



**SERVIZIO SANITARIO REGIONALE  
EMILIA-ROMAGNA**  
Azienda Unità Sanitaria Locale di Parma



Integrated Care Department of Mental Health and Addiction Services  
University-Affiliated Hospital Psychiatric Services Unit

**PROJECT TITLE:**

**Obsessive-Compulsive Disorder: formal and content-related modalities,  
factors involved in insight loss, the role of trauma, and correlations with  
Schizophrenia Spectrum Disorders.**

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### **Study Design:**

Observational (medication-free), cross-sectional, multicenter

### **Recruitment Period:**

February 2023 – February 2026

## **1. Introduction**

### **1.1a The Ritual**

In OCD, the ritual is represented by compulsive acts, which, according to the latest diagnostic systems (DSM-5), are defined as repetitive behaviors or mental acts that the subject feels compelled to perform in response to an obsession or according to rules that must be applied rigidly. These behaviors or mental acts are aimed at preventing anxiety or distress related to feared events or situations, which are the subject of obsessive ideation; however, these actions are not realistically connected to what they are intended to neutralize or prevent, or they are clearly excessive.

These rituals are experienced as highly distressing and time-consuming, leading to repercussions on occupational and interpersonal functioning. Sometimes, compulsive acts appear unrelated to obsessive ideation; in such cases, the symptomatology consists exclusively of ritualistic behavior.

Ritualistic behaviors have been observed in the general population since early childhood and are considered part of normal development, beginning around age two with a peak in adolescence. The formal and content aspects are considerably similar to pathological compulsions and no significant differences have been found across different cultural groups

Several studies have evaluated the content of compulsive rituals through self- and clinician-administered rating scales, with a prevalence of control and cleanliness content, whereas data on formal characteristics are scarce, except for studies conducted on animal models.

Compulsive behavior is often described using ethological terms such as "stereotypes" (Insel et al., 1988) or "ritualized behaviors". In ethology, a behavior is defined as ritualized when it diverges from its original function and acquires a demonstrative purpose. This occurs through the simplification or exaggeration of formal aspects, rhythmic repetition, or accentuation of particular motor units.

The structure of ritual behavior, both in ethology and psychopathology, consists of common actions (performed both in goal-directed behavior and in the ritual, providing practicality and effectiveness) and idiosyncratic or non-functional actions (performed only in rituals and not linked to practical meaning). It has been observed that OCD patients exhibit a significantly higher number of idiosyncratic actions with redundant, non-functional acts: furthermore, many idiosyncratic acts occur at the end of the action, supporting the hypothesis that OCD patients experience an altered perception of the end-signal and tend to persist in the action.

The present study aims to conduct an in-depth analysis of the formal characteristics of ritualized action in OCD patients, particularly examining the motor patterns that constitute it and their specific spatiotemporal properties; it also seeks to evaluate possible correlations with clinical manifestations and the severity of the disorder.

### 1.1b Loss of Insight

Egodystonia has traditionally been considered a distinctive feature of OCD; however, there are forms of this clinical condition in which insight (defined as "awareness of illness") is impaired.

According to the diagnostic specifications of modern classification systems, the most recent literature considers insight along a continuum: from full awareness of the absurdity of one's symptoms and preservation of egodystonia to the perception of these symptoms as realistic and reasonable, and thus egosyntonic to the subject experiencing them.

Therefore, the nosographic classification of low-insight forms—which, moreover, present with high prevalence rates (21–36%)—is more complex: in DSM-5, the specifier "OCD with poor insight" was introduced, and some authors place this condition within the schizophrenia spectrum disorders.

#### *- Clinical Characteristics and Course of Low-Insight Forms*

Regarding the relationship between insight loss and the clinical aspects of the disorder, literature findings are inconsistent: while some authors have not found significant differences between OCD forms with preserved and poor insight, other studies have identified specific symptom and course characteristics. These forms appear to be associated with greater severity of obsessive-compulsive symptoms, higher prevalence of compulsions (especially ordering, washing, and checking), and specific obsessive contents (aggressive, religious, and somatic ideations), as well as an earlier age of onset and longer illness duration.

Moreover, the course of poor-insight forms is generally considered to have a worse prognosis, with more impaired socio-occupational functioning, poorer premorbid functioning, and a greater tendency toward chronicity. As for therapeutic response, both pharmacological and behavioral, the literature again presents conflicting results: some authors have found that poor-insight forms respond less effectively to treatment; others found no significant differences compared to good-insight OCD forms.

Therefore, this study aims to investigate the clinical aspects of OCD forms with and without insight, identifying any peculiar formal or content-related characteristics.

#### *-Predisposing Factors for Loss of Insight*

Numerous studies in the literature report a high comorbidity between OCD and Personality Disorders (PD), with prevalence rates up to 20.8%. However, the role that premorbid personality traits may play in modulating OCD symptoms or influencing insight loss has been scarcely investigated.

Obsessive-Compulsive Personality Disorder (OCPD) has been inversely correlated with poor-insight OCD forms, suggesting a protective role, while Cluster A PDs (particularly Schizotypal

and Schizoid) and Cluster B PDs (Borderline and Narcissistic) have been more frequently associated with poor-insight forms.

There is also limited literature on comorbidity between poor-insight OCD forms and other Axis I Disorders. Some authors hypothesize a higher frequency of psychiatric disorders during childhood in patients with poor insight. Other studies have reported a higher prevalence of depressive disorders or greater severity of depressive symptoms in patients with poor-insight OCD, suggesting that affective state may influence insight level in the disorder.

Conversely, other authors found no correlation between obsessive and affective dimensions.

Therefore, this study aims to further explore the role of possible predisposing factors for insight loss, particularly affective or personality-related variables.

#### *1.1c The Role of Trauma*

Childhood trauma is considered a common risk factor for several psychiatric disorders: Mood Disorders, Substance Use Disorders, Psychotic Disorders Eating Disorders, and Personality Disorders.

Studies have also indicated a link between various types of childhood trauma—especially emotional abuse and emotional neglect—and the development of OCS. A causal relationship between traumatic events and the onset of symptoms has also been hypothesized.

However, the mechanism by which childhood-adolescent trauma may predispose individuals to OCS development remains underexplored. A recent study by Bey et al. (2017) proposed a possible link between childhood trauma and specific temperamental traits: particularly, high levels of "harm avoidance" are considered a premorbid vulnerability factor and an endophenotype of OCD.

The objective of this study is to retrospectively explore the possible presence of childhood and adolescent trauma in OCD patients using dedicated scales and to assess whether such trauma may have a predisposing role in the onset of OCS or OCD spectrum disorders, or a pathoplastic role in shaping clinical manifestations.

#### *1.2 Schizophrenia*

Schizophrenia is a chronic and disabling condition with a global prevalence of approximately 1%. The average age of onset is between late adolescence and the twenties in men and slightly later in women.

The diagnosis of schizophrenia is based on criteria defined by DSM-5. Positive symptoms such as delusions and hallucinations are often the primary reason patients seek medical attention; however, the disorder is also associated with negative symptoms (e.g., avolition, social withdrawal) and cognitive symptoms (e.g., deficits in working memory, executive function, and processing speed).

The comorbidity between psychosis and obsessive-compulsive disorder has gained increasing attention over the last decade. A review by Zink et al. (2014) reported higher prevalence rates of obsessive-compulsive symptoms (OCS) (13.7%) and full-blown OCD (5.5%) in individuals at clinical high risk (CHR) for psychosis compared to the general population. Furthermore, longitudinal studies show that individuals with a diagnosis of OCD have a 30-fold higher risk of subsequently being diagnosed with schizophrenia.

To identify the risk of psychosis early, two clinical approaches have been adopted: the Ultra-High Risk (UHR) model and the Basic Symptoms (BSs) model. UHR criteria include attenuated psychotic symptoms (APS) and brief limited intermittent psychotic symptoms (BLIPS). By contrast, BSs are subclinical disturbances in thought, language, body perception, motor function, drives, affects, and stress tolerance, considered early symptoms of psychosis.

The prospective Cologne Early Recognition study established two partially overlapping criteria for identifying early prodromes of psychosis, based on the Basic Symptoms approach: Cognitive-Perceptive Basic Symptoms (COPER) and Cognitive Disturbance (COGDIS) high-risk criteria. COPER and COGDIS criteria consist of subgroups of cognitive and perceptual BSs that predict first-episode psychosis with greater accuracy than UHR criteria. They are also considered transdiagnostic risk factors for psychoses, including OCD. For instance, Schultze-Lutter et al. found that COPER symptoms were more frequent in pediatric OCD patients than in the general population.

Thus, BSs may represent a bridge between OCD and psychosis; indeed, OCD and psychotic disorders share similar cognitive schemas, all captured by BSs criteria, such as increased self-focused attention, worry-based rumination, and dysfunctional metacognitive beliefs.

However, few studies have specifically examined psychotic vulnerability in patients with a primary diagnosis of OCD. Since UHR symptoms are presumed to develop later than BSs, assessing BSs in OCD patients may represent an earlier and more specific indicator of psychotic vulnerability. Additionally, evaluating BSs in OCD patients of various onset ages may shed light on phenotypic expression and developmental trajectories of the disorder.

### *1.3 Multisensory Integration*

Multisensory integration refers to the ability to combine stimuli from different sensory modalities, offering both behavioral and perceptual benefits to the individual. Among various integrative modalities, the one with the highest resolution is auditory-tactile (AT), which is superior to audiovisual (AV) and visuotactile (VT) integration.

The key element in this process is the "temporal proximity" of stimuli, meaning their arrival within a specific time window. In nature, stimuli coming from the same source are perceived as nearly simultaneous. At the neural level, multisensory cells show increased activity when receiving different types of stimuli within a certain "temporal window," allowing for improved performance compared to when they receive unisensory stimuli.

These integrative areas remain plastic for much of the individual's life, allowing neural representations to closely match the spatial-temporal features of the subject's environment. As early as two months of age, humans show the ability to perceive multisensory asynchronies, and through childhood, adolescence, and adulthood, a process of plastic remodeling of these circuits occurs, based on the subject's experiences.

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## **2. Rationale and Study Hypotheses**

The primary objective of this study is to conduct a comprehensive investigation of the psychopathology of the Obsessive-Compulsive Spectrum, exploring not only the content characteristics of obsessive-compulsive symptoms, but also the formal modalities of expression—particularly the structure of the compulsive ritual—and how these aspects may affect the individual's global functioning.

Additionally, the study aims to assess possible predisposing factors to loss of insight in OCD, particularly the potential etiopathogenetic role of trauma, personality traits, affective factors, or OCD severity, with the goal of identifying subgroups of patients who may be more responsive to therapy.



Furthermore, it seeks to evaluate how patients with OCS and schizophrenia-spectrum symptoms respond to multisensory stimuli (auditory, tactile, and audio-tactile), in order to identify correlations between their capacity for audiovisual-tactile integration and psychopathological variables—especially trauma—and the structure of the ritual. A deficit in the ability to integrate signals at the cortical level could lead to unreliable perceptions, which may be a core feature of the illness, from which obsessive phenomena such as the need for checking and repetition emerge.

### **3. Materials and Methods**

#### *3.1 Recruitment*

This study will enroll subjects diagnosed with Obsessive-Compulsive Disorder (OCD) and Schizophrenia Spectrum Disorders who are attending the facilities of DAI-SMDP of AUSL Parma. Recruitment will take place from February 1, 2023 (following approval by the Ethics Committee) to February 1, 2026. Potentially eligible patients will be contacted (upon referral by their treating psychiatrists) and included in the study after confirming inclusion criteria and obtaining signed informed consent.

Sample size has been calculated based on previous studies aimed at investigating the formal and content aspects of OCD and the factors implicated in insight loss. Only upon stabilization of the psychopathological condition, all patients will be fully informed about the study's aims and procedures, and asked to sign the informed consent form.

#### *3.2 Inclusion and Exclusion Criteria*

*3.2a Inclusion Criteria:* A. Diagnosis of OCD and/or Schizophrenia Spectrum Disorder according to DSM-5, as defined by a structured interview (SCID-5-CV). B. Age between 18 and 65 years. C. Patient agreement to participate in the study.

*3.2b Exclusion Criteria:* A. General medical condition that could be related to the mental disorder. B. Alcohol or substance dependence or abuse. C. Cognitive deterioration (score below 25 on the Mini Mental State Examination).

#### *3.3 Procedure*

All patients enrolled in the study will complete the following questionnaires:

##### *3.3a Clinical and Demographic Variables*

Participants will complete a questionnaire including age, sex, years of education, family status, employment status, and housing situation. Through an initial brief interview and data retrieved from clinical records, information will be extracted on diagnosis at onset, initial treatment, family history, age at onset, and current therapy. A clinician-rated scale evaluating patient functioning (SOFAS) will also be completed. Lastly, the number of monthly visits to the relevant service will be recorded.

### 3.3b Self-Administered Questionnaires

- Leyton Obsessional Inventory (LOY) A 69-item scale assessing OCS in daily life aspects (e.g., recurring thoughts, fears, ordering and checking rituals, indecision) and obsessive personality traits (e.g., meticulousness, punctuality, rigidity). Each item requires a yes/no answer. For positive answers, resistance to symptoms (rated on a 5-point scale from 0 = none to 4 = maximum resistance) and interference with global functioning (rated on a 4-point scale from 0 = none to 3 = maximum interference) are assessed.
- Frankfurter Beschwerde Fragebogen (FBF) Questionnaire for assessing basic pre-psychotic symptoms, consisting of 98 true/false items grouped into 10 phenomenological dimensions: loss of control, simple perceptual disturbances, complex perceptual disturbances, receptive and expressive language disorders, thought disorders, memory disturbances, motor disturbances, loss of automatisms, anhedonia-anxiety, and sensory overload.
- Childhood Trauma Questionnaire (CTQ) A retrospective questionnaire investigating five types of traumatic experiences during childhood-adolescence: emotional abuse, emotional neglect, physical abuse, physical neglect, and sexual abuse. It includes 28 items (short version) or 34 items (standard version), rated on a scale from 1 (never) to 5 (very often). The short version has been standardized and validated in France and adapted to Italian through psychometric techniques.
- Temperament and Character Inventory (TCI) A 240-item self-assessment tool evaluating personality based on Cloninger's biosocial model. It includes 4 temperament and 3 character dimensions, each with corresponding subscales. Raw scores are transformed into standardized T scores and graphed to create a personality profile. Temperament dimensions include Harm Avoidance, Novelty Seeking, Reward Dependence, and Persistence.

- Adult Temperament Questionnaire - Short Form (ATQ-SF) Consists of 77 items rated on a 7-point Likert scale (1 = extremely false, 7 = extremely true), measuring:
  1. Effortful Control (attention control, inhibitory control, activation control);
  2. Orienting Sensitivity (perceptual, associative, and affective sensitivity);
  3. Extraversion (sociability and tendency to experience positive emotions);
  4. Negative Affect (tendency to experience negative emotions). A score  $\leq 67$  on the EC scale indicates low self-regulation capacity.

### *3.3c Clinician-Administered Questionnaires*

- SCID-5-PD  
Structured Clinical Interview for DSM-5 Personality Disorders, allowing categorical and dimensional evaluation of each PD, based on criteria such as stability, pervasiveness, and early onset.
- YALE-BROWN OBSESSIVE COMPULSIVE SCALE (Y-BOCS)  
Clinician-administered scale assessing OCD symptom severity regardless of number or content of obsessions/compulsions. It includes 16 items: 10 assess time, interference, distress, resistance, and control; 6 additional items assess insight, avoidance, pathological slowness, responsibility, doubt, and referential ideas. Total score from the first 10 items ranges from 0 to 40: 0–7 = no symptoms; 8–15 = mild; 16–23 = moderate; 24–31 = severe; 32–40 = extreme symptoms.
- SCHIZOPHRENIA PRONENESS INSTRUMENT – ADULT (SPI-A)  
Semi-structured interview designed to detect and assess Basic Symptoms in subjects at risk for schizophrenia. Composed of 60 items across six subscales: affective-dynamic disorders, cognitive-attentional deficits, cognitive disturbances, self and environmental perception disturbances, somatic perception disturbances, and perceptual disorders.
- BROWN ASSESSMENT OF BELIEFS SCALE (BABS)  
A transdiagnostic semi-structured interview developed to assess the level of conviction and insight. Measures several dimensions: conviction, awareness of alternative views, explanation of alternatives, idea stability, attempts to disprove, insight, and referential ideation. Scored 0–4 per item; six items sum to the total score.

- **SOCIAL AND OCCUPATIONAL FUNCTIONING ASSESSMENT SCALE (SOFAS)**  
Clinician-rated scale derived from the Global Assessment Scale, evaluating social and occupational functioning independently from symptom severity. Ranges from 100 (excellent functioning) to 1 (severe impairment).
- **HAMILTON DEPRESSION RATING SCALE (HAM-D) (Hamilton, 1960)**  
Clinician-administered tool assessing depression severity across 21 items: mood, guilt, suicidal ideation, insomnia, work/activity, retardation, agitation, anxiety (psychic/somatic), somatic symptoms (GI/general), genital symptoms, hypochondriasis, weight loss, insight, diurnal variation, depersonalization, paranoia, and obsessive-compulsive symptoms.

### 3.3d *Quantitative Analysis of Compulsive Ritual (J-WATCHER SOFTWARE)*

To analyze the formal characteristics of rituals, patients will be asked to provide a video of their ritualized behavior. Using the behavioral analysis software J-Watcher, behavior will be broken into motor units and parameters such as repetitiveness, sequence, timing, and functional/non-functional purposes will be analyzed.

### 3.3e *Multisensory Integration*

All participants will complete the following tasks:

#### Simultaneity Judgement (SJ)

Experimental setup includes two speakers placed 25 cm to the left and right of the participant's midline, and 30 cm from the body, integrated with two constant-current tactile stimulators (Digitimer DS7A) delivering non-painful vibrotactile stimuli via electrodes on each index finger. Auditory stimuli: 30 ms sound at 3,500 Hz. Tactile stimuli: single 100  $\mu$ s monophasic pulse.

Participants are blindfolded and seated comfortably. In each trial, auditory and tactile stimulus pairs are presented at random SOAs:  $\pm 5$ ,  $\pm 10$ ,  $\pm 15$ ,  $\pm 25$ ,  $\pm 40$ ,  $\pm 70$ ,  $\pm 120$ ,  $\pm 200$ ,  $\pm 350$  ms. Participants indicate whether stimuli were simultaneous by pressing designated keyboard keys. Four blocks of 144 trials each (576 total); associations between stimulus type, side, and response are counterbalanced.

#### Simultaneity Judgement Training (SJT)

Differs from SJ in that participants receive feedback ("Correct!" or "Incorrect") after each response. SOA is initially set at 350 ms for ease and reduced after 3 correct responses or

increased after 1 error using a 40 ms staircase protocol. Each SOA is tested 30 times. Three blocks are administered with optional rest between them. Participants repeat SJ task before and after training.

#### Rubber Hand Illusion Protocol

Participants undergo classic Rubber Hand Illusion protocol with visuotactile stimulation. Tactile stimulation (via brush) varies in frequency and is applied to the dorsum of the participant's hand. Participants rate pleasantness using a 100-point visual analog scale. They then observe a rubber hand being touched synchronously or asynchronously with their hidden hand. The illusion is rated using a 100-point visual analog scale.

### **4. Statistical Analysis**

To confirm the study hypotheses, statistical analysis will be conducted in the following steps:

Pearson's correlation will be used to assess associations between formal characteristics of ritualized actions (J-Watcher scores), OCD symptom severity (Y-BOCS), childhood-adolescent trauma (CTQ), affectivity (HAM-D), pre-psychotic basic symptoms (FBF and SPI-A), personality traits (SCID-5-PD), temperament traits (TCI, ATQ), and functioning (SOFAS).

To evaluate the factors affecting overall functioning, in the case of significant correlations among the aforementioned variables, linear regression analyses (Enter Method) will be conducted, using SOFAS total score as the dependent variable and demographic variables and questionnaire scores as independent variables. The same analysis will be applied to assess variables involved in insight loss, using the total BABS score as the dependent variable.

Simultaneity Judgement will allow estimation of individual audio-tactile simultaneity ranges (SR). To obtain SR values, the percentage of simultaneous responses across all SOAs for each participant will be calculated. An Independent Channels Model will be fitted to each participant's response distribution. Unlike typical psychometric models (e.g., Gaussian, Logistic), ICM is generative and models underlying sensory and decisional processes.

This procedure will be conducted individually for each participant and stimulus combination. Data from individuals whose responses do not fit the ICM model significantly ( $p < 0.05$ ) will be excluded from further analysis. SR values from both experimental groups will then be compared and correlated with psychopathological scales using standard parametric (or non-parametric if data are non-normally distributed) tests.

For each participant, for each SOA, the median value will be calculated for the SR task pre- and post-training. This will determine how often participants correctly judged stimulus simultaneity and whether training improved accuracy. Median values from both groups will then be compared and related to psychopathological scale results.

Additionally, participants will undergo the Rubber Hand Illusion protocol with visuotactile stimulation. The resulting data will also be analyzed in relation to psychopathological variables using standard parametric (or non-parametric, if applicable) statistical tests.

## **5. Data Collection and Confidentiality**

Both the Clinical Records Form (CRF) and questionnaire/task results will be collected electronically. All costs will be covered by the UOC University-Affiliated Psychiatric Services. Only the study investigators will have access to the data. Interviews and questionnaires will be conducted in a designated room on the first floor of Pad. Braga 21, Ospedale Maggiore di Parma.

Identifying information (name and date of birth) will be used only for patient scheduling and consent. Upon enrollment, patients will receive a unique ID code used to anonymize all data. A separate file containing ID-name correspondence will be stored by the Principal Investigator on a password-protected computer in a locked office.

Dr. Matteo Tonna will be responsible for data archiving, protection, and final reporting. All investigators will participate in data analysis and preparation of scientific publications.

## **6. Safety Concerns**

No anticipated risks, physical or psychological consequences are expected from this study, which will not interfere with standard clinical care. Patients will continue to be monitored and treated by their usual clinical providers.

During questionnaire completion, some participants may temporarily experience sadness, discouragement, or irritation when recalling unpleasant past experiences. However, any such emotions are unlikely to last beyond the duration of the session. Patients may discuss their concerns at any time with a study physician.

Thus, study-related risks are not greater than those encountered in daily life. Participation is voluntary and can be withdrawn at any time. Any damages (attributable to AUSL Parma or its

personnel during the study) are covered under the Regional Risk Management Program for public health entities.

## **7. Conclusions**

The primary aim of this study is to comprehensively assess the formal and content-related features of OCD symptomatology and its relation to Schizophrenia Spectrum Disorders, in order to identify patient subgroups that may respond more effectively to treatment.

Special focus will be given to the structure of compulsive rituals and poor-insight OCD forms, evaluating their clinical characteristics and severity, and exploring potential predisposing factors.

These factors include personality and affective traits, as well as the possible etiopathogenetic role of stressful or traumatic experiences during childhood-adolescence in predisposing individuals to OCS or OCD spectrum disorders based on neurobiological vulnerability or influencing their clinical presentation.