ‘‘intrusions’’, particularly those in OCD with overt compulsions, as inferences or propositions arrived at and at some point formed through inductive reasoning processes([51]). In fact, the inference-based approach (IBA) to treating OCD offers a reasoning perspective on obsessional ideation. IBA focuses on reasoning narratives producing the initial doubting inference in OCD. Its claim is that no matter what the form of the OCD, the obsessional chain always begins with a doubting inference arrived at through a reasoning process termed inferential confusion. Inferential confusion has two components: (a) an investment in remote (often imaginary) possibilities in preference to reality and (b) a distrust of the senses and common sense. Together these two components confuse the person with OCD into inferring doubt in the absence of a valid basis for such doubt ([53]).

The aim of inference-based therapy (IBT), then, is to invalidate the reasoning producing the primary (doubting) inference and return the person to the world of the senses and common sense, which they were led to disbelieve and mistrust by the invalid reasoning narrative ([52]).

The IBT protocol is organized in a series of cumulative stages. The major steps are:

1. Establish the nature of the obsessional doubt and educate in distinguishing obsessional doubt from authentic doubt.

2. Unravel the subjective “story” (reasoning narrative) behind the primary inference.

3. Illustrate how the doubt goes against perception in the here and now and detracts from common sense.

4. Reveal clearly how reasoning devices lead to an arbitrary doubting inference.

5. Examine the power of the imagination.

6. Utilize techniques to return the person to the senses and common sense (such as constructing an alternative realistic narrative, grounding the person in reality sensing).

7. Return the person to the world of the senses.

8. Finally, target the vulnerable-self theme ([53]).

Currently, IBT is delivered in a twelve-step format for the duration of 24 one-hour sessions utilizing worksheets, exercise sheets and training cards in accordance with published guidelines. The therapy has been modified to a short-term format by two experts in IBT, in particular with respect to time-lines, and how long the therapists are expected to work en each step of the program up to a total of 12 one-hour sessions. Otherwise, however, both short-term and long-term therapy will be identical in terms of the components and steps addressed during treatment ([52]).

For those for whom these therapies are not effective, psychosurgery may afford significant symptom relief. In particular, recent research has supported the use of deep brain stimulation for OCD in at least some otherwise treatment-refractory patients ([64]).In this study, our participants received inference-based approach (IBA).

1.6. Neurocognitive and neuropsychological impairment

OCD has been the subject of numerous neuropsychological investigations since the late 1980s ([64]).

There are considerable neurocognitive and neuropsychological impairment in patients with OCD ([32]). There is evidence of improvement in some neuropsychological deficits in OCD, such as set shifting, planning, organizational strategies, flexible self-guided behavior and problem-solving following CBT and pharmacological treatments ([38, 35]). Other findings show that neuropsychological and cognitive impairment do not improve even after successful treatment, such as nonverbal memory, initiation of spontaneous or self-guided thought/action and controlled attention, immediate and delayed recall, inhibitory control and verbal fluency([35,78]).

It has been estimated that up to 50% of patients either do not benefit from therapy intervention or drop out ([72, 46]).The researchers and authors have determined different factors that could influence treatment outcomes.

Jakubovski et al (2012) report that the presence of obsessions with sexual and religious content, as well as older age at admission have been associated with a poorer prognosis. But, they believe that there is no consistent relationship between other factors such as gender, age at onset, level of insight, psychiatric comorbidity including comorbid tic disorders, pattern of response to short-term treatment, baseline severity of symptoms, and presence of psychiatric family history with long-term outcome treatment. Other studies show that although, demographic variables and comorbidity are predictors of outcome, there is no systematic relationship between neuropsychological measures and outcome treatment. These inconsistencies might be due to use of different populations, different medications or severity of OCD. It could also be that improvement in psychological variables such as confidence rather than neuropsychological performance produces changes in neuropsychological measures ([57]).

Additionally, there is the uncertainty about the influence of neurocognitive condition of patients on treatment response. D'Alcante et al (2012) show that higher baseline neuropsychological performance predicted better treatment response to both treatments, with the exception of mental flexibility. But, at least three studies didn't find significant neuropsychological differences at baseline assessment between overall responders and non-responders ([8, 78, 46]).

One of the most common limitations of these studies is the small sample size ([36, 14, 51]). In addition, patients who drop out during treatment, the difficulty to relate change to individual components of the dimension of the Y-BOCS and OCD severity ([28]), co morbidity with other disorders ([56, 14]), ethnic restriction of participants ([36]), the lack of consistency in the report of age of onset of OCD ([42]) are other limitations that could affect reliability and accuracy of studies.

1.7. Aims of study

The aim of our study is to examine the predictors of outcome on treatment of OCD in patients diagnosed with OCD with or without of comorbidities before and after they have completed 24 weeks of psychotherapy with varying degree of symptom remission. This study helps us to identify predictors relevant to treatment outcome. In fact, the objective of our study is twofold: 1) to evaluate correlation of severity of OCD and neuropsychological test scores; and 2) to evaluate clinical and neuropsychological improvement of patients with OCD who have successfully completed their treatment.

1.8. Research question

We will explore: 1) if there is a relationship between OCD symptomatology and Visio-Spatial function, non-verbal memory and verbal and non-verbal fluency performance; and 2) whether or not psychotherapy will improve the performance of patients on these tasks. Outcome will be measured using the Yale Brown Obsessive Compulsive Scale (Y-BOCS).

CHAPTER 2
METHOD

2.1. Recruitment

The study involves analysis of data collected from studies previously approved by an ethics committee. All patients were referred by clinician experts in evaluation and treatment from the Centre d'étude sur le spectre obsessif-compulsif et les tics (CÉTOCT) between September 2008 and October 2011. Following the telephone screening, an appointment was made with evaluator for Structured Clinical Interview for DSM-IV Axis I Disorders (SCID), after which a psychologist and a neuropsychologist made a thorough assessment. The SCID-I is a semistructured interview for making the major Axis I DSM-IV-TR diagnoses. It is administered by a clinician and includes an introductory overview followed by nine modules, seven of which represent the major axis I diagnostic classes. This method guides the clinician in testing diagnostic hypotheses as the interview is conducted ([69]).

Twenty-five normal controls were recruited through advertising within the Institut universitaire en santé mentale de Montréal and some journal of Montreal. All participants, OCD and control groups, were recruited from the greater Montreal region. The first interview was by telephone, in which we explained the criteria of study and asked participants if they had psychiatric disorder. The participants who had the necessary condition and criteria came to the institute to sign ethically approved consent forms and fill the questionnaires.

Entry criteria were: (a) primary diagnosis, according to DSM-IV-TR criteria of OCD,(b)no other principal axes1 disorders requiring treatment, (c) no change in medication type or dose during the 12 weeks before treatment for antidepressants(4 weeks for anxiolytics), (d) willingness to keep medication stable while participating in the study, (e) no evidence of suicidal intent, (f) no evidence of current substance abuse, (g) no evidence of current or past schizophrenia, bipolar

disorder or organic mental disorder, (h) willingness to undergo active psychological treatment, (i) willingness to undergo randomization into treatment modality, and (j) fluency in either English or French. In the interests of generalisation of results and establishing clinical effectiveness of results, the entry criteria do not exclude a secondary (comorbid) diagnosis on axis I or II providing it does not require treatment or is deemed unlikely to significantly affect compliance with the current treatment plan.

Medication-Participants with medication who enter the treatment program were assessed by one of the team psychiatrists specialized in the pharmacological treatment of anxiety disorders. If antidepressant medication has not been stable for at least 12 weeks, a stabilization period was imposed. Other medications (e.g., anxiolytics) were stable for at least four weeks. Participants with stable medication were accepted if they meet diagnostic and severity criteria for OCD for entry once the stabilization period has elapsed. Medication levels were self-monitored throughout and at follow-ups. Participants and prescribing physicians were asked to avoid modification whenever possible, and to inform the therapist if changes were unavoidable. Participants might change, reduce or eliminate medication following post-treatment evaluation.

2.2 Procedure

The OCD group was matched to a control group that consist of 14 women (56%) and 11 men (44% p=0,817) on sex, age, intelligence (Raven&WAIS) and handedness (Edinburg) to ensure comparability of mental capacity between groups.

The purpose of Raven's progressive matrices is to assess reasoning in the visual modality. The standard test consists of 60 items grouped into five sets, each set containing 12 items. Each item contains a pattern problem with one part removed and six to eight pictured inserts, one of each contains the correct pattern ([72]).

The purpose of the WAIS test is to provide a measure of general intellectual function in older adolescents and adults. It is a core instrument, giving information about the overall level of

intellectual functioning and the presence or absence of significant intellectual disability. The WAIS contains a total of 14 subsets. The examiner asks test questions, displays pictures or puzzles to the patient, and records the patient's responses in an individual response booklet ([74]).

A ten-item questionnaire designed to assess handedness by self-report of the preferred hand for carrying out common activities such as writing and drawing, throwing, and using utensils such as a toothbrush, knife, and spoon. Participants place 1 or 2 check marks under "left" or "right," indicating strength of preference for each activity; 2 checks are to be used if the individual "would never try to use the other hand unless absolutely forced to" for the given function. As some activities require the use of both hands, the directions specify which component reflects hand preference . A laterality quotient can be calculated where a score of 100 reflects complete dextrality, and a score of −100 is obtained by complete sinistrals ([54]).

Because all tasks were visual and colored, we confirmed normal visual acuity (Snellen) and color perception (Ishihara). We will explain Ishihara test in instruments and measures section.

Therapy was conducted in either English or French depending on the participant preference. All therapies were delivered on an individual weekly basis up to a maximum of 24 weeks. Previous research by our team has been shown that the best predictor of outcome at 24 weeks is clinical improvement at 13 weeks. This finding allows us to decide on best treatment options for all participants at 13 weeks. Participants undertook the therapy course of 24 weeks on the understanding that completion of the course requires continual and regular attendance at weekly sessions. In the case of a participant showing non-clinical status prior to 24 weeks, attendance was continued up to 24 weeks. At 24 weeks, if the person showed minimal improvement they were referred elsewhere to suitable resources. All parameters of treatment delivery were identical across treatment modalities. Principal outcome measures were evaluated at pre and post-treatment.

2.3 Participants

Our clinical groups consist of 16 women (59, 25%) and 11 men (40, 75%) with mean age of 40,67±13,61years old and our control group include 14 women (56%) and 11 men (44%) with mean age of 35,12±12,74.

Different subtypes of our participants can be found in Table 1.

Table1.The number and percentage of OCD participants based on their subtype

Subtype	Number	Percentage
Aggressive	5	18,51
Checking	5	18,51
Contamination	5	18,51
Hoarding	5	18,51
Body dysmorphic	6	22,22
somatic	1	3,07

2.4. Instruments and measures

An interview assessed participants according to DSM-IV-TR and on personal history and severity of OCD symptom rating using the Yale Brown Obsessive Compulsive Scale (**Y-BOCS**). Also, we used the anxiety and depression questionnaire to assess comorbidity with these disorders.

2.4.1 *Yale-Brown Obsessive-Compulsive scale*

The Yale-Brown Obsessive-Compulsive Scale (**Y-BOCS**) is a 10-item clinician-rated scale that

assesses the severity of obsessions and compulsions independent of the type or number of symptoms ([13]). Each item rated from 0 (no symptoms) to 4 (extreme symptoms), yielding a total possible score range from 0 to 40. The scale includes questions about the amount of time the patient spends on obsessions, how much impairment or distress they experience, and how much resistance and control they have over these thoughts. The same types of questions are asked about compulsions (e.g., time spent, interference, etc.) as well. The results can be interpreted based on the total score. A total score of 0-7 is interpreted as a "Subclinical "OCD; 8-15 as "Mild"; 16-23 as "Moderate", 24-31 as "Severe" and 32-40 as "extreme" OCD.

Different studies ([55, 24]) illustrate that this test has good internal consistency, convergent validity and discriminant validity. For example, Pertusa et al (2012) show that in their study Cronbach's alphas and P value for different dimensions were between 97 and 99 and less than 0.01 respectively.

Refractoriness to treatment in OCD includes a decrease less than 35% on the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) total score at final evaluation as compared to baseline or a final score of >16 on the Y-BOCS ([5]).

2.4.2 Beck Anxiety Inventory

The Beck Anxiety Inventory (**BAI**) is a 21- item multiple-choice self-report inventory that measures the severity of an anxiety in adults and adolescents. Because the items in the BAI describe the emotional, physiological, and cognitive symptoms of anxiety but not depression, it can discriminate anxiety from depression. Each of the items on the BAI is a simple description of a symptom of anxiety in one of its four expressed aspects: (1) subjective (e.g., "unable to relax"), (2) neurophysiologic (e.g., "numbness or tingling"), (3) autonomic (e.g., "feeling hot") or (4) panic-related (e.g., "fear of losing control"). Respondents are asked to report the extent to which they have been bothered by each of the 21 symptoms in the week preceding (including the day of) their

completion of the BAI. Each symptom item has four possible answer choices: Not at All; Mildly (It did not bother me much); Moderately (It was very unpleasant, but I could stand it), and; Severely (I could barely stand it). The clinician assigns the following values to each response: Not at All = 0; Mildly = 1; Moderately = 2, and; Severely = 3. The values for each item are summed yielding an overall or total score for all 21 symptoms that can range between 0 and 63 points. A total score of 0-7 is interpreted as a "Minimal" level of anxiety; 8-15 as "Mild"; 16-25 as "Moderate", and; 26-63 as "Severe" ([6]).

2.4.3 Beck Depression Inventory

The Beck Depression Inventory (**BDI**) is a 21 -item; multiple-choice self-report ratings inventory that measures characteristic attitudes and symptoms of depression. This questionnaire is composed of items relating to symptoms of depression such as hopelessness and irritability, cognitions such as guilt or feelings of being punished, as well as physical symptoms such as fatigue, weight loss, and lack of interest in sex. When the test is scored, a value of 0 to 3 is assigned for each answer and then the total score is compared to a key to determine the depression's severity. The standard cut-offs are as follows: 0-9 indicates minimal depression, 10-18 mild, 19-29 moderate and 30-63 severe depression ([7]).

2.4.4 *Ishihara*

The Ishihara Color Test is an example of a color perception test for red-green color deficiencies. The test consists of a number of colored plates, called Ishihara plates, each of which contains a circle of dots appearing randomized in color and size. Within the repetition pattern are dots which form a number or shape clearly visible to those with normal color vision, and invisible, or difficult to see, to those with a red-green color vision defect, or the other way around. The full test consists of 38 plates, but the existence of a deficiency is usually clear after a few plates. There is also the

smaller test consisting only 24 plates ([27]).

2.4.5 *Edinburgh Handedness Inventory*

The Edinburgh Handedness Inventory is a measurement scale used to assess the dominance of a person's right or left hand in everyday activities, sometime referred to as laterality. The inventory consist questions about the more obvious unilateral activities such as writing and drawing. The set of answers obtained may be regarded as a structured, standardised description of the individual's handedness characteristics ([54]).

2.5. Neuropsychologic tests and measures

The following tests were administered: Cardebat-D test to evaluate non-verbal fluency, D-Kefs test to check verbal fluency and Rey figure test to evaluate Visio spatial and memory of participants.

2.5.1 Rey-Osterreich Complex Figure Test

Rey-Osterreich Complex Figure Test (RCFT) is administered to evaluate visio-spatial integration, planning, organizational skills, problem solving, motor functioning, perceptual and memory abilities. This task includes a copy condition, a 3 minutes immediate recall and a 30 minutes delayed recall condition.

The figure was placed in front of the subjects, who were requested to copy the figure as accurately as possible and inform the examiner when they had finished. When the copying of the figure was completed the stimulus was removed from sight. After a 3-minute delay participants were asked to reproduce the figure from memory (without forewarning). In the delay-period verbal fluency tests were applied. The figure can be separated into 18 different units. For scoring (both copy and recall) two points were given if an element was correctly reproduced. One point was given when the

reproduction was distorted, incomplete but placed correctly or complete but placed in incorrect location. A score of 0.5 points was given if an element was placed in an incorrect location and distorted/incomplete. Not recognizable elements were given a score of zero.

Based on the quality of the copy, subjects were divided into two groups. Incomplete copy score (scores below 34) and faultless copy score (scores of 34 and above). This split variable was computed to evaluate recall performance based on the quality of the copy. The cut-off score of 34 was chosen because many people make minor mistakes when copying and a score of 34 would still allow one item from the figure to be missed ([45]).

The response time and the accuracy for each condition were scored by one independent neuropsychologist blind to the participant's diagnosis. Internal and Test-Retest reliability of this test is high. Both split-half and coefficient alpha reliabilities were greater than 0.60 for the copy condition and greater than 0.80 for recall condition. Also, the percentage agreement in the clinical interpretation between the first and second testing session was 91.7([74]).

2.5.2 D-KEFS fluency test

We used D-KEFS fluency test to evaluate non-verbal fluency. The objective of this test is to examine the integrity of executive functions by assessing the client's ability to make different designs, assessing response inhibition and cognitive flexibility. The participant must make the greatest possible different designs for 1 min. We use a sheet containing rows of squares filled points in the protocol. Three conditions are:

Condition 1: that the participant drew connecting points between them filled by the rules

Condition 2: that the participant drew connecting only empty points

Condition 3: that the participant switched between full and empty points to make different designs. The validity of this test for non-verbal fluency isn't high but it is acceptable and with a score about 0.59([74]).

2.5.3 Cardebat- D test

Cardebat-D is a French version of verbal fluency evaluation. Because our participants were English and French speaking, we used both versions of this test. It is a simple test of language production. The selected lexical evocation tests involve oral lexical items corresponding to three semantic criteria production and three formal. Each of these subtests is assigned a time of 2 minutes; the productions are recorded and analyzed at the time of transcription in four blocks of 30 seconds per subtest. The order of execution is random and three semantic criteria are: "Animals" considered rich items, "Furniture" items considered poor and "Fruits" considered intermediate. For lexical fluency, we ask the participants to say as many words as possible beginning with the letters P, R and V. A lexical and categorical fluency sufficient in clinical routine to get an idea. Although, several researchers have used this test to evaluate verbal fluency in diverse population and performance norms exist, there is little information about the validity of this test ([10]).

2.6. Statistical analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS; Version 8.0). Analysis of scores for normality revealed that the all neuropsychological variables except two were normatively distributed and hence parametric test (t- test) was employed. We used non-parametric test (Mann-Whitney Test) for variable of verbal fluency and handedness for data that were not normally distributed. First question was tested by correlation of analysis clinical scores on Y-BOCS compared with the neuropsychological tests using Pearson's product-moment correlation, assuming parametric distribution of scores or Spearman's rank correlation for non-parametric. Bonferroni correction controlled for multiple comparison.

In line with our first hypothesis, we compared by t-test pre-treatment information between OCD and control participants who completed the same neuropsychological tests as the OCD group

between September 2006 and June 2013. We also, established differences on neuropsychological tests within the OCD group alone in relation to symptom severity.

For the second question we computed analysis of variance on repeated neuropsychological and clinical measures pre-post treatment.

CHAPTER 3
RESULTS

3.1 Demographic and functional characteristics

Table 2 summarizes the demographic and functional characteristics of the OCD and control group. The OCD patients and the controls did not differ significantly in demographic and functional characteristics such as age, educational level, gender, visual acuity, color perception and handedness.

Table 2.Demographic and functional characteristics of the OCD patients and normal controls

Variables	OCD(n=27)		Controls(n=25)		P-value	T-Test
	Mean	SD	Mean	SD		
Age	40, 67	13, 61	35, 12	12, 74	0,136	1,514
Education (years)	14, 03	2, 86	13, 36	2, 03	0,328	0,988
Age of onset	15, 25	9, 68				
Duration of illness (year)	25, 41	14, 9				
Visual Acuity	1, 09	0, 15	1, 08	0,21	0,806	0,247
Color Perception	10, 77	0, 42	10, 68	0,69	0,538	0,621
Handedness (Mean Rank)	25, 93		27, 12		0,482	-0,703(Z)

3.2. Clinical assessment

Ten patients had minimal anxiety (37, 03%) while eight participants with OCD had mild anxiety (29, 62%). In addition, 6 and 3 patients suffered from moderate and severe anxiety, respectively (22, 22% and 11, 11%). Based on depression questionnaire, we found that one patient suffered from severe depression (3, 7%) and three of the clinical group had moderate depression (11, 11%). Also, twelve and eleven patients had minimal and mild depression, respectively (44, 44% and 40, 74%). Nineteen member of control group had minimal anxiety (76%) and six of them suffered from mild anxiety (24%). In our control group, we didn't find the participants with mild or more severe depression but, twenty four participants had minimal depression (96%).

Table 3 shows the results of pretreatment and control group of anxiety and depression questionnaires .The OCD patients were found to be more depressed (14, 89±8,25, p<0,001) and anxious (12,52±9,73, p=0,001) as evaluated by BDI and BAI. It shows that those with OCD have elevated levels of depression and anxiety as compared to controls.

Table3.Comparison of anxiety and depression questionnaire score in the OCD group and control group

Disorder	OCD(n=27)		Controls(n=25)		P-Value	T-Test
	Mean	SD	Mean	SD		
Anxiety	12,52	9,73	5,04	4,80	0,001	3,552
Depression	14,89	8,25	3,08	3,91	<0,001	6,669

Based on Y-BOCS scores, we found that one patient had mild OCD (3, 7%) and eight of them had moderate OCD (29, 62%). Also, fourteen and four persons of our participants had severe and extreme OCD, respectively (51, 85% and 14, 81%).

The results of anxiety, depression and Y-BOCS questionnaires in OCD group, before and

after treatment, are shown in table 4. This table shows that the treatment reduced the severity of OCD symptoms and the severity of anxiety and depression as comorbid disorders. Although, there is a significant difference between score of Y-BOCS before and after treatment, however twelve participants' posttreatment score remeasured greater than 16. In addition, the score of one patient with OCD reduced less than 35% posttreatment.

Table4.Comparison of anxiety, depression and Y-BOCS questionnaire score before and after treatment in OCD group

Disorder	Pre-treatment		Post-treatment		P-Value	T-Test
	Mean	SD	Mean	SD		
Anxiety	12, 52	9, 73	9, 30	8, 44	0,009	2,842
Depression	14, 89	8, 25	10, 33	8, 22	0,001	3,675
Y-BOCS	25, 81	5, 80	15, 22	6, 38	<0,001	7,643

3.3. Neuropsychological tests

Scores on pretreatment and control group assessment of neuropsychological tests and for all participants are shown in Table 5.

There were significant and near significant differences between OCD and control group on the following tests: Rey figure copy score (p=0,007), time of copy score (p=0,042), immediate recall (p=0,055), time of immediate recall (0,052), delay recall (p=0,067) and time of delay recall (p=0,092).

But, we didn't find considerable differences on D-kefs test(non-verbal fluency) condition1 (p=0,777), condition2 (p=0,922), condition3 (p=0,117), Cardebat-D test(verbal fluency), P word(p=0,325), R word(p=0,247), V word(p=0,712), animal word(p=0,572), fruit word(0,706) and furniture word(p=0,178). Also, we didn't find a significant difference between OCD group and control

group on WAIS test (p=0,164) and Raven test (p=0,382).

Table 5.Comparison of performance on neuropsychological tests in the OCD group and control group

Neuropsychological variable value	OCD(n=27) Mean	SD	Controls(n=25) Mean	SD	P-Value	t-Test
Raven	24,14	4,35	25,12	3,50	0,382	-0,882
WAIS	17,40	2,97	18,68	3,52	0,164	-1,41
D-kefs						
First Condition	10, 26	2, 79	10,00	3,25	0,777	0,285
Second Condition	12, 59	3, 50	12,50	2,30	0,922	0,099
Third condition	8, 85	2, 99	10,28	2,82	0,117	-1,600
Rey figure						
Copy Score	31, 44	2, 43	33,54	2,97	0,007	-2,788
Time of copy Score	180, 04	88, 33	140,84	36,97	0,042	2,114
Immediate Recall	18, 94	6, 54	22,38	6,02	0,055	-1,963
Time of Immediate Recall	155, 78	90, 39	118,40	32,15	0,052	2,017
Delayed Recall	18, 25	6, 41	21,46	5,85	0,067	-1,873
Time of Delayed Recall	121, 48	64, 21	98,36	25,20	0,092	1,732
Cardebat-d						
P Words	23, 44	5, 38	22,08	4,40	0,325	0,995
R words	20, 78	5, 44	19,00	5,49	0,247	1,171
V words	18, 78	4, 23	18,78	4,23	0,712	0,371
Animal Words	28, 96	5, 66	29,92	6,45	0,572	-0,570
Fruits Words(Mean Rank)	27,26		25,68		0,706	-0,378(Z)
Furniture (Goods) Words	17, 50	4, 41	15,92	3,81	0,178	1,365

Descriptive statistics for outcomes at baseline and posttretament can be found in Table 6. When baseline results compared with posttreatment situation, no differences were detected in the majority of tests. In fact, we see significant difference, just, in score of immediate and delayed recall of Rey Figure test (P=0, 034, P=0,032 respectively).

Table6.Comparison of performance on neuropsychological tests before and after treatment in the OCD group

Neuropsychological variable value	pre-treatment		post-treatment		P-Value	t-Test
	Mean	SD	Mean	SD		
D-Kefs						
First Condition	10,35	2,61	11,33	2,66	0,290	-1,099
Second Condition	12,33	4,04	12,40	3,48	0,945	-0,070
Third condition	8,80	3,50	8,87	3,24	0,910	-0,115
Rey figure						
Copy Score	30,83	1,90	32,06	3,29	0,094	-1,797
Time of copy Score	165,47	76,53	153,60	70,03	0,496	0,699
Immediate Recall	18,90	7,22	23,26	5,64	0,034	-2,344
Time of Immediate Recall	155,33	64,70	152,80	64,63	0,855	0,186
Delayed Recall	18,43	7,03	22,73	6,31	0,032	-2,374
Time of Delayed Recall	115,87	46,13	111,60	45,78	0,671	0,434
Cardebat-D						
P Words	23,33	4,43	23,07	3,93	0,838	0,209
R words	21,67	4,25	21,33	3,41	0,632	0,490
V words	18,67	3,77	20,13	4,20	0,175	-1,427
Animal Words	28,73	4,92	28,93	3,75	0,871	-0,166
Fruits Words	20,40	4,13	21,73	3,19	0,186	-1,390
Furniture (Goods) Words	18,50	5,51	17,64	3,45	0,472	0,741

Also, we used Pearson test to look at correlations between Y-BOCS score that shows severity of OCD symptoms and neuropsychological tests. Table 7 illustrates these results. We found significant correlation between Y-BOCS scores and time of copy score in Rey figure test and P words and Animal words of Cardebat-d test. While correlation is positive in the first test, it is negative in second and third test.

Table7. Correlation of Y-BOCS score with neuropsychological tests

	D-Kefs					
	First Condition		Second Condition		Third Condition	
Y_BOCS	R	P	R	P	R	P
	0,015	0,941	-0,133	0,510	-0,367	0,060

Table7.(Continued)

	Rey figure											
	Copy Score		Time of copy Score		Immediate Recall		Time of Immediate Recall		Delayed Recall		Time of Delayed Recall	
Y_BOCS	R	P	R	P	R	P	R	P	R	P	R	P
	-0,046	0,821	0,401	0,038	-0,267	0,178	0,204	0,308	-0,218	0,276	0,260	0,190

Table7.(Continued)

	Cardebat-D											
	P Words		R words		V words		Animal Words		Fruits Words		Furniture Words	
Y_BOCS	R	P	R	P	R	P	R	P	R	P	R	P
	-0,481	0,011	-,196	0,327	-,224	0,262	-,0410	0,034	-,503	0,793	0,002	0,994

CHAPTER 4
DISCUSSION

4.1 Objective and resume of study

We investigated the neuropsychological profile in a sample of OCD subjects and healthy controls using a comprehensive battery of neuropsychological tests. The OCD group and the healthy control group (HCG) were comparable on age, years of education and gender composition. Patients with OCD didn't show significant poorer performance on tasks of visuospatial working, non-verbal memory, general intelligence, verbal and non-verbal fluency comparing to control group. The only significant difference between these groups was in copy score and the time that participants took to do this part of Rey complex figure test. The RCFT has been widely employed as a measure of visuospatial constructional ability and visuospatial memory ([35]). Meyers and Meyers (1995), further, insisted that RCFT permits assessment of such cognitive processes as planning, organizational skills and problem-solving as well as perceptual, motor and memory functions ([54]). The precise cognitive operations required for adequate RCFT performance are known to include visual perception, visuospatial organization, motor functioning and, on the recall conditions, memory ([35]). Chiulli et al. (1995) suggested that conditions of copy, immediate and delayed recall provide different information. They declare that while the copy condition reflects perceptual, visuospatial and organizational skill, the immediate recall reflects the amount of information that is encoded. Furthermore, the delayed recall condition reflects the amount of information that is stored and retrieved from memory ([11]). Mathews et al (2001) believe that impaired organizational strategy scores are due to focal frontal lesion and temporal lobe lesion could cause a recall impairment ([44]).Another study (Choi et al 2003) shows that the volume of the left anterior subregion of the orbitofrontal cortex(OFC) was positively correlated with the RCFT copy score([13]).In addition, at least two studies claim that organization during a copy trial is a strong predictor for the subsequent immediate and delayed recall performance, since the organizational process of memory is crucial

for efficient encoding and retrieval of information ([15, 21]). Also, it has been suggested that individuals with OCD do not have 'true' memory deficits. In fact, they do not forget encoded material, but have difficulty utilizing organizational strategies in order to encode effectively ([32]).

There is considerable evidence in the literature for the presence of non-verbal memory deficits in OCD ([77, 32, 47, 39]) but the present study doesn't support previous findings completely.

In our study, relative to healthy controls, patients with OCD weren't shown to have impaired memory functioning on non-verbal immediate and delayed recall tests; but, the performance of OCD patients in the copy score was less than of control group. In addition, on comparison of pre and post treatment findings, there was a difference. While our patients had a considerable improvement in immediate and recall score with psychotherapy, some researchers didn't report this finding ([8, 21]).

Our results could suggest that psychotherapy improves not only encoding information but also storing and retrieving information.

The D-KEFS consists of a set of nine tasks designed to assess the component processes of executive functioning. We used one subgroup of this test to evaluate non-verbal fluency of our participants. Several studies have documented that performance on the D-KEFS, including non-verbal fluency, is adversely affected by frontal lobe lesion. To our knowledge, unlike verbal fluency, the majority of researchers didn't evaluate this task in OCD patients. Although, the finding of previous research supported our own findings ([37]), others reported inferior performance in OCD group comparing with controls ([77]). Kuelz et al (2006) reported significant difference between OCD and control group on this task but, they used the Five-Point test to assess non-verbal fluency ([38]).

Verbal fluency assesses the spontaneous oral generation of words based on phonemic (phonemic fluency) or semantic criteria (semantic fluency). In general, phonemic fluency has been thought to be associated with frontal-lobe function, while semantic fluency has been thought to be associated with temporal-lobe function ([66]). The majority of researchers have used other tests (I.e. COWA) in order to evaluate this function.

Bolton et al (2000) claim that they found a significant difference between OCD and control in verbal fluency in their study. Roh et al (2005) and Kim et al (2002) added that the results of their study are in agreement with the view that the cognitive dysfunctions associated with verbal fluency remain despite the clinical improvement. The present study doesn't support this idea because relative to healthy controls, the OCD group didn't demonstrate impaired verbal fluency.

Greisberg et al (2003) didn't find a relationship between the experimental measures and severity of symptoms as measured by the Y-BOCS ([26]) but, unlike it, Tallis et al (1999) have shown a significant relationship between recognition memory problems and immediate memory for actions with general symptom severity ([77]).

In a meta-analysis by Kuelz and his colleagues (2004), they report that out of 22 neurocognitive investigations elucidating the role of symptom severity, most commonly assessed with the Yale Brown Obsessive-Compulsive Scale; 9 studies found no correlation between symptom severity and cognitive functioning and contrary to expectation, some authors found a positive correlation between neuropsychological functioning and symptom severity ([40]).

Although, our study shows a significant correlation between 3 tests and severity of OCD symptoms, we didn't find this correlation in the majority of our tests.

Based on Y-BOCS score, we found that cognitive-behavioural treatment had the effect of reducing symptoms for all participants. It is in the agreement with five earlier studies ([28, 38, 8, 42, 63]) but, some article have claimed that psychotherapy hasn't been effective ([73]).

The data from our sample illustrates that OCD patients are more anxious and depressed than control healthy participants. These results are broadly consistent with extant research ([32, 35, 38, 28]). Research on the impact of co-morbid psychiatric problems on neuropsychological functioning in OCD has focused almost exclusively on depression, typically examining correlations between performances on continuous measures such as the Beck Depression Inventory. Several such studies have reported that depression contributes to deficits in OCD on measures such as those tapping executive functions, memory and verbal fluency ([64]). This finding raises an important

question. What percentage of these defects is due to depression and how much caused by OCD? Next studies might answer to this question.Yap et al (2012) state that comorbid depression is a predictor of poor treatment response in OCD ([84]) but, the present study illustrates that treatment has reduced OCD symptoms and severity of depression and anxiety. These data are compatible with some studies ([35, 63]).

6. Limitation

This study must be interpreted in the light of some limitations. As with other studies conducted in this area, an important limitation to this study is small sample size. Also, some patients didn't come back to repeat neuropsychological test after treatment. Using, just three neuropsychological tests is the third limitation of this study, therefore; we didn't evaluate all neurocognitive functions.

7. Recommendation

As we already mentioned, we used three neuropsychological tests in order to evaluate neurocognitive function of our participant. We believe that our results need to be replicated with a larger participant's sample especially for the Cardebat-D test that researchers have used less than other tests. Also, if other researchers use other neuropsychological tests, we could have clearer image of the extent of neurocognitive dysfunction of patients with OCD. In addition, more controls on the influence of comorbid disorders on cognitive function of patients with OCD are necessary.

CHAPTER 5
CONCLUSION

The present research is one of only a handful of studies examining the neuropsychological tests for predicting the outcome of treatment in OCD. In summary, the present study demonstrated that OCD patients have specific cognitive impairments. Compared with the controls, the OCD patients showed their cognitive deficits in copy score and the time that they took to do this part of the Rey complex figure test. The neuropsychological profile in OCD patients obtained from the present study isn't consistent with some other studies. To conclude, the findings suggest that OCD patients with neurocognitive impairment can benefit from cognitive-behavioral therapy, because this therapy improves at least, some neurocognitive dysfunction.

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Appendix A

Beck anxiety inventory

Below is a list of common symptoms of anxiety. Please carefully read each item in the list. Indicate how much you have been bothered by that symptom during the past week, including today, by writing an “X” in the corresponding space in the column next to each symptom.

	Not At All	**Mildly** but it didn’t bother me much	**Moderately** It wasn’t pleasant at times	**Severely** It bothered me a lot
1. Numbness or tingling				
2. Feeling hot				
3. Wobbliness in legs				
4. Unable to relax				
5. Fear of worst happening				
6. Dizzy or lightheaded				
7. Heart pounding/ racing				
8. Unsteady				
9. Terrified or afraid				
10. Nervous				
11. Feeling of choking				
12. Hands trembling				
13. Shaky / unsteady				
14. Fear of losing control				
15. Difficulty in breathing				
16. Fear of dying				
17. Scared				
18. Indigestion				
19. Faint / lightheaded				
20. Face flushed				
21. Hot/cold sweats				

Appendix B

Beck Depression Inventory

This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the one statement in each group that best describes the way you have been feeling during the past two weeks, including today. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Change in Sleeping Pattern) or Item 18 (Change in Appetite).

1.	0	I do not feel sad.
	1	I feel sad much of the time.
	2	I am sad all the time.
	3	I am so sad or unhappy that I can't stand it.
2.	0	I am not discouraged about my future.
	1	I feel more discouraged about my future than I used to be.
	2	I do not expect things to work out for me.
	3	I feel my future is hopeless and will only get worse.
3.	0	I do not feel like a failure.
	1	I have failed more than I should have.
	2	As I look back, I see a lot of failures.
	3	I feel I am a total failure as a person.
4.	0	I get as much pleasure as I ever did from the things I enjoy.
	1	I don't enjoy things as much as I used to.
	2	I get very little pleasure from things I used to enjoy.
	3	I can't get any pleasure from the things I used to enjoy.

5.	0	I don’t feel particularly guilty.
	1	I feel guilty over many things I have done or should have done.
	2	I feel quite guilty most of the time.
	3	I feel guilty all of the time.
6.	0	I don’t feel I am punished.
	1	I feel I may be punished.
	2	I expect to be punished.
	3	I feel I am being punished.
7.	0	I feel the same about myself as ever.
	1	I have lost confidence in myself.
	2	I am disappointed in myself.
	3	I dislike myself.
8.	0	I don’t criticize or blame myself more than usual.
	1	I am more critical of myself than I used to be.
	2	I criticize myself for all of my faults.
	3	I blame myself for everything bad that happens.
9.	0	I don’t have any thoughts of killing myself.
	1	I have thoughts of killing myself, but I would not carry them out.
	2	I would like to kill myself.
	3	I would kill myself if I had the chance.
10.	0	I don’t cry anymore than I used to.
	1	I cry more than I used to.
	2	I cry over every little thing.
	3	I feel like crying, but I can’t
11.	0	I am no more restless or wound up than usual.
	1	I feel more restless or wound up than usual.
	2	I am so restless or agitated that it’s hard to stay still.
	3	I am so restless or agitated that I have to keep moving or doing something

12. 0 I have not lost interest in other people or activities.
    1 I am less interested in other people or things than before.
    2 I have lost most of my interest in other people or things.
    3 It's hard to get interested in anything.

13. 0 I make decisions about as well as ever.
    1 I find it more difficult to make decisions than usual.
    2 I have much greater difficulty in making decisions than I used to.
    3 I have trouble making any decisions.

14. 0 I don't feel worthless.
    1 I don't consider myself as worthwhile and useful as I used to.
    2 I feel more worthless as compared to other people.
    3 I feel utterly worthless.

15. 0 I have as much energy as ever.
    1 I have less energy than I used to have.
    2 I don't have enough energy to do very much.
    3 I don't have enough energy to do anything.

16. 0 I have not experienced any change in my sleeping pattern.
    1a I sleep somewhat more than usual.
    1b I sleep somewhat less than usual.
    2a I sleep a lot more than usual.
    2b I sleep a lot less than usual.
    3a I sleep most of the day
    3b I wake up 1-2 hours early and can't get back to sleep.

17. 0 I am no more irritable than usual.
    1 I am more irritable than usual.
    2 I am much more irritable than usual.
    3 I am irritable all the time.

18.	0	I have not experienced any change in my appetite.
	1a	My appetite is somewhat less than usual.
	1b	My appetite is somewhat greater than usual.
	2a	My appetite is much less than before.
	2b	My appetite is much greater than usual.
	3a	I have no appetite at all.
	3b	I crave food all the time.
19.	0	I can concentrate as well as ever.
	1	I can't concentrate as well as usual.
	2	It's hard to keep my mind on anything for very long.
	3	I find I can't concentrate on anything.
20.	0	I am no more tired or fatigued than usual.
	1	I get more tired or fatigued more easily than usual.
	2	I am too tired or fatigued to do a lot of the things I used to do.
	3	I am too tired or fatigued to do most of the things I used to do.
21.	0	I have not noticed any recent change in my interest in sex.
	1	I am less interest in sex than I used to be.
	2	I am much less interest in sex now.
	3	I have lost interest in sex completely

Appendix C

Y-BOCS Symptom Checklist

Date: ..... Evaluator:.....

Check all that apply, but clearly mark the principal symptoms with a 'P' and must ascertain whether reported behaviours are bona fide symptoms of OCD and not symptoms of other disorders such as Simple Phobia or Hypochondriasis.

	AGGRESSIVE OBSESSIONS	*Current*	*Past*
1.	Fear might harm self		
2.	Fear migth harm others		
3.	Violent or horrific images		
4.	Fear of blurting out obscenities or insults		
5.	Fear of doing something else embarrassing		
6.	Fear will act on unwanted impulses (e.g. stab a friend)		
7.	Others (specify)		
	HONNESTY AND MAKING A MISTAKE OBSESSIONS	*Current*	*Past*
8.	Fear will steal things (a bank, shoplifting, or 'cheating' a cashier)		
9.	Fear will harm others because not careful enough (e.g. hit and run)		
10.	Fear will be responsible for something else terrible happening (e.g. fire, burglary)		
11.	Others (specify)		
	CONTAMINATION OBSESSIONS	*Current*	*Past*
12.	Concerns or disgust with bodily waste or secretion (e.g. urine, feces, saliva)		
13.	Concern with dirt or germs		
14.	Excessive concern with environmental contaminants (e.g asbestos, radiation, toxic waste)		
15.	Excessive concern with household items (e.g. cleansers, solvents)		
16.	Excessive concerns with animals (e.g. insects)		
17.	Bothered by sticky substances or residues		
18.	Concerned will get ill because of contaminant		
19.	Concerned will get others ill by spreading contaminant		
20.	No concern with consequences of contamination other than how it might feel		
21.	Others (specify)		

	SEXUAL OBSESSIONS	*Current*	*Past*
22.	Forbidden or perverse sexual thoughts, images, or impulses		
23.	Content involves children or incest		
24.	Content involves animals		
25.	Content involves homosexuality		
26.	Aggressive sexual behaviours toward others		
27.	Others (specify)		

	HOARDING/SAVING OBSESSIONS	*Current*	*Past*
28.	(specify)		
	RELIGIOUS OBESSIONS (SCRUPULOSITY)	*Current*	*Past*
29.	Concerned with sacrilege and blasphemy		
30.	Excess concern with right/wrong, morality		
31.	(specify)		
	OBSESSION WITH NEED FOR SYMMETRY OR EXACTNESS	*Current*	*Past*
32.	What are the consequences? Accompanied by magical thinking (e.g. mother will be in an accident unless things are in the right place)		
33.	Not accompanied by magical thinking		
34.	(specify)		
	MISCELLANEOUS OBSESSIONS	*Current*	*Past*
35.	Need to know or remember		
36.	Fear of saying certain things		
37.	Fear of not saying just the right thing		
38.	Fear of losing things		
39.	Intrusive (non-violent) images		
40.	Intrusive nonsense sounds, words, or music		
41.	Bothered by certain sounds/noises		
42.	Lucky or unlucky numbers		
43.	Colours with special significance		
44.	Supersticious fears		
45.	Others (specify)		
	SOMATIC OBSESSIONS	*Current*	*Past*
47.	Excessive concerns with body part or aspect of appearance		
48.	Others (specify)		

	CLEANING/WASHING COMPULSIONS	*Current*	*Past*
49.	Excessive or ritualized handwashing		
50.	Excessive or ritualized showering, bathing, toothbrushing, grooming, or toilet routine		
51.	Involves cleaning of household items or other inanimate objects		
52.	Other measures to prevent contact with contaminants		
53.	Other measures to remove contact with contaminants		
54.	Others (specify)		

	CHECKING COMPULSIONS	*Current*	*Past*
55.	Checking doors, locks, stove, electrical appliances, hand-brake in the car, etc.		
56.	Checking that did not/will not harm others		
57.	Checking that did not/will not harm self		
58.	Checking that nothing terrible did/will happen		
59.	Checking that did not make mistake		
60.	Checking tied to somatic obsessions		
61.	Others (specify)		
	REPEATING RITUELS	*Current*	*Past*
62.	Re-reading or re-writing		
63.	Need to repeat routine activities (in/out the door, up/down from chair, etc.)		
64.	Others (specify)		
	COUNTING OBSESSIONS	*Current*	*Past*
65.	(specify)		
	ORDERING AND ARRANGING OBESSIONS	*Current*	*Past*
66.	(specify)		
	HOARDING/COLLECTING COMPULSIONS	*Current*	*Past*
67.	(specify)		

	MISCELLANEOUS COMPULSIONS	*Current*	*Past*
68.	Excessive listmaking		
69.	Need to tell, ask, or confess		
70.	Need to touch, tap, or rub		
71.	Rituals involving blinking or staring		
72.	Measures to prevent : harm to self		
73.	harm to others		
74.	terrible consequences		
75.	Ritualized eating behaviours		
76.	Superstacious behaviours		
79.	Others (specify)		

	MENTAL COMPULSIONS	*Current*	*Past*
80.	Words, images, or special numbers that are used to neutralize		
81.	Special prayer (short or long) that are repeated in a specific set way		
82.	Mental counting		
83.	Mental listmaking		
84.	Review back mentally (like playing back a movie)		
85.	Others (specify)		

	NEUTRALIZATION **(Due to your thoughts about..., do you ever...)**	*Current*	*Past*
86.	Reassure self by telling one's self certain things (e.g. it is not as bad as it seems, don't overreact)?		
87.	Reassurance-seeking from a loved-one, from others (E.g. friends, family, doctors, etc.)?		
88.	Take part in a mental act or a concrete action in order to get rid of the thought? What?		
89.	Ponder carefully about the thought (e.g. find solutions, analyze)?		
90.	Replace the thought by thinking about something else (e.g. more positive things, or others)?		
91.	Distract one's self with surrounding (e.g. arranging a frame, things on the desk)?		
92.	Throw one's self into activities (e.g. housework, TV, work, sport)?		
93.	Tell one's self 'STOP' or something similar (e.g. that's enough)?		
94.	Do nothing with the thought (e.g. let it roam free, not get preoccupied, thought leaves by itself without any strategy)?		
95.	Others (specify)		

	AVOIDANCE **(Due to your thoughts or compulsions, have you ever avoided...)**	*Current*	*Past*
96.	Places (e.g. hospitals, schools)?		
97.	Objects (e.g. a knife)?		
98.	People (e.g. a friend, a teacher, a group of individuals)?		
99.	To do things (e.g. avoided peeling potatoes)?		
100.	Certain types of information (e.g. a movie, a report, the news)?		
101.	Interpersonal situations (e.g. if people around me talk about cancer I leave)?		
102.	Others (specify)		

Target Symptom List

Date: ..... Evaluator:.....

Obsessions

Problem 1: _____

_____

_____

Problem 2: _____

_____

_____

Problem 3: _____

_____

_____

Problem 4: _____

_____

_____

Compulsions (Mental compulsions included)

Problem 1: _____

_____

_____

Problem 2: _____

_____

_____

Problem 3: _____

_____

_____

Problem 4: _____

_____

_____

Neutralization (Do not include mental compulsions)

Problem 1: _____

_____

_____

Problem 2: _____

_____

_____

Problem 3: _____

_____

_____

Problem 4: _____

_____

_____

Avoidance

Problem 1: _____

_____

_____

Problem 2: _____

_____

_____

Problem 3: _____

_____

_____

Problem 4: _____

_____

_____

YALE-BROWN OBSESSIVE COMPULSIVE SCALE (Y-BOCS)
Revised version

Date:..... Evaluator:.....

Obsessions

1.	Time occupied by obsessive thought	*None*	*Mild*	*Moderate*	*Severe*	*Extreme*
		0	**1**	**2**	**3**	**4**
1.b	Obsession-free interval (not included in sub-total scores)	*None*	*Long*	*Moderately long*	*Short*	*Extremely short*
		0	**1**	**2**	**3**	**4**
2.	Interference due to obsessive thoughts	**0**	**1**	**2**	**3**	**4**
3.	Distress associated with obsessive thoughts	**0**	**1**	**2**	**3**	**4**
4.	Resistance against obsession	*Complete resistance*				*Yields completely*
		0	**1**	**2**	**3**	**4**
5.	Degree of control over obsessions	*Complete*	*Much*	*Moderate*	*Little*	*None*
		0	**1**	**2**	**3**	**4**

Sub-total for obsessions (add items 1 to 5): _____

Compulsions

C6.	Time spent performing compulsive behaviours	*None*	*Mild*	*Moderate*	*Severe*	*Extreme*
		0	**1**	**2**	**3**	**4**
C6. b	Compulsion-free interval (not included in sub-total scores)	*None*	*Long*	*Moderately long*	*Short*	*Extremely short*
		0	**1**	**2**	**3**	**4**
C7.	Interference due to compulsive behaviours	**0**	**1**	**2**	**3**	**4**
C8.	Distress associated with compulsive behaviours	**0**	**1**	**2**	**3**	**4**

C9.	Resistance against compulsions	*Complete resistance*				*Yields completely*
		0	**1**	**2**	**3**	**4**
C10.	Degree of control over compulsive behaviours	*Complete*	*Much*	*Moderate*	*Little*	*None*
		0	**1**	**2**	**3**	**4**

Sub-total for compulsions (add items C6 to C10): _____

Neutralization

N6.	Time spent on neutralization	*None*	*Mild*	*Moderate*	*Severe*	*Extreme*
		0	**1**	**2**	**3**	**4**
N6.b	Neutralization-free interval	*None*	*Long*	*Moderately long*	*Short*	*Extremely short*
		0	**1**	**2**	**3**	**4**
N7.	Interference due to neutralization	**0**	**1**	**2**	**3**	**4**
N8.	Distress associated with neutralization	**0**	**1**	**2**	**3**	**4**
N9.	Resistance against neatralization	*Complete resistance*				*Yields completely*
		0	**1**	**2**	**3**	**4**
N10.	Degree of control over neutralization	*Complete*	*Much*	*Moderate*	*Little*	*None*
		0	**1**	**2**	**3**	**4**

Sub-total for neutralization (add items N6 to N10): _____

Avoidance

E6.	Degree of avoidance	*None*	*Little*	*Moderate*	*Important*	*Extremely important*
		0	**1**	**2**	**3**	**4**
E6.b	Avoidance-free interval	*None*	*Long*	*Moderately long*	*Short*	*Extremely short*
		0	**1**	**2**	**3**	**4**
E7.	Interference due to avoidance	**0**	**1**	**2**	**3**	**4**
E8.	Distress associated with avoidance	**0**	**1**	**2**	**3**	**4**
E9.	Resistance againsts avoidance	*Complete resistance*				*Yields completely*
		0	**1**	**2**	**3**	**4**
E10.	Degree of control over avoidance	*Complete*	*Much*	*Moderate*	*Little*	*None*
		0	**1**	**2**	**3**	**4**

Sub-total for avoidance (add items E6 to E10): _____

11.	Insight into obsessions and compulsions	*Excellent*				***Absent***
		0	**1**	**2**	**3**	**4**

12.	Avoidance		*None*	*Little*	*Moderate*	*Important*	*Extremely important*
			0	**1**	**2**	**3**	**4**
13.	Degree of indecisiveness		**0**	**1**	**2**	**3**	**4**
14.	Overvalued sense of responsability		**0**	**1**	**2**	**3**	**4**
15.	Pervasive slowness		**0**	**1**	**2**	**3**	**4**
16.	Pathological doubting		**0**	**1**	**2**	**3**	**4**
17.	Global severity	*None*	*Slight*	*Mild*	*Moderate*	*Moderate-severe*	*Severe*	*Extremely severe*
		0	**1**	**2**	**3**	**4**	**5**	**6**
18.	Global improvement	*Extremely worse*	*Much worse*	*Minimally worse*	*No change*	*Minimally improved*	*Much improved*	*Very much improved*
		0	**1**	**2**	**3**	**4**	**5**	**6**
19.	Reliability			*Excellent*	*Good*	*Fair*	*Poor*	
				0	**1**	**2**	**3**	

Comments