Cognitive and Metacognitive Structures and Processes in Obsessive Compulsive Disorder

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ABSTRACT

The present study aimed to review and discuss the cognitive and metacognitive structures and processes in the etiology Obsessive Compulsive Disorder (OCD). Studies concerned cognitive structures research dysfunctional thoughts and primary negative appraisals in OCD and use self-report inventories. At the other hand studies concerned cognitive process research cognitive deficient, information processing problems or biases and use performance measurements. However studies at the cognitive level have not explained OCD in an effective way, because of not using proper measurements, properties of participants and inconsistent results. Thus studies at the metacognitive level which focuses on appraisals, monitoring and control of cognitive structures and process. Metacognitive structure studies explain OCD secondary negative appraisal and metacognition; which appraise, monitor and control cognitive structure and process by using self-report inventories. Metacognitive process studies explain OCD executive function; which monitor control, cognitive process; and use performance measurements. In literature it is stated that metacognitive level studies explain OCD in more effective way than cognitive level studies. However metacognitive structure studies and process studies have some problems because of having same results with using different measurements, and operational definitions. By the way there is confusion in literature. Thus in this study implicated further studies taking consideration both metacognitive structure and metacognitive process.

Key Words: OCD, Cognitive, Metacognitive Level, Structure, Process

INTRODUCTION

As defined in DSM 5 under the title "obsessive compulsive and related disorders", obsessive compulsive disorder (OCD) is a mental disorder that involves repetitive thoughts and related disorders (American Psychiatric Association, 2013). Obsessions are defined as uncontrollable, insistent, ego-alien, repetitive, involuntary and intrusive thoughts, images or impulses (Bienvenu, et al., 2012). Compulsions, on the other hand, are repetitive, compulsory mental and behavioral actions displayed by the individual to mitigate the anxiety stemming from obsession, and its consequences (Bienvenu, et al., 2012; Purdon & Clark, 1999). One of the recent approaches to define OCD in the most effective way is the cognitive approach. Cognitive approach addresses the cognitive mechanism of OCD separately as cognitive and meta-cognitive levels (Abramowitz & Houts, 2005; Clark, 2004; Wells, 2000; 2009).

Some of the approaches defining OCD at cognitive level focus particularly on cognitive structures, whereas others are mainly centered upon cognitive processes. In the studies that focus on the cognitive structures in OCD, non-functional beliefs and negative evaluations [(exaggerated perception of responsibility - Salkovskis et al., 2000), (maladaptive interpretation of personal significance of thoughts – Rachman 2002)] are addressed and these structures are evaluated using self-report measurements [e.g.: (Thought Control Questionnaire – Yorulmaz & Gençöz, 2008), (Obsessional Beliefs Questionnaire – Boysan, Beşiroğlu & Çetinkaya, 2010)]. The studies addressing the cognitive processes in OCD focus on the problems or biases in information processing, and implement performance tests (e.g.: memory tests) to assess the impairments during information processing (Cougle, Salkovskis, & Wahl, 2007; Foa, Amir, Gershuny, Molnar, and Kozak, 1997; Clark, 2004).

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The approaches defining the etiology of OCD at a meta-cognitive level focus both on meta-cognitive structures and meta-cognitive processes (Abramowitz & Houts, 2005; Clark, 2004). According to the studies addressing the metacognitive structures in OCD through self-report measurements (Meta-cognition questionnaire-Irak & Tosun, 2008), metacognitive structures that evaluate, monitor and supervise the structures at cognitive level, as well as secondary level negative self-evaluations, are more effective in understanding OCD (Purdon & Clark, 1994; Wells & Mathews 1994; Wells, 2009). It is suggested in the studies focusing on meta-cognitive processes that, lower confidence in memory, which leads to memory biases, stems from the meta-systems within the meta-memory of individuals diagnosed with OCD (Irak & Flament 2007; Tekcan, Topçuoğlu, and Kaya 2007; Tuna, Tekcan, and Topçuoğlu, 2005). This meta-system, however, is defined as meta-cognition in some of the studies (Hermans, Engelen, Grouwels, Joosa, Lemmensb, and Pietersa 2003; Hermans Martens, De Cort, Pieters, and Eelen, 2008; Irak & Tosun, 2008), and as executive functions in others (Kuelz, Hohagen, and Voderholzer 2004; Moritz et al. 2001). Self-report measurements are used in meta-cognition studies, (Hermans et al. 2003; Hermans et al. 2008) whereas performance tests are used in the studies addressing executive functions (Bannon, Gonsalvez, Croft and Boyce, 2006; Bohne et al., 2005; Kuelz et al. 2004; Moritz et al, 2001). In this context, the aim of the present review study is to review the findings of the approaches addressing OCD at cognitive and metacognitive levels, and to discuss the similarities and differences among them. For this purpose, recent cognitive approaches and related studies are surveyed in Psyc-Info, ProQuest and Index Medicus databases with the keywords: Obsessive Compulsive Disorders, Cognition, Cognitive Process, Metacognition, Executive Function.

Cognitive and Metacognitive Structures and Processes in Obsessive Compulsive Disorder

Cognitive Structures in Obsessive Compulsive Disorder

Inflated responsibility, overestimation of threat, importance of thoughts/thought-action fusion, perfectionism and intolerance of uncertainty are the beliefs addressed by cognitive structures in OCD.

Inflated Responsibility

Individuals diagnosed with OCD exhibit non-functional beliefs in the form of an inflated sense of responsibility with relation to the need for protecting themselves and their environment, accompanied by a belief that they will face serious negative consequences while fulfilling this responsibility. To mitigate the anxiety stemming from this inflated sense of responsibility, individual does compulsive behaviors. Such behaviors soothe the individual in the short term, while feeding the obsessions, beliefs, intrusive thoughts and self-evaluations in the long-term (Salkovsis, 1989; 2000).

In several studies (Cougle et al. 2007; Foa, Sacks, Tolin, Prezworski and Amir, 2007; Libby et al. 2004, Mancini, & Gangemi, 2004; Obsessive Compulsive Cognitions Working Group/OCCWG, 2003; Salkovskis et al. 2000) a significant correlation is observed between the symptoms of OCD and inflated responsibility beliefs – negative self-evaluations. Particularly OCD patients with checking type compulsive behaviors were found to receive significantly higher scores than comparison groups (individuals in normal conditions or with other types of disorders) in "responsibility questionnaires" (Cougle et al. 2007; OCCWG, 2003; Salkovskis et al., 2000). In a number of studies highlighting the importance of hyper-responsibility, patients in the high responsibility condition (with restricted error margin, as the test results are used in medication of children and adults) were reported to display higher levels of compulsive behaviors than those in the low responsibility condition (in which the test results are used in phar-

maceutical industry) (Arntz, Voncken and Goosen, 2007; Ladouceur, Freeston, Gagnoa, Thibodeau, and Dumont 1995; Freeston et al., 1997). It is also indicated in some of the studies that, inflated responsibility applies only for compulsive checking type OCD (Myers, Fisher and Wells, 2008; Rachman and Shafran, 1999, Foa et al. 2002), whereas others (Cougle et al. 2007; Lee & Known 2003, Yorulmaz, Karancı, Baştuğ, Kısa, Göka, 2008) state that it is observed in other OCD types as well (e.g.: compulsive washing/cleaning). Moreover, there is no study explicitly stating that inflated responsibility increases the control behavior in OCD cases, which reveals that "inflated responsibility" beliefs alone do not suffice to explain OCD.

Exaggerated threat/ Overestimation of Threat

Non-functional thoughts of individuals diagnosed with OCD, such as they will not be able to cope with what they are facing, result in exaggerated threat/overestimation belief which manifests itself in two ways. At the initial level, individuals diagnosed with OCD exaggerate the probability of undergoing a bad situation, and at the second level he/she exaggerates/overestimates the probable adverse consequences of this situation (Taylor, Abramowitz and McKay, 2005). According to Obsessive Compulsive Cognitions Working Group (OCCWG, 2003), exaggerated threat/overestimation belief is closely associated with the cognitive structure of hyper-responsibility, and it is an important factor in OCD's progression.

Results of the literature studies (Menzies, Harris, Cumming, and Einstein, 2000; Rachman, 2004; Tolin, Woods and Abramowitz 2003; Woods Frost ve Steketee, 2002) conducted on non-clinical groups indicate that, there is a statistically significant relationship between obsessive compulsive symptoms and exaggerated threat/overestimation belief. On the other hand, the studies conducted on clinical group (Cisler, Brady, Olatunji and Lohr, 2010; Wheaton, Abramowitz, Berman, Riemann and Hale, 2010) reveal that there is a significant relation particularly between exaggerated threat/overestimation belief and the fear of contamination. Also, literature studies conducted on clinical groups (Moritz & Pohl, 2009) indicate that, exaggerated threat/overestimation results in a statistically significant difference between the individuals displaying and not displaying obsessive compulsive behaviors. On the other hand, there are also studies reporting that exaggerated threat/overestimation belief/structure does not pertain to OCD, and it is encountered in other disorders (e.g.: panic disorder) (Abramowitz & Houts, 2005; Tolin, Worhunskya and Maltby, 2006). It can be inferred from these results that, exaggerated threat/overestimation belief/structure alone does not suffice to define OCD.

Importance of Thought and Thought-Action Fusion

According to Rachman (2002), a personal importance is ascribed to thoughts in OCD and the possible consequences of intrusive thoughts are assessed in a maladaptive way. Attaching such importance to a thought, after a degree, renders the thought as important as the action itself and makes the person feel as disturbed as if he/she committed that specific action. Such situations are referred to as "thought-action fusion" (Rachman & Shafran 1999). Thought-action fusion manifests itself in two dimensions, namely "likelihood" and "moral" thought action fusion. In the case of "likelihood thought-action fusion" the individual is of the opinion that thinking about an unpleasant event will increase the likelihood of that event. In "moral thought-action fusion", on the other hand, the person thinks that thinking about immoral behaviors is as unacceptable as committing those behaviors. Also, such beliefs may bur-

den the individual with a sense of exaggerated responsibility resulting in a lack of confidence in his/her memory (Rachman & Shafran 1999).

In numerous descriptive research (Rassin, Merckelbach, Muris ve Schmidt 2001; Yorulmaz, Yılmaz ve Gençöz, 2004; Yorulmaz et al, 2008), a significant relationship was detected between obsessive compulsive symptoms and thought-action fusion. It is also stated in various studies (Clark & Claybourn, 1997; Freeston & Ladoucer, 1993; Purdon, 2001, Steeke & Frost, 1994) that, individuals diagnosed with OCD attach more meaning and importance to intrusive thoughts, and find those thoughts more unacceptable as compared to control groups. In the related experimental studies it is reported that, even in non-clinical groups, individuals suffer anxiety due to the possible adverse consequences of an intrusive thought (his/her friend will be shocked if he/she thinks about apple) or an unacceptably immoral intrusive thought (when he/she was made to write "I hope a beloved of mine dies in an accident), and they exhibit a number of behaviors as a means for coping with those anxieties (Rassin, Merckelbach, Muris & Spaan, 1999; Rachman, Shafran, Mitchell, Trant, and Teachman, 1996; Siev, Chambless, and Huppert, 2010). Clark et al. (2000) states that, in clinical and non-clinical groups, a significant difference is observed between thought-action fusion and the control perception, frequency and intensity of obsession.

In other studies, however, importance of thought, maladaptive interpretation (Constans, 2001) and thought-action fusion (Abramowitz, Whiteside, Kalsy and Tolin, 2003; Amir, Freshman, Ramsey, Neary, and Brigidi, 2001) were reported to be observed in other anxiety disorders as well, thus associating this situation with anxiety. This in turn led to investigation of different structures for definition of OCD.

Perfectionism

A negative perfectionism manifests itself in OCD. In negative perfectionism, the individual is predisposed to think that, there is a perfect solution to each specific problem; a perfect action is required to solve that situation, and even a simple fault is likely to have serious consequences (OCCGW, 2003). This in turn may lead to the development of resistive neutralization by individual resulting in an urge to control (McHugh O'Leary, 2005). A significant relationship between negative perfectionism and obsessive compulsive symptoms is reported in clinical (Buhlmann, Etcoff and Wilhelm, 2008; Norman, Davies, Nicholson, Cortese and Malla, 1998; Frost & Steketee, 1997; Rice & Pence, 2006) and non-clinical (Rheaume, Freeston, Dugas, Letarte and Ladouceur, 1995; Wu, & Cortesi, 2009) groups. However, a scarce number of studies are available addressing the negative perfectionism in OCD using experimental methods (Coles, Heimberg, Frost and Steketee, 2005; McHugh O'Leary, 2005). On the other hand, negative perfectionism manifests itself in other anxiety disorders of cognitive structure (Generalized Anxiety Disorder) as well. All these findings are indicative of negative perfectionism structure's insufficiency in explaining OCD by itself.

Intolerance of Uncertainty

The "intolerance of uncertainty cognitive structure" in OCD covers three types of beliefs (individual's beliefs as to certainty, believing that he/she will be incapable of coping with unpredictable situations, and that he/she will become dysfunctional in situations where uncertainty prevails) and these beliefs become effective in avoidance behavior (OCCGW, 2003). Intolerance of uncertainty is also related to dysfunctional negative perfectionism and it has negative impacts on the decision making abilities of individuals diagnosed with OCD (McHugh O'Leary, 2005; Tolin et al. 2003).

As reported in numerous studies (Boelen, & Carleton, 2012; Sookman & Pinard 2002), individuals diagnosed with OCD received higher scores in scales evaluating the intolerance of uncertainty. Also, according to the findings of several studies (Constans et al. 1995, MacDonald, et al. 1997, McNally and Kohlbeck 1993), individuals diagnosed with OCD request information and time at significantly higher rates as compared to control groups. As opposed to these studies, it is stated in other studies (Gentes, & Ruscio, 2011; Holaway, Heimberg and Coles, 2006) that there is no significant difference between OCD and other anxiety disorders in terms of intolerance of uncertainty. Additionally none of the surveyed studies addresses the intolerance of uncertainty cognitive structure in OCD with experimental methods (McHugh O'Leary, 2005). All these findings attest to the insufficiency of "intolerance of uncertainty" in explaining OCD by itself.

Briefly; the studies addressing the structure at cognitive level explain OCD with top-to-bottom operations, and several cognitive and self-report measurements. However, as a result of the used methods (scarce number of comparison studies), questionnaires (self-report measurments questionnaire), attributes of the participants (absence of clinical participants in most studies) and the inconsistency of obtained results, these studies remain incapable of explaining the types, symptoms of OCD as well as the factors underlying the persistence (Abramowitz & Houts 2005; Clark, 2004). Accordingly, some of the researchers address the cognitive processes, while others focus on the structures and processes at meta-cognitive level, to define OCD.

Cognitive Processes in Obsessive Compulsive Disorder

In clinical observations, individuals diagnosed with OCD are often reported to exhibit behaviors such as getting suspicious about their behaviors and what is going around (have I completely washed my hands?), undergo difficulties in making decisions and remembering the compulsions that they made to mitigate their anxieties, thus repeatedly exhibiting the same behaviors (Foa et al. 1997; Rubenstein, Peynirdoglu, Chambless and Pigott 1993). Therefore, several theoreticians focus on cognitive processes (attention, memory, organized omission) and they address these processes with performance tests (Stroop test, etc.) (Clark 2004; Greiseberg & McKay 2003; Muller & Roberts 2005; Tuna, 2003).

Cognitive deficits (verbal and nonverbal episodic memory deficits and deficits in reality-monitoring)

The studies defining OCD on the basis of cognitive deficits are categorized as memory studies (verbal, nonverbal, commission) and the studies on deficits in reality-monitoring. In some of the studies addressing memory deficits (Deckersbach, Otto, Savage, Baer, & Jenike, 2000; Deckersbach et al. 2005; Zitterl ve ark, 2001) it was reported that, individuals diagnosed with OCD exhibited lower performance as compared to normative data and underwent difficulties related with their episodic verbal memory. Results of other studies indicate that (Deckersbach et al. 2000; Savage et al. 2000) deficits are observed in episodic nonverbal memory, which is ascribed to organization-related disorders. Additionally, some other studies (Rubenstein et. 1993; Rauch et., 2007; Sher, Frost, Kushner, Crews, and Alexander, 1989) addressed the deficits in commission memory of individuals with OCD and in these studies this situation was attributed to the impaired capability of the individual to distinguish between reality and imagination (reality monitoring) (Ecker & Engelkamp, 1995).

According to McNally and Kohlbeck (1993), however, no reality monitoring related issue was observed during the recognition tests (recalling information by clues) that they conducted on individuals with OCD, and individuals exhibited a lack of confidence in their reality-monitoring based decisions, thus

leading to permanently repeating compulsions. Constans et al. (1995), on the other hand, stated that the differences between vivid recollection and vivid recollecting expectations became effective on the sustained checking behaviors of individuals diagnosed with OCD. The inconsistent results of these studies are indicative of the possibility that individuals with OCD may undergo difficulties in information processing, thus rendering such studies on information processing more important.

Information Processing-Related Attention and Attention Biases in Obsessive Compulsive Disorder

In numerous studies (Foa, Ilai, and McCarthy, 1993; Greisberg & McKay 2003; McNally & Kohlbeck, 1993; Moritz, Von Muhlenen, Randjbar, Fricke and Jelinek, 2009; Muller & Roberts 2005) individuals with OCD were reported to direct their selective attention to threat related stimuli. Muller and Roberts (2005) stated that individuals exhibiting severe OCD symptoms were displaying attention biases at higher rates compared to those with mild OCD symptoms. This is attributable to inhibition of other distracting stimuli by individual (negative priming), retention of stimulus which is subject to his /her attention and his /her inability to divert his/her attention from the stimulus (Moritz & Von Muhlenen, 2005; Rankins, Bradshaw, Moss and Georgiou-Karistianis, 2004). All these issues pave the way for overrepresentation of threat-related stimuli, which in turn results in intrusive thoughts, and predisposition of the individual to attach much importance to intrusive thoughts. All these processes may yield memory biases as well (Muller & Roberts 2005).

However, studies (Algom, Chajut and Lev, 2003; Kampman, Keijsers, Verbraak, Naring and Hoogduin, 2002; Kyrios & Iob, 1998) reporting no attention bias in OCD, are also available in the literature. In these studies attention bias is associated with emotional stimuli-based avoidance strategies, or depression (Chamberlain, Blackwell, Fineberg, Robbins and Sahakian, 2005; Harkness, Harris, Jones and Vaccaro, 2009). Therefore, in defining the etiology of OCD and checking biases, the importance of memory biases receives more emphasis than the importance of attention biases (Harkness et al. 2009; Moritz & Von Muhlenen, 2005).

Memory Biases During Information Processing in Obsessive Compulsive Disorder

Studies stating that individuals diagnosed with OCD display and don't display memory biases, are both available in the literature (Radomsky & Rachman 1999; Radomsky, Rachman and Hammond, 2001). Studies, indicating there is no memory bias in OCD (Williams, Watts, MacLeod and Mathews, 1997; Mathews & Macleod 1994) suggest that, individuals with OCD diagnosis remember threat stimuli at lower levels as a result of their avoidance from threat stimuli.

According to the studies suggesting that individuals with OCD exhibit positive memory biases (Radomsky et al 2001), when performing an action, these individuals display a lack of confidence in their memory, thus remembering threat stimuli at higher levels, which results in biases in their memory. In the case of lower confidence in memory; the individual repeatedly engage in compulsions as a result of the reduced vividity of memory data (Ashbaugh & Rachman 2007; Hermans et al., 2008; Radomsky & Rachman 1999; Radomsky et al., 2001; Tolin, Abramowitz, Brigidi, Amir, Street and Foa, 2001). In literature studies, however, there is no complete description of why individuals with OCD diagnosis have no or less confidence in their memories. This in turn brings about the necessity for addressing and attaching emphasis to the meta-cognitive processes that account for the lower levels of confidence in memory.

Briefly, studies addressing OCD with a cognitive process define OCD with a bottom-to-top procedure (attention-memory) and performance tests. However, inconsistent results are yielded due to the use of different monitoring tools (non-threat words and environments) and methods (absence of comparison groups in the research). Accordingly, more importance is attached to meta-cognitive structures and processes, which control and assess cognitive structures and processes (Clark, 2004).

Meta-Cognitive Structures and Processes in Obsessive Compulsive Disorder

Meta-cognitive Structures in Obsessive Compulsive Disorder

Approaches describing the etiology of OCD with metacognitive structures put particular emphasis on the metacognitive structures that control, evaluate and organize cognitive structures, and the secondary negative evaluations which result from primary negative evaluations. These metacognitive structures are "control of thought" (Purdon & Clark, 1994) and meta-cognition (Wells & Mathews 1994; Wells, 2000). Structure approaches for meta-cognitive level suggest that cognitive structures are also important in OCD, and metacognitive structures also evaluate, monitor and control cognitive structures by means of self-report measurements (Abramowitz & Houts 2005; Clark, 2004).

Control of Thoughts

According to Purdon and Clark (1999; 2001) control of thought structure involves a two-level evaluation and this structure is closely related to metacognitive processes. In the "control of thoughts" cognitive structure, individual has a misbelief as to controlling his/her intrusive thought (primary level evaluation), and an interpretation that he/she is likely to fail in controlling his/her negatively interpreted belief (secondary level evaluation). When an individual with OCD diagnosis deems his/her intrusive thought important and feels encumbered with this thought, he/she strives to control and suppress this specific thought upon a primary level evaluation (Purdon & Clark 1999; 2001). This intrusive thought becomes more severe with each attempt of the individual to suppress his/her intrusive thought that is subject of his/her negative interpretation, and in turn, he/she fails to control the situation which results in a negatively affected mood. As a result, individual makes a secondary level evaluation that he/she is likely to fail in controlling his/her negatively interpreted misbelief. In consequence of this secondary level evaluation, individual engages in controlling his/her obsessions, in addition to being concerned about the possible negative consequences in case he/she fails to control his/her thoughts. Moreover, he/she gives weight to the completion of ritualistic thinking process as a means for avoiding from these situations. The presence of evaluations in two levels and their connection with control are indicative of metacognitive structures and processes that control these two levels.

In numerous studies (Abramowitz et al., 2003; Purdon 2001, Tolin et al. 2006) thought control or control strategies (e.g: anxiety and punishment) are reported to be important in predicting obsessive compulsive symptoms. It is emphasized in some of the descriptive studies (Rassin et al. 2001, Sma´ri & Hosteinsonn 2001) that, thought suppression has a negotiating role between obsessive symptoms and intrusive thoights. Studies suggesting that thought suppression results in increased obsessive symptoms (Tolin, Abramowitz, Przeworski and Foa, 2002), are also available.

In other descriptive studies (Höping & Jong-Meyer, 2003), however, no significant relationship was found between thought suppression and obsessive symptoms. Also, according to the studies conducted with non-clinical (Purdon & Clark, 2001) and clinical groups (Purdon 2001; Purdon, Rowa and Antohny,

2005), thought suppression did not increase the frequency of obsessions, and the increase in obsessive symptoms was rather a consequence of the interpretations related to the mood and thought control. As a result, the meta-structures (metacognition) enabling thought control in OCD received more emphasis in the field.

Metacognition

Metacognition stands for high level metacognitive structures and processes that control, organize and assess cognitions (Dienes & Perner 1999). Metacognition is also effective on the cognitive processes of individuals (Wells & Cartwright-Hatton, 2004). According to Wells (2000) OCD emerges as a result of the deviations in metacognition which enables functional operation of cognitive processes. There are two types of adverse beliefs (importance of thoughts and control of thoughts beliefs) regarding the intrusive thoughts of individuals with OCD, and the possible effects of these thoughts. In metacognitive belief which is related to the importance of thought, there are three types of intrusive thoughts (thought-event, thought-action, and thought-object). The belief related to the importance of thought, on the other hand, involves the beliefs regarding control and rituals. As the metacognitive belief, related to the significance of thought, is triggered by intrusive thoughts, the metacognition system, which is based on the individual's "self-control executive function", is activated. As the self-control executive function is activated, the individual negatively evaluates this intrusive thought, while he/she directs what is interpreted by metacognitive thoughts towards attention and cognitive processes. Perception of intrusive thoughts as threat in the metacognition of individual, its negative interpretation and the individual's predisposition to focus his/her cognitive processes on these negatively interpreted intrusive thought, give rise to anxieties. As a means for coping with resulting anxiety, individual chooses between the coping strategies (neutralizing, controlling) in compliance with the context of his/her metacognition beliefs. The selected strategies work in the long term, while in the short term they do not function, additionally giving rise to ruminations and active anxieties, even making the individual believe that he/she cannot succeed in controlling his/her thoughts. Accordingly, individuals' evaluations regarding the threat become permanent, thus resulting in a lack of confidence in their memories (Wells, 2000).

In several studies (Gwilliam, Wells ve Cartwright-Hatton, 2004; Hermans et al. 2003; Irak & Tosun, 2008; Janeck, Calamari and Riemann, 2003) a positive correlation was observed between obsessive compulsive symptoms and metacognitive factors. A positive correlation between metacognition and pathological anxiety in a number of studies (Cartwright-Hatton & Wells 1997; Irak & Tosun 2008). Irak and Tosun (2008) proposed that metacognition function as a mediator between pathological anxiety and compulsive symptoms. In other studies (Myers & Wells 2005; Gwillian et al. 2004), on the other hand, it was stated that metacognitive structure is significantly more effective on prediction of obsessive compulsive symptoms compared to other cognitive structures (responsibility, importance of thoughts). Moreover, the importance of self-awareness in the metacognitive structure in prediction of obsessive compulsive symptoms, is also emphasized (Abramovitch, & Cooperman, 2015; Ahmari, Eich, Cebenoyan, Smith, Blair Simpson, 2014; Cohen & Calamari 2004; Exner, Kohl, Zaudig, Langs, Lincoln and Rief., 2009).

Metacognitive Processes in Obsessive Compulsive Disorder

Meta-memory (Feeling-of-Knowing)

In OCD cases, the lack of confidence in memory stems from individuals' inability to manage internal representations in their visual memory, in other words, from their meta-memory (Radomsky, Dugas,

Alcolado and Lavoie, 2014; Tuna et al. 2005). Also defined as the "feeling-of-knowing", meta-memory relates to the extent to which a non-recognized situation will be remembered at a later stage, and the accuracy of this evaluation. Also, any adverse situation in the process of recalling (recalling information in terms of quantity, vividity) also has adverse effect on the evaluation of the feeling-of-knowing (Irak & Flament 2007; Tekcan et al. 2007; Tuna et al. 2005). In this context, when an individual with OCD diagnosis focuses his/her attention on threat stimuli, he/she remembers threat stimuli at higher rates, which in turn results with increased levels of anxiety, feeling of responsibility and repetitive behaviors. As an individual performs compulsions, the process of recalling a memory takes place with lower levels of vividness and with less detail, and in consequence, the individual displays a lack of reliance in his/her feeling-of-knowing based evaluation (Radomsky & Rachman, 1999; Tuna et al. 2005).

A scarce number of studies are available which correlate the confidence in memory with the feeling-of-knowing. These studies generally address the confidence in episodic memory. Also, few studies focused on the issue of confidence in semantic memory (Dar, 2004; Tekcan et al. 2007). In some of these studies, related to confidence in episodic memory (Tolin et al. 2001, Tuna et al. 2005), the "feeling-of-knowing" was measured using recall and recognition tests for individuals diagnosed with OCD and in control groups (individuals with other anxiety disorders and individuals without any anxiety disorder). In other studies, (Boschen & Vuksanovic 2007; Radomsky, Gilschirt and Dussault, 2006, Van den Hout & Kindt, 2004), the feeling-of-knowing was measured by making individuals shut-off valves, etc. and making them repeatedly check these actions. Most of the studies addressing both episodic and semantic memory in OCD (Dar, 2004; Hermans et al. 2003; Hermans et al. 2008, Tolin et al. 2001; Tuna et al. 2005) state that individuals diagnosed with OCD display a lack of confidence in memory. Few studies (Tekcan et al., 2007), on the other hand, suggest that individuals with OCD do not display a lack of confidence in memory. It is worth to note that, these studies consist of the ones on semantic memory, not episodic memory.

Studies, both verifying and denying the lack of confidence in memory, indicate that the problem in OCD cases is related to a meta-system which administers, monitors, controls, organizes and evaluates the cognition and cognitive processes of the individual (Irak & Flament 2007; Tekcan et al. 2007; Tuna et al. 2005). In some of the studies (Hermans et al. 2003, Hermans et al. 2008; Tuna et al. 2005) this meta-system is assumed to be metacognition, while in others (Kuelz et al. 2004, Moritz et al. 2002; Savage et al. 2000) these are defined as executive functions.

Executive Functions

Executive functions provide an insight into the nature of OCD through controlling, evaluating and monitoring the cognitive processes in OCD (Clark, 2004). Executive functions hold particular importance in explaining the memory and meta-memory related issues in OCD. In numerous studies on this subject (Purcell, Maruff, Kyrios and Pantelis,1998; Kuelz et al. 2004; Moritz et al. 2001; Savage, 2000) it was investigated via performance tests (Wisconsin Card Sorting Test, etc.), as to whether there is a significant relationship between meta-memory and executive functions. However these studies yielded inconsistent results due to the types of questionnaires used (presence of stimuli irrelevant to OCD), and the attributes of participants (non-clinical group, few individuals in clinical group), and these studies failed to explicitly articulate the significant relationship between the confidence (in memory) related issues and executive functions. According to a common and consisted account, individuals diagnosed with

OCD undergo difficulties in maintaining and changing the setup for not being able to get away from the threat stimuli; and they encounter difficulties in tackling disruptive effect as they fail to withstand intrusive thoughts and compulsions. Accordingly, individuals are reported to get suspicious about their actions, have difficulties in making decisions and repeatedly exhibit the same behaviors (Clark, 2004; Greisberg & McKay, 2003)

As also stated in a number of studies, the tasks performed by executive functions, that control cognitive processes (attention, memory) and meta-memory, are also performed by meta-cognitive structure (Hermans et al., 2003; Hermans et al., 2008). Both approaches yielded similar results with different evaluation methods (self-report measurements, performance tests), thus, recent studies are centered on finding out which one really controls and monitors the cognitive processes. In the literature, few studies were carried out to tackle this incomprehensibility and address metacognitive structures and metacognitive processes using both performance and self-report tests (Ahmari et al., 2014; Exner et al., 2009).

Consequently, no clear account of how problems arise in OCD and how they are processed in both meta-systems is available in the literature. What is clear about existing studies is that, in both meta-systems they articulate similar issues with different conceptual expressions after using different monitoring methods.

DISCUSSION and CONCLUSION

The aim of the present review study was to address and discuss the similarities and differences of cognitive and metacognitive structures and processes that define OCD, making reference to recent studies. In this context, the studies addressing the cognitive and meta-cognitive structures and processes were surveyed and the obtained results were presented. The studies addressing OCD at a cognitive level were based upon different approaches in terms of cognitive structures and processes, as a result of differing definitions and monitoring methods (e.g. inventory, performance/task) used in these studies.

However, the methods (scarce number of comparative studies), questionnaires (self-report questionnaires, non-threat related words and ambiance used in performance tests), attributes of the participants (applications on non-clinical or few clinical groups, and application on only control-type patients), and the obtained results (being valid only in control groups or for checking type, and acquisition of inconsistent results) proved ineffective in explaining the types, symptoms and the factors underlying the persistence of OCD (Abramowitz & Houts, 2005; Clark, 2004; Greiseberg & McKay, 2003; Muller & Roberts, 2005). Accordingly, it can be inferred that, collective use of cognitive structures and processes is possible and likely to remedy the deficiencies of each level. However, the inconsistent results of cognitive studies indicate that collective use of both approaches may remain ineffective as well. This is probably why several researchers have attached particular importance to the metacognitive structures and processes that control, evaluate and administer these cognitive structures and processes.

Results of several studies indicate that, metacognitive structures and processes addressing OCD at a meta-cognitive level have become more effective in defining OCD than cognitive structures and processes. However, an ambiguity prevails in the studies dealing with metacognitive structures and processes. This is attributable to the use of different tools and methods for controlling and monitoring the cognitive processes in OCD, in both cognitive and metacognitive studies. It is deemed reasonable to use

self-report measurements in the meta-cognitive structure which manages the cognitive structure; whereas no clear account is available for the use of self- report questionnaires instead of performance tests in the metacognitive structure that manages cognitive processes.

As for the meta-cognition questionnaires used for metacognition, most of the questionnaire items were found monitor the structure and few items (MCQ, 11th item: I cannot ignore anxiety inducing thoughts when I think of them) were found to monitor cognitive processes indirectly as performance test This clearly indicates that metacognition fails to provide a complete, explicit and clear account of cognitive process. On the other hand, in the studies associating the meta-cognitive issues with executive functions, performance test was used to assess executive functions (Kuelz et al., 2004; Moritz et al., 2001). These studies, however, yielded inconsistent results due to the used monitoring tools (incompliance of operations in questionnaires/tasks with OCD) and the attributes of participants (use of non-clinical groups or very few participants in clinical groups), and failed to provide a clear account of how meta-memory is related to executive functions. This in turn resulted in ambiguities and incomprehensibilities in the literature as both metacognitive levels failed to effectively elucidate OCD.

These two approaches converge at a point as they are both representatives of meta-cognitive level, and they yield similar results through articulating similar issues using different conceptual expressions and evaluations. In this context, these two metacognitive levels can be collectively addressed with a view to demonstrate their similar context and results in a more unambiguous way. A scarce number of studies on this subject have been conducted so far (Ahmari et al., 2014; Exner et al., 2009). Accordingly, in the current study, the negotiating role of cognitive awareness present in the cognitive structure was underlined through both performance test and self-report measurement, with a particular emphasis on feasibility of the collective use of metacognitive structures and metacognitive processes. However the scarce number of studies does not suffice for proving that there is no such ambiguity, and further studies should be carried out in this context. As for the limitations of this review study, the first one is the use of limited number of databases (Psyc-Info, ProQuest and Index Medicus) with limited number of keywords ("Obsessive Compulsive Disorder, Cognition, Cognitive Processes, Metacognition and Executive Functions") during the survey. The number and variety of these databases and keywords can be increased. The second limitation is that the surveyed studies were limited with review studies, and a meta-analysis study can be performed with the studies surveyed in this context.

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