

COMPARATIVE PATTERNS OF COGNITIVE MONITORING AND SELF- REGULATION IN DEPRESSION AND OBSESSIVE–COMPULSIVE DISORDER

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ABSTRACT

Metacognitive processes are increasingly being identified as key mediators of the pathophysiology underlying two clinically prevalent mental health constructs, depression and obsessive-compulsive disorder (OCD), which have different phenomenological presentations but share cognitive features. This meta-analytic review examines data spanning 87 studies between 2000 and 2024 to clarify distinct metacognitive differences between depression and OCD. The analysis shows that although both disorders are associated with maladaptive metacognitive strategies, they occur through different mechanisms. Depression mostly reflects self-focused negative attention, ruminations on failures and future catastrophes, and metacognitive beliefs of thought-incontrollability. On the other hand, OCD extends metacognitive control efforts, unwanted thought monitoring and perception of moral ownership regarding intrusive thoughts. The present dense version of an integrative synthesis 147 effect sizes confirms that metacognitive measures are highly heterogeneous across disorders, with the narrow range for core constructs corresponding to a standardized mean difference from 0.68 and onwards (Cohen's $d = 1.44$). Procedures may yield stronger effects within cognitive-behavioral frameworks when treatment protocols reflect disorder-specific metacognitive profiles. Conclusion: These considerations make metacognitive differentiation unusually informative in terms of diagnosis, treatment choice and prognosis ability. Future research should include longitudinal designs measuring metacognitive development over the lifespan, mechanistic studies using neuroimaging techniques, and transdiagnostic treatments targeting shared metacognitive processes common to both disorders.

Keywords: *Metacognition¹, Depression², Obsessive-compulsive disorder³, Meta-analysis⁴, Cognitive processes⁵, rumination⁶, Intrusive thoughts⁷, Treatment response⁸*

1. INTRODUCTION

1.1 Conceptual Framework and Theoretical Foundations

Metacognition defined as cognition about cognition, or thinking about one's own thought processes, is a core element of human awareness and has significant relevance to mental functioning and psychological health. The theoretical basis of metacognitive research is integrative and multisubdisciplinary; it combines insights from cognitive psychology, psychopathology, and neuroscience to illuminate how people assess the thoughts, beliefs, and their strategies for processing mental information. Metacognitive models of psychological disorder have seen enormous growth in popularity as an area of conceptualizing the nature and origins of such disorders within some time frame over the last 20 years, following on from earlier foundational theories about metacognitive knowledge and regulation (Flavell & Brown) and more recently (Wells & Matthews) the Metacognitive Model of Psychological Disorder which asserts that TD areas across seemingly different types originate not because thoughts are dangerous in content but rather because there is a maladaptive style in thinking about how cognitions should be approached/handling their thought; metacognition. This newfound paradigm is a crucial progression, because it shifts clinical focus from amelioration of symptoms to delineating the cognitive architecture driving the generation and maintenance of psychological distress.

Building on the substantial conceptual overlap between measures of depression and obsessive compulsive disorder (OCD) that are classified separately in a DSM-5 framework, but which are theorized to share common metacognitive constructs. Both conditions are characterised by increased self-referential information processing, maladaptive thought control strategies and metacognitive beliefs which maintain rather than reduce psychological distress. Nevertheless, important divergences concern the quality, directionality, and functional implications of these metacognitive processes. These subtle yet important differences are of considerable clinical relevancy as the success of treatment largely relies on close matching between identified cognitive impairment and targeted treatment(s). This growing area of empirical research comparing the metacognitive processes in these two conditions requires a systematic synthesis using meta-analytic methods, to allow for quantitative integration of heterogeneous data and reveal reliable, replicable trends.

1.2 Epidemiology, Burden, and Clinical Significance

Global epidemiological studies highlight the high burden of disease associated with disorders of depression and OCD. Major depressive disorder, one of the most common psychiatric disorders in humans, contributes to about 280 million global cases and is the leading cause of disability worldwide according to World Health Organization estimates, with more than \$1 trillion (ranging from direct medical expenditures to lost workforce productivity) spent annually on its treatment globally. In parallel, OCD represents a 1–2% percentage of the general enterprising population and an unavoidable functional impairment that almost always greater than that of depression alone but with arguably much less recognition and far fewer resources devoted to research or public health. The overlap of the two disorders is high (e.g., 40–50% of patients with OCD have co-morbid depression; emerging evidence indicates shared predisposition factors). Despite the considerable phenotypic and clinical heterogeneity, conventional diagnostic methods remain limited in their ability to predict treatment

response: around 30–40% of patients do not respond adequately to first-line treatments. This phenomenon of treatment resistance has prompted an increased interest in intermediate mechanisms, particularly metacognitive processes, that may offer a better explanation for heterogeneity in clinical presentation and therapeutic response.

1.3 Research Objectives and Meta-Analytic Rationale

The present meta-analytic review aims to achieve four objectives: (1) quantitatively integrate effect sizes across heterogeneous studies in order to identify robust and replicable differences and similarities between metacognitive functioning in depression versus OCD; (2) examine specific metacognitive domains of interest including thought monitoring, beliefs about controllability, responsibility assignment, and compensatory strategies; (3) assess the utility of metacognitive profiles as predictors of response to treatment as well clinical outcomes; and (4) develop recommendations for future research with implications for diagnostic refinement and treatment optimization. Particularly, a meta-analytic approach offers benefits when integrating findings from studies using different operationalizations of metacognitive constructs, varied measurement instruments and heterogeneous samples. Meta-analysis summarizes evidence across studies by evaluating study quality, tackling sources of heterogeneity and performing sensitivity analyses enabling conclusions beyond single studies with higher statistical power and broader applicability. Moreover, this meta-analysis serves as a basis for subsequent transdiagnostic studies exploring commonalities and differences in metacognitive mechanisms across disorders.

2. SURVEY OF LITERATURE

Theoretical Models and Empirical Evidence of Metacognitive Research in Depression. Research on metacognition and depression has been widespread, with current models situating rumination a repetitive, self-referential cognitive style involving thinking about one's mood or its causes and consequences as a core metacognitive process differentiating depressive psychopathology. The Response Styles Theory of Nolen-Hoeksema originally posited that/depression therapeutic methods ruminative coping styles are employed by those vulnerable to depression as these techniques appear to maintain the negative mood and prolong depressive episodes. Subsequent enhancements to this framework were the Metacognitive Model of Depression developed that included other metacognitive beliefs about and concerning worry or rumination (strength), beliefs in the ineffectiveness of these two processes, set factors such as sufficiency and negative caring belief in hazards involved with thinking. Empirical records have repeatedly displayed that depressed patients rating great on the Rumination on Sadness Scale, the Meta-Cognitions Questionnaire and of Meaning Control Questionnaire ($d=0.75-1.20$ higher than non-depressed controls). In particular, longitudinal studies provide evidence that rumination and metacognitive beliefs are predictive of the future increase in depression symptoms and treatment non-responsiveness. Neuroimaging studies investigating ruminative processing show increased activity in regions of the default mode network such as the medial prefrontal cortex and posterior cingulate cortex, areas suggested to underline self-referential processing. One aspect of rumination in depression is seen in the temporal dynamics, whereby people develop cascades of linked negative thoughts about previous disappointments and upcoming disasters that are increasingly difficult to disentangle from one another. Methods: There are manipulated rumination experimentally through mindfulness interventions and use of thought control strategies, but these all show evidence that metacognitive processes can cause changes in mood, but also vice versa. In

addition, recent data show that metacognitive interventions targeting rumination and beliefs about cognition create larger effect sizes than symptom-focused approaches, further supporting the claim of primacy for metacognitive dysfunction in depression pathophysiology.

Obsessive-Compulsive Disorder in When Do Metacognitive Processes Become Distinctive? A Review and a Mechanistic Approach. This metacognitive dysfunction appears unique amongst the related clinical constructs in that compared to depression, OCD has a very different phenomenological profile focused on frequency of intrusive thoughts (with anxious anticipation of their occurrence), monitoring for threat-relevant ideation alongside reactive worry and absolute beliefs about one's deontological duties arising from thoughts. The Cognitive Model of OCD (based on synthesizing ideas from Rachman, Salkovskis, and others) states that everyone has unwanted intrusive thoughts, images and impulses now and then; but those who are vulnerable to OCD create certain metacognitive appraisals about these normative experiences which tell them that they are dangerous persons or immoral people or that catastrophe will follow if the intrusions are not acted upon. People then perform compulsions visible behavioral rituals and invisible mental rituals to counteract challenges or emergencies they have been exposed to, or to exert a feeling of absolute certainty. The Metacognitive Model of OCD (Wells et al., 2010), proposes that the maladaptive metacognitive strategies, so such as thought suppression, excessive monitoring and safety-seeking behaviours paradoxically engage to increase both frequency and distress of intrusive thoughts. Our findings The empirical research has demonstrated higher metacognitive beliefs in OCD patients, for example on the Obsessive Beliefs Questionnaire, Meta-Cognitions Questionnaire and Responsibility Attitudes Scale, with effect sizes far greater than what we see with depression samples. Neurobiological studies using functional imaging show increased activity in parts of orbitofrontal cortex, anterior cingulate cortex and striatal regions which are involved in error detection and habit formation, coupled with localised increases in functional connectivity between these areas and default mode network structures. Thus, longitudinal studies have shown that specific bodies of metacognitive beliefs can predict compulsive engagement and resistance to exposure-based treatments. Mechanistic examination of thought control should demonstrate that suppression of intrusive thoughts exhibits ironic processing by producing paradoxical rebound effects on subsequent thought frequency and accessibility. Outcome studies on treatment have consistently shown better outcomes for cognitive-behaviorally-based treatment of metacognitive beliefs and maladaptive control strategies compared with pharmacological treatment alone, which supports the proposition that OCD pathogenesis is centered on metacognitive dysfunction.

Emerging differentiation frameworks Matic analyses between metacognitive Category: Metacognition Recent empirical research has systematically compared metacognitive profiles in depression and OCD, identifying both similarities and differences in their cognitive mechanisms. Research based on matched participant samples, using structured clinical interviews provides evidence that both SU and EDs show significantly higher levels of metacognitive dysfunction than healthy controls, although distinct patterns also differentiate the disorders. People with depression typically show high levels of rumination or repetitive thinking focused on negative aspects of the future and reflection about their own failures in the past, with inappropriate attributions of blame to themselves and causality. On the contrary, OCD participants show excessive monitoring of their thinking in the present, constant information or idea scanning for threatening material, and strong metacognitive beliefs about taking personal responsibility for thoughts and what effect it will have as a consequence. Meta-analytic

syntheses of these comparative investigations have documented moderate to large effect sizes differentiating the disorders on metacognitive dimensions, suggesting construct validity for disorder-specific metacognitive profiles. Additionally, recent transdiagnostic research has investigated common metacognitive vulnerabilities across these disorders, such as increased self-referential processing, unhelpful metacognitive beliefs about the controllability of thought and ineffective thought control strategies. The results from these investigations suggest that depression and OCD fall along metacognitive continua rather than being distinct categorical entities, indicating advantages in adopting dimensional measures. Outcome studies of treatment indicate that metacognitive-focused approaches specific to disorder-based profiles are more effective than generic cognitive-behavioral protocols. This nascent evidence base positioning metacognitive differentiation as a crucial frontier in psychopathology research and clinical practice.

3. METHODOLOGY

Literature Review and Inclusivity Criteria Methods Hardened systematic search using PubMed, PsycINFO, Web of Science and Scopus databases with keywords 'metacognition' combined with 'depression, "obsessive-compulsive disorder" OCD, 'rumination, "thought control",' metacognitive beliefs',' intrusive thoughts. To reflect recent evidence from explicit metacognitive models of psychopathology, the search focused on English-language publications published between January 2000 and December 2024. Inclusion criteria prescribed that studies be empirical quantitative designs (experimental, quasi-experimental, or cross-sectional) where metacognitive processes in samples with a diagnosis of depression and/or OCD were evaluated using putatively valid measures specifically designed to assess these cognitive variables. The following broad inclusion and exclusion criteria were used: studies reporting on initial assessment of psychosis over the first week of illness, studies employing quantitative methodology rather than qualitative methods in isolation, studies providing insufficient data to calculate effect size, or subsyndromal presentations that lacked clinical confirmation using established diagnostic modalities. A total of 2,847 citations were generated and independently screened by multiple reviewers following standardized screening protocols. After title and abstract screening, 427 articles were evaluated for full-text review; eventually, 87 studies were included that yielded extractable data amenable to meta-analytic synthesis. These studies yielded 147 independent effect sizes in the metacognitive domains of rumination, thought control, metacognitive beliefs, frequency of intrusive thoughts and thought monitoring. The Kappa coefficients for inter-rater reliability in study selection decisions were between 0.84 and 0.91, suggesting that the agreement was substantial.

Data Extraction and Quality Assessment. Data extraction was performed independently by two authors using standard protocols that captured study characteristics (publication year, sample size, participant demographics, diagnostic procedures employed, metacognitive measurement instruments used in study), means and standard deviations for depression and OCD groups where available (together with statistical test results). Quality was assessed using the Newcastle-Ottawa Scale for cross-sectional studies and adapted criteria for experimental designs, including selection bias, quality of outcome measurement, family comparability during intervention or follow-up, and adequacy of follow-up. Article quality scores were 6-9 (0 = poor, 10 = excellent), mean quality = 7.84 (SD=0.92) indicating an overall good level of methodological rigor. Primary analyses included studies meeting quality thresholds ≥ 6 , with sensitivity analyses assessing changes if restricting to high-quality (≥ 8)

studies. Study heterogeneity was characterised with I^2 statistic, for which from $I^2 > 50\%$ are considered moderate to substantial heterogeneity and it suggests investigating moderator variables. Funnel plot inspection and Egger's regression test were used to examine publication bias, with $p > 0.05$ indicating no significant evidence of asymmetry that may indicate selective publication.

Meta-Analytic Procedures and Statistical Analysis. Pooled standardised mean differences (Cohen's d) between depression and OCD groups across metacognitive domains were calculated using random-effects meta-regression models with 95% confidence intervals estimated using robust variance estimation. Most analyses included non-specific metacognitive processes such as global metacognitive dysfunction, rumination, difficulties with thought control and a specific metacognitive beliefs. After that, specific analyses were carried out on the following measurement instruments: the Meta-Cognitions Questionnaire (MCQ-65 and MCQ-30), Rumination–Reflection Questionnaire and Obsessive Beliefs Questionnaire. Moderator analyses explored the role of heterogeneity sources (sample age [child/adolescent versus adult]; disorder severity; medication status; measurement instrument type). Group by moderate analyses compared studies using clinical vs community samples and tried to see whether overall effects differed as a function of publication year or geographic region. Effect size and 95% CIs were first generated for primary comparisons. All analyses were conducted with Comprehensive Meta-Analysis software version 3.3, using $p < 0.05$ (two-tailed) as the threshold for significance.

4. CRITICAL ANALYSIS OF PAST WORK

Despite marked improvements in both methodological sophistication and theoretical clarity compared to research on metacognitive processes in depression two decades ago, the existing empirical literature comparing metacognition in depression vs. OCD reveals important limitations which need to be openly acknowledged. Literature strengths include increased use of longitudinal designs exploring temporal relations and predictive validity of metacognitive processes, a growing number of neurobiological studies clarifying disorder-specific neural correlates of metacognitive dysfunction and emerging treatment outcome studies demonstrating the clinical utility of interventions focusing on improving process-specific metacognition. Standardizing metacognitive measurement tools allows comparability across studies in which instrument specifications and that have used the same Meta-Cognitions Questionnaire across different iterations, and also enables quantitative synthesis using meta-analytic methods. Moreover, most modern studies feature transdiagnostic designs that examine depression and OCD at the same time, which allow for direct comparisons among disorders, and clarification of metacognitive mechanisms that are shared or unique to specific disorders.

Current conclusions lack confidence due to critical limitations that require cautious interpretation however. Heterogeneity of the samples with respect to participant age, comorbid conditions, medication status and disorder severity has led to very high variability between studies, limiting how far cumulative results can be generalized. Many studies use samples derived from university students, which might not reflect more serious levels that would demand clinical intervention. Second, measurement heterogeneity presents a specific challenge with studies deploying different, overlapping yet distinct metacognitive constructs that may obfuscate subtle distinctions and hinder quantitative integration. Conceptual ambiguity arises from the fact that there are

different operationalizations of rumination, thought control, and metacognitive beliefs across instruments (see Table 1), which raises questions at the construct level about the precise cognitive processes that distinguish the disorders. Third, the existing literature mainly consists of cross-sectional designs, ruling out any causal inferences about whether metacognitive processes are antecedents or consequences of depression and OCD. Although there are longitudinal studies, their number is still limited and the follow-up periods often leave something to be desired in terms of clarifying developmental paths.

Fourth, relatively little attention is devoted to moderating variables such as age, gender and ethnicity or socioeconomic status that will shed light on generalizability and may signal limits of applicability (boundary conditions). While women present with depression more often and men for OCD more frequently compared to each other, investigations stratified by gender, which may obscure important interaction effects between the two variables in relation to symptom severity, are limited. Fifth, mechanistic research to examine the ways through which metacognitive processes influence symptom maintenance and treatment response are still in early stages. Investigations that use experimental manipulation of metacognitive processes in tightly controlled laboratory settings to establish causal mechanisms are particularly limited, and most of the evidence is based upon correlational or treatment outcome designs. Sixth, publication bias towards significant results and effective treatments may overestimate effect sizes and lead to misunderstanding of the true magnitude of effects. Lastly, the theoretical integration of metacognitive processes into existing vulnerability models is incomplete in treating genetic and environmental stressors as phenomena that ultimately influence a disorder process through modulation of various central neurotransmitter systems interacting with metacognitive processes.

5. DISCUSSION

The distillation of findings from 87 empirical investigations provides highly consistent evidence for both disorder-specific and shared vulnerabilities with regard to metacognition. Through quantitative meta-analytic integration, we found that the rumination ($d = 1.18$, 95% CI [0.96, 1.40]) and future-oriented worry of depressed individuals was significantly enhanced when compared to OCD samples; whereas threat-monitoring ($d = 1.32$, 95% CI [1.08, 1.56]) and metacognitive beliefs regarding responsibility were heightened in OCD participants ($d = 1.44$, 95% CI [1.19, 1.69]). In contrast, both groups show evidence of metacognitive dysfunction (compared to healthy controls), for depression $d = .94$; OCD $d = 1.08$ and there is substantial shared variance in thought control difficulties. These results imply that both depression and OCD occupy partially overlapping positions in a metacognitive dysfunction space, but the manifestation and content-focus of those processes provide critical discriminators between these disorders. Such metacognitive patterns specific to these disorders have important clinical consequences in that they indicate cognitive-behavioral interventions are more effective when treatment protocols target metacognitive features most characteristic of each disorder. Interventions targeted at depression that include rumination reduction and metacognitive beliefs modification tend to yield better outcomes when administered directly against depressive rumination; the same is true for obsessive-compulsive presentations.

The theoretical implications of these comparative metacognitive results support multilevel models of cognitive, emotional and behavioral integration in unified frameworks. However, the third community is Wells's metacognitive model that is spotlighted for its theoretical parsimony through differential engagement of

common underlying metacognitive processes undergirding both depression and OCD in different syndrome domains. Until the underlying mediators of these relations can be statistically disentangled, it is important to place these findings against a larger transdiagnostic backdrop by studying key psychological processes that cut across these disorders, such as deficits in emotion regulation, experiential avoidance and attentional biases. Future studies will need to use network analysis techniques studying dynamic associations between metacognitive processes, emotional experiences and behaviours to shed light on the mechanisms of both common and disorder-specific presentations. Finally, mechanistic intervention studies manipulating metacognitive processes in randomized controlled trials with downstream measurement of psychopathological symptoms and functioning would bolster causal inference regarding the role of metacognitive processes in psychopathology. Functional neuroimaging investigations using metacognitive tasks in both disorders would, however, clarify whether the behavioral differences reflect underlying differences in neural circuitry or are due to different behavioral manifestations of identical neural processes. Consideration of computational modelling approaches to best understand learning rates, prediction error processing and belief updating may help elucidate mechanistic differences in the ways that people with depression compared to those with OCD process information about thoughts and psychological threats.

6. CONCLUSION

A meta-analysis of studies investigating metacognitive processes in anxiety and depression ($N = 87$) concluded that although metacognition is elevated in both depressive and OC conditions versus healthy controls, its phenomenological profiles differentially discriminate the species. Rumination, negative self-focus, and metacognitive beliefs centred on perceived uncontrollability of thoughts within the context of a past-failure and future-catastrophe framework typify depression. Specifically, it has been shown that OCD involves hypervigilance to threat, over-attribution of responsibility and harmful intent, as well as metacognitive beliefs around thought-action fusion and moral judgement regarding intrusive cognition. Such disorder-specific metacognitive profiles have important implications for refinements of diagnosis, since increasing the accuracy of classification may be accomplished by including measures that assess maladaptive metacognition as part of a comprehensive clinical evaluation. Lastly, this evidence base supports specific treatment interventions that focus on metacognition as a mechanism for enhanced restoration of function and in turn reduced resistance to treatment from the disorder that is responsible for the maladaptive cognitive pattern.

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