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Running head: DEVELOPING A MODEL

Pepperdine University
Graduate School of Education and Psychology

DEVELOPING A MODEL FOR UNDERSTANDING MINDFULNESS AS A POTENTIAL INTERVENTION
FOR OBSESSIVE-COMPULSIVE DISORDER

A clinical dissertation submitted in partial satisfaction
of the requirements for the degree of
Doctor of Psychology

by

Steven I. Rudoy

July, 2014

Stephanie Woo, Ph.D. – Dissertation Chairperson

This clinical dissertation, written by

Steven Rudoy

under the guidance of a Faculty Committee and approved by its members, has been submitted to and accepted by the Graduate Faculty in partial fulfillment of the requirements for the degree of

DOCTOR OF PSYCHOLOGY

Doctoral Committee:

Stephanie Woo, Ph.D. - Chairperson

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VITA

EDUCATION

Pepperdine University, Graduate School of Education & Psychology. Los Angeles, CA
 Doctoral Candidate in Clinical Psychology May 2014 (anticipated)

- Dissertation Chair: Stephanie Woo, Ph.D.
 - Title: *Developing a model for understanding mindfulness as a potential intervention for obsessive-compulsive disorder.*
 - Currently completing final draft; expected to complete defense February 2014.

Pepperdine University, Graduate School of Education & Psychology. Los Angeles, CA
 Master of Arts in Clinical Psychology May 2010

University of California, Santa Barbara. Goleta, CA
 Bachelor of Arts in Sociology June 2006

CLINICAL EXPERIENCE

Pacific Clinics (APA-Accredited Predoctoral Internship) August 2013 - present
 Psychology Predoctoral Intern (*under supervision of Beth Jenks, Ph.D., Susan Sabo, Ph.D., and Charles Chege, Psy.D.*)

- Participate in didactics focusing on evidence-based practices relevant to the community setting training, including: Seeking Safety, Interpersonal Process Therapy (IPT), Motivational Interviewing, and Trauma Focused CBT.
- Conducting a participatory action research project at the Monrovia Intensive Milieu Program (faculty chair: Scott Fairhurst, Ph.D.), focused on coding client-staff interactions. Participate in a bi-monthly research workshop.
- Take part in case conceptualization group, supervision-of-supervision group, and Spanish language supervision.

Primary Placement: Pasadena Full Service Partnership (*Supervisor: Susan Sabo, Ph.D.*)

- Provide services for underserved ethnically diverse populations between ages 26 and 59 who experience homelessness, severe mental illness, and/or substance abuse with a focus on reducing recidivism, homelessness, unemployment, substance use, and psychiatric hospitalizations, while assisting clients in achieving their desired recovery goals.
- Conduct intake assessments, provide individual and group psychotherapy, and administer and interpret psychodiagnostic tests in order to provide the treatment team with information regarding differential diagnosis, cognitive functioning, and treatment planning.
- Coordinate treatment as a multidisciplinary team member in order to address a broad range of client needs and implement client care plans with psychiatrists, case workers, employment and housing specialists, and other therapists.

Secondary Placement: Pacific Clinics Monrovia Outpatient (*Supervisor: Charles Chege, Psy.D.*)

- Provide individual and group psychotherapy to child and adolescent clients and their families, focusing on skills building, parent training, and improvement of family relationships.
- Conduct intake assessments and coordinate new clients' care in order to enhance engagement in treatment and complete coherent multifaceted treatment plans.

UCLA Youth Stress and Mood Clinic December 2011 – July 2013
 Psychotherapy and Assessment Extern (*under supervision of Jennifer Hughes, Ph.D. and Joan Asarnow, Ph.D.*)

- Conduct research-based assessments, including the K-SADS, CDRS, and SCID, on adolescents and

their families to determine eligibility for program, and to evaluate outcomes.

- Facilitate and co-facilitate various individual and group psychosocial interventions (Interpersonal Psychotherapy, Dialectical Behavioral Therapy, Functional Family Therapy) from three studies focusing on the treatment of youth depression, suicidality, and borderline personality features.
- Participate in weekly didactic seminars, and a weekly DBT consultation team meeting, and contribute to clinic case conceptualizations and treatment plans.

UCLA Aftercare Research Program, Los Angeles, CA July 2011 – July 2012
Psychotherapy and Assessment Extern (*under supervision of Kenneth Subotnik, Ph.D. and Denise Gretchen-Doorly, Ph.D.*)

- Take part in multidisciplinary team treatment approach for patients with first onset schizophrenia and schizoaffective disorders, with responsibilities for diagnosis, treatment planning, and continual updates of patient progress to the team, as well as working with other service providers to ensure consistent and effective patient care.
- Facilitate and co-facilitate various activity-focused groups, involving both cognitive remediation as well as healthy living psychoeducation.
- Conduct individual psychotherapy, focusing on improving patients' coping with illness, improving self-care, and meeting academic and occupational goals.
- Administer research assessments as a part of research outcomes measures, which includes the MATRICS battery, as well as objective health measures, motivation measures, and assessments of academic and occupational performance.

Pepperdine Community Counseling Center, Encino, CA Sept. 2010 – July 2013
Psychotherapy Trainee (*under supervision of Anat Cohen, Ph.D.*)

- Provide brief and long-term individual and family psychotherapy to diverse adult, adolescent, and child populations suffering from mood and anxiety disorders, relational difficulties, behavioral problems, substance use disorders, and personality disorders.
- Implement crisis interventions for clients with a variety of diagnoses and risk levels.
- Conduct intake assessments and diagnostic interviews.
- Write integrated intake reports, which include five-axis diagnoses and treatment plans.
- Administer, score, and interpret psychodiagnostic and outcome measures to monitor client response to intervention.
- Act as on-call therapist on a rotating basis.
- Present clinical cases in weekly and group supervision.
- Provide outreach and school-based psychotherapy on two local campuses.

Didi Hirsch Suicide Prevention Center, Culver City, CA Sept. 2009 - Sept. 2010
Crisis Line Counselor

- Volunteered as a crisis line counselor for Los Angeles' first and most prominent suicide prevention line.
- Interfaced with callers following the SPC Crisis Call Model to de-escalate crises and to provide referrals to social services or other buffers as an alternative to suicide.
- Trained and monitored new trainees in order to maintain theoretical integrity and consistent delivery of services.

SUPERVISORY EXPERIENCE

Pacific Clinics (APA-Accredited Predoctoral Psychology Internship) August 2013 - present
Practicum Supervisor (*under supervision of Charles Chege, Psy.D.*)

- Provide weekly supervision to practicum students, focusing on developing supervisory competencies and obtaining training in supervision theory and technique.
- Meet quarterly with student's primary supervisor to provide input into evaluation and develop goals to enhance student's development.
- Provide direct feedback regarding therapeutic style and professional role, and mentor student in professional development and career planning.

Pepperdine Community Counseling Center, Encino, CA Sep. 2012 – July 2013
Peer Supervisor (*under supervision of Anat Cohen, Ph.D.*)

- Supported and mentored a group of first-year doctoral students in their clinical training and professional development.
- Reviewed videotaped sessions, with an emphasis on modeling legal and ethical issues, therapeutic alliance, and technique development.
- Provided oversight in crisis evaluation, monitoring, and documentation, and reviewed therapist paperwork to ensure adequate documentation of all relevant clinical issues.
- Developed collaborative training goals with supervisees, focused on a competency-based model of training.
- Assisted supervisees in formulating treatment plans and case conceptualizations from various theoretical orientations.
- Participated in weekly group supervision in order to develop supervisory competencies, to review supervisory relationship, and develop mentoring skills.

RESEARCH EXPERIENCE

Didi Hirsch Community Mental Health, Culver City, CA April 2009 - present
Outcomes Department (*under supervision of Dominica Salvatore, M.S.*)

- Collected, inputted, and managed a large database in Microsoft Access, which represents clinical outcomes across all of Didi Hirsch's Southern California offices and ranges from measures related to children to those designed for use with special populations.
- Designed, implemented, and tested new data management interfaces and interacted with a team of employees and volunteers on training and streamlining of vital data management processes.
- Ran data queries and created reports, which used the array of data available to answer clinical questions and to establish efficacy and client satisfaction benchmarks across many programs.

PUBLICATIONS AND PRESENTATIONS

Frank, G., Rudoy, S., Hakimi, D., and Bryant-Davis, T. (in review). *Family reunification for sexually exploited youth*.

Rudoy, S., and Frank, G. (2011). *Diagnosis of childhood anxiety disorders and parent interventions* (community outreach project for Pepperdine Community Counseling Center, presented for parent group at Lanai Elementary School).

Rudoy, S. (2011). *First episode schizophrenia: Diagnosis, treatment, and outcomes* (guest lecture for master's level comprehensive review course at Pepperdine University).

PROFESSIONAL ACTIVITIES

Pepperdine Community Counseling Center, Encino, CA August 2012 – present
School-Based Counseling Coordinator

- Maintain and audit student charts for psychotherapy work at local high school.
- Serve as a liaison between school contact and therapists in obtaining referrals, assigning cases, and troubleshooting potential difficulties.

Pepperdine University, Los Angeles, CA Sept. 2011 – June 2012
Graduate Assistant, Wiseburn School District

- Maintain and audit student charts.
- Serve as a liaison between school contact and therapists in obtaining referrals, assigning cases, and troubleshooting potential difficulties.

Pepperdine University, Los Angeles, CA October 2008 – present
Graduate Assistant, Writing Support

- Proofread, edit, and provide feedback on writing projects for graduate students in Pepperdine's Graduate School of Education and Psychology.
- Tutor English Language Learners, provide in-depth support for various writing issues, and editing theses, literature reviews, and dissertations for clarity, unity, and cohesion.

ABSTRACT

The paucity of effective alternative or augmentative treatments available for OCD coupled with the emerging potential of mindfulness-based treatments indicate that exploring the potential utility of such interventions for the OCD population is a useful area of inquiry. In addition, although more general examinations of the mechanisms by which mindfulness contributes to positive change have been conducted, those mechanisms of action have never been theoretically linked with the mechanisms of action believed to underlie the mental processes in OCD. The current study will include a critical analysis of the existing literature covering the cognitive and biological bases for understanding the etiology and maintenance of OCD symptomatology, empirical findings on the efficacy and effectiveness of various biological and psychosocial treatments for OCD, research on the effectiveness of augmenting traditional treatments with mindfulness for various psychiatric disorders, and an exploration of the mechanisms of action posited in dismantling studies of mindfulness treatments for various clinical and non-clinical populations. Through an integration of the findings, hypotheses regarding the mechanisms for change are offered along with clinical recommendations for how this understanding might be applied to treating client suffering from OCD. This study's methodology is informed by Pawson's realist synthesis method, whose goal is explanatory rather than summative, making it well suited to carrying out syntheses to develop working explanatory models in areas where data are insufficient to identify and test relationships (Pawson, 2006). The final process of this research involves making logical connections between the proposed components of mindfulness and OCD, developing an explanatory model, and applying such theoretical concepts to clinical practice.

Chapter 1. Review of Background Literature and Statement of the Problem

Background

Obsessive-compulsive disorder (OCD) is classified as an anxiety disorder in the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)*, and is characterized by “recurrent obsessions and compulsions that are severe enough to be time consuming or cause marked distress or significant impairment” (American Psychiatric Association [APA], 2000, p. 456). Its hallmark symptoms include obsessions, defined as “persistent ideas, thoughts, impulses, or images that are experienced as intrusive and inappropriate and that cause marked anxiety and distress” (p. 457), and compulsions, or “repetitive behaviors or mental acts the goal of which is to prevent or reduce anxiety and distress, not to provide pleasure or gratification” (p. 457). These symptoms often manifest cyclically, in which obsessional thoughts trigger the fear response in the brain, followed by a compensatory behavior aimed at neutralizing the overwhelming feeling of distress.

Symptoms of the disorder vary depending on the content of the individual's obsessions, and can range from repeated thoughts about contamination (most common), to pathological doubt, a need to have things in a particular order, aggressive or horrific impulses, or inappropriate sexual imagery (APA, 2000). The course, severity, and pattern of symptoms vary by individual, causing disability in some while staying relatively manageable in others. The average age of onset is earlier in males than in females (6-15 years and 20-29 years, respectively), but for the majority of individuals, the condition has a gradual onset and a chronic course (APA, 2000). OCD is the fourth most common neuropsychiatric illness in the U.S., affecting one in 40 adults and one in 200 children (Obsessive Compulsive Foundation, n.d.). Estimates of the disorder's prevalence in the U.S. number around five million, and based on community studies, OCD has a lifetime prevalence of 2.5% and a one-year prevalence of 0.5%-2.1% among adults (APA, 2000).

Current empirical research has lent support for treating OCD using an initial course of cognitive-behavioral therapy (CBT), with a focus on exposure and response prevention (ERP), in conjunction with pharmacotherapy using high doses of selective serotonin reuptake inhibitors (SSRI) (Hood, Alderton, & Castle, 2001). ERP involves exposure to the individual's feared stimulus, either in vivo or imagined, followed by focused compulsion inhibition. The goal of this intervention is to teach the client to allow the anxiety associated with the obsessive thought to habituate, breaking the cycle of anxious arousal followed

by negative reinforcement (i.e., lessening of anxiety) that occurs when compulsions are performed in response to obsessive thoughts (Butcher, Mineka, & Hooley, 2007).

Purpose of the Study

Although ERP reflects a tremendous improvement from previous psychotherapeutic methods that existed up to the mid-20th century (e.g., “talk therapy” aimed at increasing insight into the nature of obsessions and compulsions, coping techniques such as thought stopping), OCD is still difficult to treat and complete symptom alleviation occurs infrequently. As many as 30% of patients remain refractory to treatment (Hood et al., 2001), and such individuals often remain severely impaired by their symptoms. Additionally, many individuals find it difficult to adjust to SSRI medication and are often unresponsive to the first and second trials of these first-line agents. According to results of a longitudinal study of treatment adherence in OCD (Mancebo, Pinto, Rasmussen, & Eisen, 2008), as many as 57% of patients were either inconsistent with taking their medication, took lower doses than prescribed, or discontinued medication against the recommendation of their doctor. In this study participants cited as reasons for lowered/lack of adherence environmental barriers (i.e. financial, time); beliefs about treatment, diagnosis, and the clinician; as well as fears of side effects and anxiety regarding the effect the medication might have. Although CBT treatments, including ERP, are relatively effective, problems with adherence have also been noted (Abramowitz, Franklin, Zoellner, & DiBernardo, 2002). These treatments also appear less efficacious in treating chronic OCD sufferers, those with comorbid Axis I disorders (specifically major depressive disorder), and those with certain types of obsessional themes (i.e., cleaning and washing). According to Hood et al. (2001), almost a third of OCD patients treated with ERP and/or SSRI pharmacotherapy will continue to exhibit disability and impaired functioning. These authors note that the next line of treatment currently includes pharmacological augmentation using atypical antipsychotics or monoamine oxidase inhibitors (MAOI), which typically have only minimal efficacy. Psychosurgery (e.g., anterior cingulotomy) and deep brain stimulation may be used in especially challenging cases. Hood et al. assert that the rarity of complete symptom remission in OCD, and the consequent likelihood of continued dysfunction, indicates that the current standard of practice does not provide optimal results.

As a response to sub-optimal treatment response in OCD and other mental disorders, practitioners and scholars have begun exploring mindfulness-based treatments, which have been gaining

ground over the past decade. These interventions are based on mindfulness meditation, a practice that centers on “an awareness that emerges through paying attention, on purpose, and non-judgmentally to the unfolding of experience moment by moment” (Kabat-Zinn et al., 1992, p. 145). Mindfulness has been used as a spiritual meditative practice for centuries in East Asia, but has only recently been introduced as a potential method to relieve the symptoms associated with some of the most common mental and physical disorders of today, including chronic pain conditions, depression, and anxiety. This practice was initially adapted for clinical application by Kabat-Zinn, who developed the first Mindfulness Based Stress Reduction Program (Kabat-Zinn et al., 1992). It has since been used to prevent relapse in chronic depression (Teasdale, Segal, Williams, Ridgeway, Soulsby, & Lau, 2000), and has been found effective in the treatment of a number of mental disorders (e.g., Craigie, Rees, & Marsh, 2008; Vujanovich, Youngwirth, Johnson, & Zvolensky, 2009), which will be explored further in the following section.

The lack of effective alternative or augmentative treatments available for OCD coupled with the emerging potential of mindfulness-based treatments such as those described above, indicate that exploring the potential utility of such interventions for the OCD population may be a useful area of inquiry. In the OCD treatment literature, a lack of information exists on effective augmentative treatments available to manage symptoms of individuals who do not respond to traditional treatments. In addition, although more general examinations of the mechanisms by which mindfulness contributes to positive change have been conducted, those mechanisms of action have never been theoretically linked with the mechanisms of action believed to underlie the mental processes in OCD. Examining whether existing literature can provide information linking symptoms to potential change processes will provide a more sound foundation for applying mindfulness interventions to OCD, and may provide a framework from which additional research can be conducted to determine the efficacy of such treatments on this population.

Roemer and Orsillo (2003) observe that although findings suggest interventions that include mindfulness provide additional symptom reduction when compared to existing CBT treatments alone, more exploration is required of the underlying mechanisms by which this process successfully accounts for change. The positive outcomes from the use of mindfulness-based treatments were corroborated in a meta-analysis conducted by Baer (2003), who also noted that “the empirical evaluation of any intervention

requires clear operational definitions of concepts and procedures, and the identification of conceptually sound mechanisms that may account for changes produced by the intervention” (p. 140). It is this latter observation that serves as the basis for the proposed clinical dissertation, which will seek to analyze and connect what is known about both OCD and mindfulness to determine whether there is enough information to warrant further investigation into the efficacy of mindfulness as an adjunctive intervention for OCD.

Research Topic

The current study will include a critical analysis of the existing literature in the following areas: (a) cognitive and biological bases for understanding the etiology and maintenance of OCD symptomatology, (b) empirical findings on the efficacy and effectiveness of various biological and psychosocial treatments for OCD, (c) research on the effectiveness of augmenting traditional treatments with mindfulness for various psychiatric disorders, and (d) an exploration of the mechanisms of action posited in dismantling studies of mindfulness treatments for various clinical and non-clinical populations. Through an integration of the findings, hypotheses regarding the mechanisms for change will be offered along with clinical recommendations for how this understanding might be applied to treating client suffering from OCD. First, however, in order to provide a framework for understanding the problem, some literature will be reviewed to provide an overview of: (a) the theoretical models of OCD, (b) existing treatments available for OCD, (c) a background and history of mindfulness as a psychosocial intervention, and (d) a review of mindfulness-based treatments that have been studied in both clinical and nonclinical populations.

Literature Review

Theoretical Models of OCD. In order to provide a context for understanding current ways of conceptualizing OCD, the variety of theoretical models for understanding the disorder will first be reviewed. The disorder has been an area of interest for theoreticians and researchers dating back to Freud’s era, and although current thinking has given favor to cognitive and behavioral understandings of the disorder, psychodynamic views have also contributed to the conceptualization of OCD over time.

In 1909, Freud published the case of the Rat Man (Freud, 1997) an apparent OCD sufferer who held Freud’s interest for many years, and who served as the source of extensive inquiry into the disorder throughout this period (Rice, 2004). This case study has provided psychoanalytic thinkers with a

conceptualization of OCD that includes a focus on struggles for control, unresolvable ambivalence, and a reliance on defenses including reaction formation, intellectualization, isolation, and undoing, and the use of magical thinking (Esman, 2001). Although this conceptualization is likely palatable to many current practitioners, the paucity of research on effective psychodynamically oriented interventions for the disorder has made such a conceptualization virtually obsolete at this point. More recent psychodynamic theorists continue to find *obsessional neuroses* to be challenging to treat, with recent exploration into attachment elucidating some potential predisposing factors, but still offering little into understanding potential treatments for OCD (Brandchaft, 2001).

Conversely, the relative success of cognitive and behavioral interventions for OCD since the 1960s has made these theoretical models the core of our current scientific understanding of the disorder. Initially, Dollard and Miller (1950) adapted Mowrer's (1939, p. 72) two-stage theory of learning to explain the development and maintenance of obsessions and compulsions, and their mutual reinforcement (Franklin & Foa, 2011). This theory, which is based, in part, on classical conditioning, describes intrusive mental thoughts, which are an almost ubiquitous human experience, as a neutral event stimulus (conditioned stimulus). Once the conditioned stimulus (intrusive thought) becomes paired with an unconditioned response (fear/anxiety) due to the sufferer's interpretation of its importance (unconditioned stimulus), the once neutral stimulus begins to provoke a response similar to the response that the unconditioned stimulus provoked. Once the conditioned response is acquired, the conditioned stimulus (intrusive mental thought) is avoided in order to reduce associated anxiety, which introduces an operant conditioning conceptualization into the theory. This avoidance pattern reinforces the obsessive-compulsive cycle, thus creating an endless cycle of fear arousal and avoidance behavior that can result in severe impairment. Currently, a number of studies have validated this theoretical link between obsessions and compulsions, which has also influenced the functional conceptualization utilized since the DSM-III (Franklin & Foa, 2011).

Later, Foa and Kozak (1986) added a cognitive conceptualization to the understanding of the disorder. This model posits that OCD sufferers make common errors in information processing, specifically in regard to an over-estimation of danger in relatively safe situations and an over-assignment of responsibility to themselves. This addition signaled the introduction of cognitive restructuring

techniques into the therapeutic repertoire available to treat the disorder (Franklin & Foa, 2011).

Salkovskis (1985) connected obsessive-compulsive thought patterns with Beck's delineation of three levels of cognitive processing. In this conceptualization, intrusive thoughts are thought to be stimuli that trigger certain types of underlying negative automatic thoughts and intermediate beliefs. In particular, Salkovskis outlines five common assumptions that characterize OCD: (1) thinking about an act is equal to doing that act, (2) failing to prevent harm is the same as doing harm, (3) responsibility requires that any risk of danger be attended to in order to prevent its occurrence, (4) avoiding neutralization is equivalent to walking into harm's way, and (5) one should and must be able to control one's own thoughts at all times. This conceptualization, which serves as an extension of the theory presented above, gave rise to a cognitive treatment focusing on modifying these specific beliefs in order to allow patients to have a more realistic appraisal of intrusive thoughts, rather than responding by compulsively seeking neutralization of them through compulsive behaviors (Foa & Franklin, 2011). The conceptualizations described above, which to date are the most widely accepted among researchers, inform the treatments that will be described in the next section, and will serve as a framework for describing the mechanisms of action later in this document.

Advances in neuroimaging and studies of various medication effects on OCD and OCD-spectrum disorders in the past two decades have elucidated a biological understanding of the disorder. A review conducted by Stein (2000a) outlined five aspects of neurobiology now widely accepted to be implicated, at least in part, in the processes underlying OCD symptomatology. These include differences and changes in neurochemistry, neuroanatomy, and neuroimmunology, as well as neuroethology and neurogenetics; the latter two focusing on the genetic and evolutionary facets of OCD symptomatology, which will not be reviewed here.

The first of these, neurochemical differences between individuals diagnosed with OCD-spectrum disorders and controls, indicate that the 5-HT system has a crucial role in OCD (Stein, 2000a). The exclusive efficacy of SSRIs in patients with OCD contrasts with findings in pharmacotherapy for the treatment of major depressive disorder, in which SSRIs as well as noradrenergic reuptake inhibitors have both been found to be effective. Additionally, administration of 5-HT agonists was found to exacerbate OCD symptoms.

Next, neuroanatomical changes in OCD patients suggest that symptoms are mediated by basal ganglia circuits (Insel, 1992). Insel's fMRI studies demonstrate that individuals with OCD have increased brain activity in the basal ganglia, that this activity increases during exposure to feared stimuli, and that this hyperactivity decreases after successful SSRI pharmacotherapy or cognitive-behavioral therapy for OCD. In addition to disruptions in basal ganglia functioning, frontal lobe dysfunctions are also implicated in OCD symptomatology (Khanna, 1988). Frontal lobe abnormalities have been seen in structural studies (Garber, Ananth, Chiu, & Griswold, 1989), while functional imaging studies show that hyperactivity occurs in the frontal lobe (Rauch & Savage, 1997).

Finally, immunology has been implicated in OCD and OCD-related behaviors. More specifically, obsessive-compulsive symptoms can be precipitated or exacerbated simply by streptococcal throat infection in childhood (Swedo et al., 1998), with a condition known as PANDAS (Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal Infections) implicated as either etiologically linked to later OCD pathology, or at least similar in symptomatology if not in underlying pathophysiology.

Neurobiological studies, including those listed above, have tended to explore OCD as part of a spectrum of disorders, including some impulse control disorders (Tourette's Syndrome, Trichotillomania) and somatoform disorders (Body Dysmorphic Disorder), which is a controversial clustering of likely related disorders that also differ in important ways. Nevertheless, neurobiological differences between OCD sufferers and normal controls suggest that in addition to the cognitive models described earlier, biological underpinnings are additionally at play in this illness. Thus, the neurobiology of OCD as it may interplay with the neurobiological effects of mindfulness interventions that have been more recently uncovered, will be outlined further as part of this analysis.

Current OCD Treatments. Based on the theoretical conceptualizations previously outlined, various treatments have been developed and tested to treat OCD. To date though, no treatment has been as universally accepted as the standard of practice for the disorder as exposure and response prevention (ERP), which has been studied for over 40 years (Foa & Franklin, 2011). This treatment was developed based on the blended theoretical model presented by Foa and Kozak (1986), which conceptualizes OCD as a disorder that is developed and maintained by both cognitive and behavioral processes. In order to break the cycle of avoidance and negative reinforcement that exists in OCD, ERP involves prolonged

exposure to obsessional cues, coupled with systematic blocking of any neutralizing behavior (i.e. compulsions). This procedure allows for natural habituation to occur, which allows for the behavioral principle of counterconditioning to take affect. Additionally, cognitive techniques are utilized using this procedure, which helps patients test and modify irrational beliefs, and to learn new thoughts that lead to flexibility in the face of intrusive stimuli. Exposure is most often done gradually (i.e., hierarchically), with increasingly distressing cues, and often includes both imaginal and in vivo elements.

To date, a number of randomized controlled trials employing ERP as the primary intervention have been conducted in various formats (group, weekly, bi-weekly, etc.), and most have achieved excellent results, some of which will be discussed below. For example, a randomized controlled trial conducted by Foa and colleagues (2005) compared ERP to placebo, as well as in combination with an SSRI, and against an SSRI alone. This study found the following effects: ERP was superior to clomipramine, ERP plus clomipramine was superior to clomipramine, and there were no differences between patients receiving ERP alone as opposed to those receiving ERP plus clomipramine based on Yale Brown Obsessive Compulsive Scale (Y-BOCS) total score and the Clinical Global Impression Improvement Scale. These findings suggest that ERP, SSRI medication, and their combination, are efficacious treatments for OCD, and that ERP alone may be superior to SSRI medication alone.

A similar study conducted by Franklin, Abramowitz, Kozak, Levitt, and Foa (2000) used quasi-experimental methods to test ERP in an outpatient clinical setting. Significant changes in OCD symptoms, as measured by the Y-BOCS, the Hamilton Rating Scale for Depression (HRSD), and the Beck Depression Inventory (BDI), were observed pre- to post-treatment, after controlling for prior treatment history, concomitant pharmacotherapy, comorbidity, and other potential confounding variables. This study found 86% of treatment completers achieved significant clinical improvement on measures of both OCD and depression. Additional randomized controlled studies, including those conducted on children and adolescents, such as the study conducted by de Haan, Hoogduin, Buitelaar, and Keijsers (1998), found similar results, suggesting that exposure is an essential component of treatment for OCD.

Although treatment efficacy has been satisfactory using the more behaviorally based principles inherent in ERP, additional treatment protocols came out of the cognitive conceptualizations that emphasize changing thoughts in order to improve OCD symptoms (Foa & Franklin, 2011). Earlier studies

of cognitively based interventions alone found symptom reduction ranging only slightly greater than 20%, which in comparison to most ERP studies, was much less promising. On the other hand, a meta-analysis of cognitive and behavioral interventions for OCD (Abramowitz, 1997) found cognitive therapy to be at least as effective as ERP, and pointed to various overlapping change processes in both treatments. More recent studies, such as the one described below, which are based on more specific cognitive models of the disorder rather than general cognitive restructuring techniques, found clinically significant symptom reduction to ERP.

A study conducted by Whittal, Thordarson, and McLean (2005) compared cognitive therapy to ERP, and found no significant differences between the two treatments, with both treatments resulting in adjusted post-treatment Y-BOCS mean scores in the mild range. This suggests that improvements in cognitive theory have led to more effective treatments and that such treatments may be useful in treating the disorder. On the other hand, although there were no explicit behavioral techniques employed in the cognitive intervention, such interventions as behavioral experiments do not allow for clear theoretical delineation, as overlap exists between the potential mechanisms of action of both interventions. Thus, defining clear boundaries between purely cognitive and purely behavioral techniques is impossible due to ambiguities and overlap in definitions of each, although it is suggested that the addition of cognitive interventions serves to augment outcomes.

Finally, a study conducted by Vogel, Stiles, and Gotestam (2004) found that the addition of cognitive interventions following a course of ERP augmented outcomes by leading to decreased symptomatology, suggesting unique mechanisms of action between the two interventions. Results on the YBOCS and BDI suggested that ERP followed by relaxation training or cognitive therapy was superior to a wait list condition. This study did not address whether the integration of the techniques rather than continuing ERP leads to improved outcomes. Furthermore, improvements seen between both active treatment groups were comparable, suggesting that ongoing treatment may be a confounding variable. In addition, the relatively small sample sizes limit generalizability of these results, but suggest an area for further exploration.

Origins of Mindfulness in Psychotherapy. Mindfulness is a key aspect of Buddhism, the ancient religion dating back 2,500 years to India (Kang & Whittingham, 2010). In Buddhist tradition,

mindfulness is described as a state of consciousness that can be achieved through number of paths, one of which is meditation. Kang and Whittingham defined the state of consciousness that characterizes mindfulness in the Buddhist tradition as:

Nonreactive, non-elaborative, non-reified awareness that has meta-cognitive functions, monitoring ongoing awareness and discriminating wisely between aspects of awareness content so that awareness and behavior can be directed according to the goals of genuine happiness, virtue, and truth. Thus, mindfulness can be focused on present moment experience, sustaining attention on a familiar, factually concordant and positively evaluated object or on systematic recollection of constructive ideas, in a way that is volitionally generated or spontaneously emergent. (p. 170)

Although this state of consciousness is held as a tenet of all of the “schools” of Buddhism, each has differing ways of attaining this state, which reflects the differing meditative practices of each school.

Buddhist practices, including meditation, became popular in the West in the 20th century. Individuals seeking better ways of achieving happiness and health, who had grown tired of Western medical paradigms, adopted some of these practices (Virtbauer, 2012). Kabat-Zinn, a molecular biologist and professor of medicine at the University of Massachusetts, who himself had been altered by a traditional Zen Buddhist meditative practice called *vipassana*, began applying and studying this technique in the 1980s on medical center patients with a variety of illnesses (Kabat-Zinn, 1990). This training developed into a standardized protocol known as the mindfulness-based stress reduction program (MBSR), which sought to treat patients who had chronic conditions or who had not been responsive to traditional treatments (Kabat-Zinn et al., 1992).

As part of this program, patients are taught to meditate for varying lengths of time, paying attention to specific stimuli (i.e., breath in sitting mediation, movement in Hatha Yoga, bodily sensation in body scan meditation, and walking in walking meditation), while redirecting attention to the chosen stimulus whenever they are distracted by thoughts, urges, memories, or other internal or external stimuli, including painful or overwhelming emotional experiences (Kabat-Zinn, 1990). The goal of this process is to cultivate *mindfulness*, which describes the ability to focus one’s attention on a stimulus of choice, while letting other stimuli “pass” in consciousness. This theoretical understanding clearly points toward the utility of such a practice for teaching patients to focus their attention on areas of comfort within their bodies rather than chronic pain, or to avoid ruminative patterns of thinking in favor of experiencing present moments of joy and excitement.

MBSR is based on an eight-week group model that employs a psychoeducational format to train individuals in the practice of cultivating mindfulness in general, and as a specific aid in dealing with chronic pain and stress. The MBSR program is built around providing participants with a multi-faceted exposure to various methods of cultivating mindfulness, including traditional sitting (breathing) meditation, hatha yoga, and a body scan meditation, over an eight-week course (Kabat-Zinn, 1990). As participants are taught various techniques, they are given daily homework to complete with guided audio recorded by the teacher to reinforce the teaching that takes place each week. Beginning in the 1990s, Kabat-Zinn began adapting treatments to include mindfulness for various clinical populations, including individuals with anxiety disorders (Vollestad, Siverson, & Nielsen, 2011), and research has begun to establish empirical support for their use.

Kabat-Zinn's adaptation of the ancient practice for the psychological improvement of clinical populations was one of the first times in history that a religious practice was standardized and de-spiritualized to provide benefits to followers and non-followers alike (Kabat-Zinn, 1990). Although the practice and goal of mindfulness in MBSR does not differ significantly from traditional Buddhist conceptualizations, Kabat-Zinn's *areligious* application of the practice allowed it to be more easily incorporated into Western medical and psychological practice. As an example, Kabat-Zinn operationally defined mindfulness as "an awareness that emerges through paying attention, on purpose, and non-judgmentally to the unfolding of experience moment by moment" (p. 145), a definition akin to the Buddhist definition, but which removes the practice from its spiritual context. This allows it to be the means to an end of improvement of suffering that does not require an individual to practice other aspects of Buddhism that may interfere with his or her own religious practices. On the other hand, this treatment has been controversial in some circles due to fears of indoctrination, and the clear divide between medicine and spirituality, which has only recently begun to soften (Morris, 2010).

Use of Mindfulness as a Psychosocial Intervention. After Kabat-Zinn found promising outcomes in studies conducted in the University of Massachusetts Medical Center, interest in broader application of mindfulness to the fields of psychology and medicine began to grow, and media attention brought a previously unknown practice to the masses. Segal, Williams, and Teasdale (2002) became interested in the MBSR program after seeing Bill Moyers' documentary entitled *Healing from Within*

(1993), which profiled the MBSR program and its early successes in treating chronic pain. These researchers sought to derive a treatment for recurrent depression based on the tenets of MBSR and translated Kabat-Zinn's program into an eight-week supplementary treatment modality for those who had recovered from major depressive episodes but who were at risk for relapse.

Segal, Williams, and Teasdale (2002) adapted Kabat-Zinn's MBSR for use with chronic depression in their mindfulness-based cognitive therapy (MBCT). They developed a theory of relapse for depression that included a focus on information processing, suggesting that individuals who have experienced at least one major depressive episode are vulnerable to relapse whenever dysphoric states are experienced. They posited that these states reactivate cognitive patterns associated with depression, which may precipitate another major depressive episode. In order to short-circuit this pattern, mindfulness is taught to train such sufferers to distance themselves from depressive thoughts and mood states in order to decrease the likelihood of relapse. Studies to date have demonstrated reduced relapse rates in chronically depressed individuals with at least two previous major depressive episodes treated with MBCT (e.g., Teasdale et al., 2000), reducing their rate of relapse and recurrence over the 13-month follow-up period by about 50% compared with patients who had not been exposed to the MBCT intervention (treatment as usual [TAU]), who were placed in a wait-list condition, and received bi-monthly assessment.

Interventions such as MBCT and other so-called *third-wave* cognitive-behavioral therapy (CBT) modalities incorporate mindfulness training as a complement and extension of the strategies being taught by CBT. Some of these treatments employ mindfulness not as a core component of treatment, but as part of a multifaceted approach of teaching coping skills and new ways of approaching problematic behaviors. Dialectical behavior therapy (DBT) is one such approach, which was designed to treat borderline personality disorder. This approach incorporates mindfulness as one of the four core components of skills training, which also includes interpersonal effectiveness, emotion regulation, and distress tolerance (Linehan, 1993a; Linehan, 1993b). These skills are taught as part of a multi-pronged approach to improving the lives of individuals who are often chronically suicidal and for whom coping skills are limited. This treatment is based on behavioral principles of operant conditioning, and provides learning in a group format to improve patients' skills in addition to weekly individual psychotherapy to change maladaptive

behavioral patterns. The primary goal of DBT is to help patients improve functioning within the context of finding a balance between acceptance and change.

Mindfulness is taught within DBT similar to the way it is taught in MBSR, but is organized somewhat differently (Baer, 2003). Linehan separates mindfulness into its behavioral elements, including three “what” skills (observe, describe, participate), and three “how” skills (nonjudgmentally, one-mindfully, effectively). Patients learn these skills in weekly groups throughout a yearlong protocol, and are also taught to incorporate mindfulness practice into other core skills that are reviewed. The duration of practice and the types of exercises differ between MBSR and DBT as well, but the goal of distance from thoughts, acceptance of pain, and highlighting the temporary nature of all human experience are similar.

Acceptance and commitment therapy (ACT; Hayes, Strosahl & Wilson, 1999) is another third-wave treatment, based primarily on Hayes’ relational frame theory, which involves a focus on understanding and changing the linguistically-based elements of human suffering, particularly as they relate to self-concept and evaluation. This treatment involves a multi-faceted approach to changing an individual’s relationship to his or her internal experience, including cognitions, emotions, and physical sensations. Mindfulness and meditation are not practiced or described overtly in ACT, but many of the strategies and exercises taught within the ACT framework borrow from the mindfulness tradition, and are aimed at achieving the goals of mindfulness as described above. One such exercise is entitled “Watching the Mind-Train,” which instructs participants to imagine thoughts, feelings, and urges as cars on a train in their minds, and to allow each thought to pass while continuing to observe the thoughts that arise in real-time. This exercise, although not clearly incorporated into a daily practice (as in MBSR and MBCT), is taught as part of the new skills being learned within ACT. The tenets of non-judgment, acceptance, and present-moment focus are core to this theory, and are also encapsulated by mindfulness. In addition another key tenet of mindfulness, the nonspecific practice of observing one’s internal experience as it arises without judgment, is practiced through a variety of methods within ACT theory.

Finally, the relapse prevention (RP) model developed by Marlatt and Gordon (1985) provides substance abusers with a full CBT treatment aimed at minimizing relapse after abstinence has been achieved. Mindfulness skills are a part of the treatment, which involves teaching patients a number of techniques to avoid relapse. One of the primary techniques used within the RP model is “urge surfing,”

which encourages clients suffering from a substance use disorder to observe the rise and fall of urges to use, and to begin to experientially understand the temporary nature of such urges. Within this model, mindfulness is presented as the opposite of addiction; where addiction is described as an inability to accept the present moment as it is, mindfulness is described as the acceptance of the ever-changing experience of the present moment, including unwanted and often-painful emotional states and behavioral tendencies.

The theoretical models and their accompanying treatments described above represent the most recent innovations in cognitive-behavioral approaches to psychosocial treatment. These approaches take advantage of effective treatments that exist for common mental disorders, and augment these effects by either incorporating mindfulness components into understanding the roots of pathology, and/or in providing patients with effective ways of modifying maladaptive patterns in order to improve overall health.

Chapter 2. Review and Analysis Procedures

The present study involved a review of the existing literature to devise an explanatory model of the potential mechanisms of change of mindfulness meditation on improvement of obsessive-compulsive symptomatology. This was achieved through systematic review of both empirical and theoretical writings in the areas of both OCD symptom pathology, and mindfulness interventions. The explanatory model sought to link the elements of the disorder with potential change processes implicated in mindfulness and mindfulness-based interventions.

Study Design

Pawson's realist synthesis method (Pawson, 2002; Pawson, 2006; Pawson, Walshe, & Greenhalgh, 2004) was used to drive the critical analysis of the literature to develop a model to explain the use of mindfulness as a potential intervention for OCD. This model was chosen in order to address the variety and diversity of existing literature on the areas of interest for this study. This model's goal is explanatory rather than summative, which makes it well suited to carrying out syntheses to develop working explanatory models in areas where data are insufficient to identify and test relationships (Pawson, 2006). The end-product of the synthesis is not a summary of the evidence in support of relationships (e.g. between the intervention and outcome), but rather a beginning theory to explain "what works for whom in what circumstances and in what respects" (Pawson, 2006, p. 74). This description falls in line with the intentions of this study, and allows for diverse sources of information to be analyzed concurrently, and integrated into a larger explanatory theory of the relationship between the intervention and its potential benefits. The details of this methodology will be explored further in the next section.

Methodology

In order to develop a preliminary model, the current study was conducted using an exploratory, open-ended search method, which continually fed into the model and back out into exploration in a cyclical pattern. In other words, rather than reviewing a focused collection of studies addressing a predetermined set of research questions, the review itself led to more questions, which led the researcher back to search for more data to flesh out the model (Pawson, 2006). It is the search for an explanatory model that drives the research, not a predetermined desire to prove a link between two phenomena.

Because its focus is explanatory, a realist synthesis such as the current study seeks answers to a broad

range of questions about why, when and how an intervention works.

To narrow the review focus, this synthesis began with reading and review to identify the factors with the greatest potential explanatory value, which included the data gathered from the preliminary literature review described above. The factors identified were then integrated into a provisional model and a series of propositions to guide the subsequent review were established [e.g., see Figure 1 below; model based on Baer's (2003) findings].

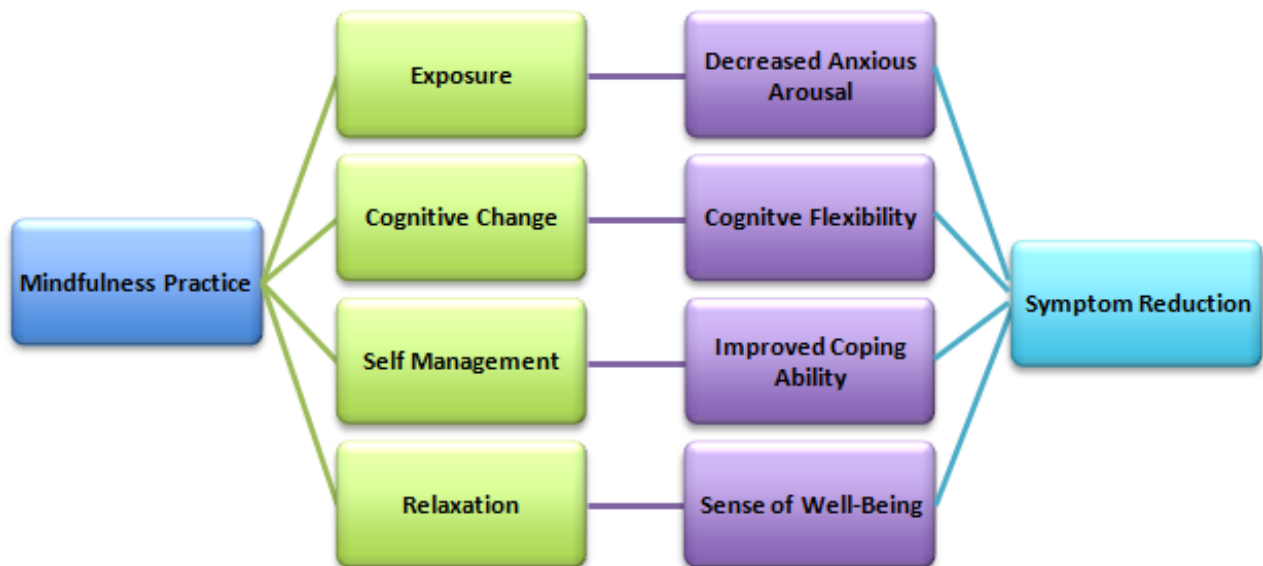


Figure 1. Provisional model explaining the link between mindfulness practice and symptom reduction in OCD.

Using a model such as the one outlined above, the realist synthesis allowed the researcher to further explore each part of the model, and to add and subtract elements, and to connect and disconnect potential relationships as the findings of the review unfolded.

Search Methods

A realist synthesis allows the researcher to apply a more critical eye to the research that will be included in the study, while simultaneously providing the flexibility to include information from less traditional sources of information, such as more theoretical studies (Pawson, 2006). On the other hand, this inherent flexibility increases the researcher's need to provide transparency in his or her decision-making process in order to apply appropriate weight to more salient and reliable data. In realist synthesis, rather than appraising and excluding publications prior to review, the reviewer mines each publication for evidence that may contribute to fuller development of the explanatory model. Instead of entire reports

being evaluated against a priori standards for quality appraisal, each piece of evidence is appraised for its utility and relevance (Pawson, Greenhalgh, Harvey, & Walshe, 2005). The value of evidence depends on whether it contributes to a better understanding of the questions addressed in the review, including the reliability of the data reported, potential weaknesses in methodology, and applicability of those findings to the proposed model herein.

Databases that were explored to gather the data necessary for creating this model included PubMed, PsychINFO, Academic Search Premier, and Google Scholar for all years up to the present. Data were not excluded on the basis of publication date, as less timely data may clarify the model as effectively as more contemporary research findings. The initial search focused on such terms as the following: *obsessive compulsive disorder (OCD)*, *mechanisms of action*, *underlying processes*, *pathology*, *cognitive*, *behavioral*, *affective*, as well as *mindfulness*, *interventions*, *mindfulness based stress reduction (MBSR)*, *mindfulness based cognitive therapy (MBCT)*, and *meditation*. A critical eye was applied to each study to determine the applicability of the findings, and to determine the quality of the findings based on methodology and reporting. Data with questionable validity, such as data from studies with limited information about methods, or from unreliable sources (e.g. non-peer-reviewed journals, independent websites, etc.), were either excluded from the analysis, or used conservatively with full disclosure of the decision-making process behind its use.

Review Strategies

The study capitalized on a cyclical, continually deepening pattern of information gathering, with new data being incorporated into existing hypotheses, and leading to ongoing refinement of the hypothesized model. To begin refining the explanatory model, an initial review of data was conducted, focusing on the existing data on the proposed pathology implicated in OCD. Next, the same process was undertaken with mindfulness and its interventions. Finally, research was sought connecting symptoms with potential change processes, and hypotheses were made connecting these change processes to the symptom reduction reported in the literature reporting the efficacy of mindfulness as an intervention for OCD. Based on this review, broad themes were identified and a list of propositions were created to further refine the explanatory model. Evidence was synthesized and applied to the explanatory model and then iteratively refined the model to best explain the existing data. In cases where evidence did not fit the

model, the reviewer looked for other factors that may have more explanatory value. The synthesis ended with a summary of how the explanatory model was revised.

Chapter 3. Models and Mechanisms of Mindfulness

This chapter will begin by explaining and comparing the four most commonly cited models of the change process implicated in mindfulness. These models will be described in context, and then compared and contrasted to develop a meta-model that aims to capture the larger categories that make up the various change processes put forth by the authors discussed. Then, these categories will be used to explore the outcome literature seeking to connect the theoretical constructs with real-life measures and clinical outcomes.

Models of Mindfulness

Although this section discusses several models that are similar, and some that come from very different orientations (i.e. neurobiology), they were chosen due to their frequency of citation, their completeness, and the availability of follow-up studies that have employed these models to test outcomes.

Coffey and Hartmann's Model. The first model was developed by Coffey and Hartman (2008). These authors suggest that there is support from previous theoretical and empirical research on the negative correlation between mindfulness and psychological distress. The first is the connection between mindfulness and increased emotion regulation, defined as the increased ability to manage affect by adjusting thoughts or behaviors to address the source of distress or better cope with it.

Coffey and Hartman (2008) suggest a second potential way by which mindfulness may improve mental health is by decreasing rumination, which has been associated with depression and other types of psychopathology. This mechanism of action will be discussed further in a later section, but is notable in that it differs from other proposed mechanisms in its emphasis on behavior rather than any theoretical linkage to how exactly this decrease rumination occurs. In other words, Coffey and Hartman do not speculate on whether decreased rumination is due to increased emotion regulation, attention regulation, or some other single or combined effect of mindfulness. Thus, although it will be listed among the considerations in developing the meta-model, it will be differentiated in that it posits a functional outcome rather than a true mechanism of action.

A third mechanism that explains the connection between mindfulness and psychological distress is non-attachment (Coffey & Hartman, 2008), which is defined as the ability to allow experiences (i.e.,

thoughts, emotions, urges, etc.) to pass in consciousness, rather than assigning personal significance to them. Mindfulness has been connected with non-attachment in other studies (Brown, Ryan, & Creswell, 2007), and non-attachment has been suggested as a link between decreased rumination (McIntosh and Martin 1992), and decreased psychological distress (Jain et al. 2007).

Holzel and colleagues' model. The next model was developed by Holzel et al. (2011) and describes mindfulness from both a psychological and neurological perspective. These authors created a model that includes four primary components of mindfulness. These include: attention regulation, body awareness, emotion regulation (achieved through reappraisal and exposure/extinction), and change in perspective on the self.

Attention regulation is defined as the behavior involved in maintaining the focus of attention on a selected object, while ignoring distractions (Holzel et al., 2011). The next component, body awareness, describes a process often reported by practitioners that paying attention to body sensations results in better awareness of bodily states and greater clarity of attention to internal experience (interoception) (Holzel et al., 2011).

Emotion regulation within this model refers to the change in ongoing emotional responses through various self-regulatory processes, which has been defined from a neuropsychological perspective previously in Ochsner and Gross' (2005) research. Within this formulation of emotion regulation, the process is accomplished through two neurological processes. The first is reappraisal, which is defined as a healthy reaction to negative affect where stressful events are seen as beneficial, meaningful, or benign. The next includes exposure, extinction, and reconsolidation. Mindfulness meditation is a process by which the practitioner is instructed to purposely engage in cognitive processes, and to avoid safety behaviors (e.g., mental neutralization, undoing, etc.) by using enhanced attention regulation skills. This maximizes the exposure to emotions, while the relaxation component of meditation is thought to increase the effects of extinction process (i.e. systematic desensitization). The outcomes of these processes will be described later, and controversies surrounding the potential conflict between relaxation and extinction will also be addressed.

Finally, Holzel et al. (2011) suggest that mindfulness practice is linked to changes in perspective of the self. From a neurological perspective, interoception is improved through meditation, allowing

meditators to observe mental processes with more clarity and sensitivity (MacLean et al., 2010). Further, the experience of a continually arising sense of self becomes more prominent to the meditator through the development of meta-awareness (Holzel et al., 2011). Rather than identifying with a conceptualized self based on history, the practitioner begins to experience him or herself in the present moment as the foundation of the self.

Brown, Ryan, and Creswell's Model. Brown, Ryan, and Creswell (2007) developed a model that provides both an operational definition of mindfulness, and puts forth several potential benefits of mindfulness practice. They define mindfulness by the following characteristics: clarity of awareness; non-conceptual, nondiscriminatory awareness; flexibility of awareness and attention; empirical stance toward reality; present-oriented consciousness; and stability or continuity of attention and awareness. Although this definition is helpful in better understanding their model, the focus of their research will be on the explanatory model of the change processes implicated in mindfulness rather than on their definition, as this has been set forth by previous authors, and has been consistently applied in more recent research.

These authors describe five benefits of mindfulness, which they gathered from existing research (Brown, et al., 2007). The first is insight, which comes from a decentered perspective and involves metacognitive awareness. This is the central focus of such mindfulness-based psychotherapies as MBCT (Teasdale, Segal, & Williams, 1995), and may have numerous consequences, such as discouraging habitual thought patterns like rumination and obsession, adding flexibility to psychological rigidity, and encouraging the individual to move toward threatening thoughts and emotions by providing a safe context for reality testing.

Exposure is the next potential benefit discussed by these authors (Brown, et al., 2007). Exposure may lead to desensitization, reduced emotional reactivity, faster recovery, and a greater tolerance for unwanted states and experiences. These authors link exposure with affect regulation (Borkovec, 2002). This voluntary exposure to unwanted stimuli may lead to decreased distress and more adaptive behavior.

Mindful nonattachment, the next component, may increase equanimity, ease, and other states reflecting an ongoing experience of well-being (Brown, et al., 2007). Next, mindfulness has been linked to enhanced mind-body functioning; in particular, mindfulness practitioners have been found to experience less distress and experience greater subjective vitality (Brown & Ryan, 2003). Finally, a concept known

as integrated functioning is put forth as a potential link between mindfulness and psychological well-being in this model. When people are more mindful, they are more capable of making choices that are in line with their values rather than being reactive to immediate stimuli. They are also more aware of themselves and the situations in which they find themselves (Brown, et al., 2007).

Baer's Model. One of the most oft-cited models was developed by Baer (2006), who published a conceptual and empirical review of the existing literature on the topic of mindfulness and well-being. The first mechanism of action she cites is exposure. She discusses this in the context of mindfulness as a treatment for pain, in which prolonged exposure to painful sensations in the absence of catastrophic outcomes is thought to lead to a desensitization (Kabat-Zinn, 1990). This theory has also been applied in the treatment of anxiety and panic (Kabat-Zinn, 1990), and has been conceptually linked to interoceptive exposure (Barlow, Gorman, Shear, & Woods, 2000). Finally, Baer discusses Linehan's (1993a, 1993b) theory of borderline personality disorder and the connection between mindfulness and exposure more specifically, Baer describes these individuals as "emotion phobic," and attempts to avoid emotion as leading to maladaptive responses.

Next, Baer (2006) discusses mindfulness and cognitive change. She cites Kabat-Zinn (1992), who suggests that nonjudgmental observation of pain and its related thoughts may lead to a better understanding that they are "just thoughts," decreasing their intensity and perceived intolerability. Linehan (1993a, 1993b) puts forth the concept that observation and description (rather than judgment or labeling) of internal experiences leads to a better sense that these experiences do not always accurately reflect reality. Finally, Teasdale (1999) and Teasdale, Segal, and Williams (1995) suggest that the nonjudgmental, decentered view of one's thoughts taught through MBCT may work counter to existing ruminative styles believed to be central to the onset and maintenance of depressive episodes, and reflective of a change in cognition by definition.

Next, Baer (2006) describes the concept of self-management within the context of the existing mindfulness literature. One concept she discusses comes from Kabat-Zinn (1992), who suggests that increased awareness of pain sensations and their related cognitions may enable sufferers to cope more effectively, including employing skills outside of traditional treatments. Kristeller and Hallett (1999) suggest that self-observation developed through mindfulness could lead to more accurate recognition of

satiation in binge eaters, as well as increased ability to observe and resist urges to. Finally, Baer (2006) discusses Linehan's (1993b) suggestion that nonjudgmental observation and description allows individuals to recognize the consequences of behaviors rather than making global judgments about the self.

Lastly, Baer (2006) describes relaxation and acceptance as important change agents within mindfulness. Although the practice of mindfulness may lead to relaxation, this is not the primary reason for engaging in mindfulness skills. On the other hand though, it is an important component to explore further in the current analysis in order to make a connection between the potential effects of mindfulness on a disorder like OCD, which is associated with both psychological and physical tension. Finally, she discusses Hayes' (1994) idea that acceptance involves "experiencing events fully and without defense, as they are" (p. 30), and notes that clinicians working from a traditional cognitive-behavioral perspective may have placed too much emphasis on the possibility and purpose of changing all unpleasant experiences without recognizing the important role of acceptance.

Shapiro, Carlson, Astin, and Freedman's Model. Shapiro, Carlson, Astin, and Freedman's (2006) created the arguably most cited and most inclusive model of mindfulness to date. Their definition of mindfulness includes three components: attention, intention, and attitude (IAA), in which intention describes the behavior being "on purpose," attention means "paying attention," and "in a particular way" reflect the attitude.

The authors posit that there is a meta-mechanism of action that underlies all of the change processes implicated in mindfulness. This meta-mechanism, known as *reperceiving*, overlaps significantly with other Western psychological concepts such as *decentering*, *deautomatization*, and *detachment*. The four additional mechanisms that grow out of *reperceiving* include the following: self-regulation/self-management, values clarification, cognitive, emotional, and behavioral flexibility; and exposure. Self-regulation/self-management is conceptualized as following a pattern of intention → attention → connection → regulation → order → health. In other words, developing non-judgment of internal experience leads to connection, which leads to self-regulation and greater clarity and health. Values clarification is described as "we become the value, instead of the one who observes the value," (Shapiro et al., p. 380), where *reperceiving* may also help people decide what is meaningful for them. Cognitive,

emotional, and behavioral flexibility come out of re-perceiving, which facilitates more flexible responses to environmental stimuli rather than reflexive, reactive patterns that arise out of over-identification with one's current experience. And finally, exposure works through re-perceiving by enabling a person to experience perceived overwhelming emotions with greater objectivity and less reactivity, highlighting that most emotions are tolerable and not harmful.

Meta-Model of Mindfulness

This author reviewed the models described above, and included and excluded models based on their completeness, ability to add a new understanding to the field, their utility, and their popularity (as measured by number of citations in the mindfulness literature). The models above represent the primary models from which the majority of the mindfulness literature is based, and therefore, they will make up the models for which the meta-model serves to provide an overview and summary of multidisciplinary findings. In Table 1 below, the author reviewed the components of each model as a means through which to categorize, differentiate, and compare the various components. The goal of this process is to develop a larger explanatory model from which future research may be able to draw in order to work from more consistent and agreed-upon models for the concept being studied.

Next, in order to create a meta-model from which to work toward establishing the general components of change within mindfulness, the author created categories, deleted repetitive headings, and further refined categories, until each mechanism described above could be subsumed under a more general, but complete, heading. These headings will guide the next portion of this analysis, which will include an exploration of each proposed process and the outcomes that have already been determined through empirical data (see Table 1 below).

These categories will be listed and clarified next. The first category of outcome studies will fall under *exposure*, which includes such concepts as *acceptance*, *extinction*, and *reconsolidation*. The next, *relationship to thoughts*, includes such concepts as *decentering/distancing*, *cognitive change*, *reappraisal*, *change of perspective to the self*, *acceptance*, and *nonattachment*. Within this category, specific attention will be paid to outcome studies examining the concept of *metacognition*, for which there are numerous

Table 1	
<i>Most commonly cited psychological theories of mindfulness and proposed mechanisms.</i>	
Model	Proposed Mechanisms
Coffey & Hartmann, 2008	<ul style="list-style-type: none"> • Emotion Regulation • Decreased Rumination • Non-attachment
Baer, 2006	<ul style="list-style-type: none"> • Exposure • Cognitive Change • Self Management • Relaxation • Acceptance
Brown, Ryan, & Creswell, 2007	<ul style="list-style-type: none"> • Insight • Exposure • Nonattachment • Enhancing mind-body functioning • Integrated functioning
Holzel, et al., 2011	<ul style="list-style-type: none"> • Attention regulation • Body awareness • Emotion regulation <ul style="list-style-type: none"> ◦ <i>Reappraisal</i> ◦ <i>Exposure, extinction, and reconsolidation</i> • Change in perspective on the self
Shapiro, Carlson, Astin, & Freedman, 2006	<ul style="list-style-type: none"> • Reperceiving <ul style="list-style-type: none"> ◦ Self-regulation/self-management ◦ Values clarification ◦ Cognitive, emotional, and behavioral flexibility ◦ Exposure

findings. Next, *self-regulatory processes*, including *emotion regulation*, *attention regulation*, *response inhibition*, and *cognitive flexibility* will be explored. The *physiological effects* associated with mindfulness will be subsumed under one section. And finally, *values clarification*, including *insight*, will fall into the fifth and final category (see Figure 1 below).

Efficacy of Various Mechanisms by Category

The current section will outline and explore the concepts discussed within the meta-model above. Each mechanism of the model will be broken down into its corresponding terms, as described in existing research. The findings within these studies will be used to provide support for the role of each of these concepts within the context of decreased psychological distress or increased wellness. This section will only review outcome studies, not studies exploring the definition of concepts, differentiating one concept from the other, or theorizing about the role of each mechanism within the context of change. In addition,

some concepts have not been adequately defined or have not been studied in the context of efficacy, and therefore will not be included here.

Exposure. The concept of exposure will be explored within the context of *acceptance*, *extinction*, and *reconsolidation*. The first study, conducted by Carmody, Baer, Lykins, & Olendzki (2009), involved 320 adults enrolled in 17 MBSR classes, reporting a wide range of problems including illness-related stress, chronic pain, anxiety, and personal and employment-related stress. This study employed S.L. Shapiro's et al. (2006) model of mindfulness (described above), and used various measures to test the outcomes of each mechanisms proposed within that model, including exposure. The study will be discussed further in the context of re-perceiving/decentering, which was the main variable tested due to its prominence in the model employed. Results indicated that for both mindfulness and re-perceiving, pre- and post-treatment change was significantly correlated with changes in the four dependent variables, which were exposure (as measured by a subset of items from the Acceptance and Action Questionnaire; Bond et al., 2011) examined mindfulness against unfocused attention on extinction and return of behavior

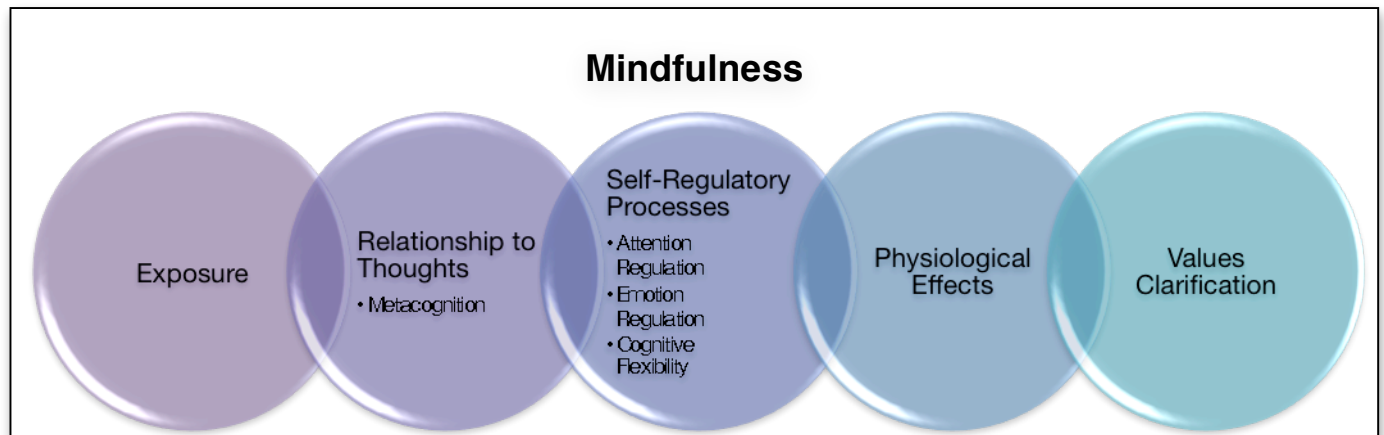


Figure 2. Components of mindfulness from meta-model.

with the aim of exploring whether mindfulness would produce less contingency insensitivity in humans. The first experiment employed a simple conditioning-then-extinction procedure in order to determine whether mindfulness training would enable participants to learn more rapidly to switch from reinforcement to extinction. These researchers predicted that behavior would extinguish at a quicker rate during transition to an extinction schedule following mindfulness training, as compared with the participants who received the unfocused-attention induction. Nineteen adults (8 males, 11 females) with no history of psychiatric problems, with an age range of 21–24 years (mean 0 20.4 ± 3.7), took part in this study.

Analysis suggested a statistically significant main effect of trial, but neither the main effect of group nor the interaction between the factors was significant. There was only a minimal difference between the rates of response for the two groups at the end of reinforcement training, as would be expected. However, during extinction, responding in the group that received mindfulness training decreased, but increased in the control group, and the latter group also responded more often than the mindfulness group. These data suggest that mindfulness training produced greater extinction than did unfocused-attention training.

The next stage of the experiment tested behavior resurgence, a phenomenon involving the reappearance of an apparently absent behavior in the current repertoire of an individual, when the occurrence of more recent behaviors are challenged, either by low levels of reinforcement or by extinction (McHugh, Procter, Herzog, Schock, & Redd, 2012). This study involved applying a mindfulness intervention in measuring post-training performance in extinction to provide insight into how the bringing of awareness to environmental contingencies could influence conditioned (resurgent) behavior that is potentially under the control of a prior history of reinforcement. Thirty adults (8 males, 22 females), with an age range of 21– 60 years (mean = 39.7 ± 13.03) participated in this portion of the study. There was an initial conditioning phase. The second phase involved further conditioning (reconditioning) to bring the rates established in Phase 1 together. The participants then were given a mindfulness or an unfocused-attention control procedure, before being placed into extinction. The data show that for the control group, initially, responding increased for both groups. The mindfulness group showed little differentiation between the components during extinction and had lower rates of response in the extinction phase than did the control group. The participants exposed to the mindfulness induction, however, did not display resurgence results to the same extent as the group with the unfocused-attention control procedure. Instead, they showed faster extinction and less increase in responding. These data replicate the extinction effects discovered in the first stage of the study, and demonstrate that a mindfulness induction increases the speed of extinction and reduces resurgence. Taken together, these results indicate that mindfulness produced responding that was more sensitive to the currently operative contingencies.

Treanor (2011) addressed mindfulness in the treatment of pathological anxiety. Although he did not conduct an empirical study, his theoretical application of behavioral concepts to the use of

mindfulness in exposure treatment is especially relevant for the current study. He hypothesized that the broadened awareness provided by mindfulness may enhance extinction by increasing awareness of distress cues and allowing attention to multiple conditioned stimuli at once. The presence of several related stimuli facilitates the process of extinction by “overpredicting” occurrence of the unconditioned stimulus, increasing the discrepancy between what is predicted and what occurs. While multiple stimuli might be present during any given exposure procedure, the individual may fail to be aware of them under normal circumstances. Mindfulness may help to increase awareness of these cues, leading to faster and more specific extinction learning. Several studies suggest that mindfulness practice can increase a practitioner’s ability to maintain attention on a specific stimulus, despite the presence of distractors. Additionally, mindfulness practice may be linked to enhanced ability to notice and differentiate between multiple stimuli, while maintaining focus on a target. The most direct benefit of mindfulness when combined with standard exposure-based interventions is the ability of mindfulness inductions to act as triggers to decrease the potential for the return of fear. By conducting mindfulness inductions along with exposure procedures, the practitioner may begin to associate the process of mindfulness with the extinction context, which can be used outside of therapy to induce more efficient extinction.

When considering mindfulness and relaxation, mindfulness is seen by some as a safety behavior that interferes with complete extinction learning. Behaviorally, safety behaviors function as conditioned inhibitors, that, when presented alongside conditioned stimuli, cancel out the strength of the conditioned excitator, which leads to no change in associative strength. On the other hand though, extinction cues that decrease the likelihood of a return of fear are also present during extinction, but evidence suggests that they function as negative occasion setters and not conditioned inhibitors (Brooks & Bouton, 1994). Unlike other stimuli, occasion setters do not form a direct relationship with the unconditioned stimulus, but instead, they moderate the relationship between the CS and the US by providing a context for which the relationship functions (Bouton, 2004). These concepts are included to address the common concern related to employing mindfulness due to its potential for serving as a distractor from extinction learning, and further support the role of mindfulness in enhancing and facilitating extinction learning.

Values Clarification. Values clarification includes such concepts as insight and integrated functioning. Carmody, Baer, Lykins, & Olendzki (2009) found a significant correlation between

mindfulness and values clarification, as measured by the Purpose in Life Scale from the Scales of Psychological Well-Being (Ryff, 1989). Shapiro, Carlson, Astin, and Freedman (2006) also note that automatic processing often decreases an individual's awareness of options that would be more in line with that individual's needs and values (Ryan, Kuhl, & Deci, 1997). However, awareness can help us choose behaviors that fit with our needs, interests and values (Brown & Ryan, 2003; Ryan & Deci, 2000). Brown & Ryan (2003) found that when subjects "act[ed] mindfully," as assessed by the Mindful Attention Awareness Scale (MAAS), their behavior is more congruent with their deeper values. This study did not employ experimental manipulation, but instead tested trait mindfulness in normal participants; therefore application of findings for the purposes of the current study is limited.

Brown & Ryan (2003) discuss the ways in which self-regulation has been described in the context of awareness/attention and the maintenance and enhancement of psychological functioning. One of these is Self-Determination Theory (Deci & Ryan, 1985; Ryan & Deci, 2000), which suggests that the type of awareness cultivated through mindfulness may be most closely linked with an individual's ability to regulate behaviors to include more of those that are consistent with needs, values, and interests (Deci & Ryan, 1985). Thus, mindfulness may increase well-being through regulation of behavior and fulfillment of the basic needs for autonomy, competence, and relatedness (Hodgins & Knee, 2002)

Relationship to thoughts. Relationship to thoughts is a larger category that was created for the current study to capture such concepts as *decentering/distancing*, *cognitive change*, *reappraisal*, *change of perspective to the self*, *acceptance*, and *nonattachment*. These concepts are unique from one another and complex in and of themselves, but are categorized based on their function within this framework, which is the alteration in the relationship between the practitioner and his or her perception of the validity, power, and importance of thoughts passing in consciousness.

Van Dam, Hobkirk, Sheppard, Aviles-Andrews and Earleywine (2013) aimed to compare aspects of mindfulness, self-compassion, and emotion regulation, ascertaining which was most predictive of changes in anxiety, depression, and stress among 58 participants, randomly assigned on a 2:1 basis to mindfulness training or wait-list in a pre-/post-assessment design. Participants completed the STICSA (Gros et al. 2010; Ree, French, MacLeod, & Locke, 2008) for anxiety, Center for Epidemiologic Studies Depression Scale—Revised (CESD-R) (Eaton, Muntaner, Smith, Tien, & Ybarra, 2004) for depression,

Perceived Stress Scale (PSS) (Cohen, Kamark, & Mermelstern, 1983), Five Facet Mindfulness Questionnaire (FFMQ) (Baer, 2006), Self- Compassion Scale (SCS) (Neff, 2003) to measure self compassion, and Difficulties in Emotion Regulation Scale (DERS) (Gratz and Roemer 2004) to measure emotion regulation. The results indicated that the facets of overidentification and self-judgment (components of self-compassion) were most predictive of changes in outcome variables, though mindfulness and emotion regulation also contributed. The findings suggest that mindfulness, as a process, may be more complicated than some have given credit and that attention and emotional balance may be particularly important aspects related to its effects. Additionally, mindfulness training showed evidence of leading to meaningful reductions in anxiety, depression, and stress. Also, backwards regression analyses revealed that the Self-Judgment and Overidentification subscales of the SCS were the most parsimonious predictors of change in psychological symptoms. Self compassion is closely linked to mindfulness, and given the strong relationship between self-compassion to the facets of the FFMQ (Baer, 2006), and the FFMQ's predictive validity regarding psychological symptoms and well-being (Coffey, Hartman, & Fredrickson, 2010), it seems unlikely that it is just "self-compassion" that is doing all the work in mindfulness-based interventions. These researchers posit that the measure of self-compassion reflects critical aspects of mindfulness, as has been previously suggested by Van Dam et al. (2013).

The study conducted by Carmody, Baer, Lykins, & Olendzki (2009), mentioned previously in relation to exposure and values clarification, has significance in relation to the concept of cognitive distancing and decentering, essential components describing a change in relationship between the mindfulness practitioner and his or her experience of cognitive processes. These researchers first examined relationships between mindfulness and reperceiving (decentering). Mindfulness and reperceiving were very strongly correlated at pre-MBSR and at post-MBSR. To test the model further, they took two preliminary steps. Since mindfulness and reperceiving/decentering were so highly correlated, these researchers developed a compound variable by converting mindfulness and reperceiving to z-scores and averaging them. Two of the proposed mediators (values clarification and flexibility) predicted reperceiving significantly; however, the relationship between mindfulness/reperceiving and symptoms/stress remained significant, suggesting that there is a direct relationship between

mindfulness/reperceiving and stress/symptoms that is not completely mediated by the variables examined in the study. This suggests that mindfulness and reperceiving are highly overlapping constructs and that both constructs increase with participation in MBSR. However, values clarification and increased cognitive, emotional, and behavioral flexibility were found to be partial mediators of the relationship between mindfulness/reperceiving and symptom reduction.

Decentering/distancing. Teasdale, Moore, Hayhurst, Pope, Williams, Segal (2002) examined two conclusions proposed by cognitive theorists regarding depression and its prevention. The first was that the likelihood of relapse increases based on the ease with which depression-related cues are accessible in sufferers' memories. This was confirmed using a measure of metacognitive awareness in the memories of depressing experiences accessed from the five months before baseline. Correlational analyses suggested that time to relapse and lower levels of metacognitive awareness predicted earlier relapse. This is consistent with the hypothesis that the ability to relate to depressive thoughts and feelings within a decentered perspective determined whether shorter states of depression will develop into more severe and persistent syndromes characteristic of major depressive relapse. Teasdale et al. (1995) proposed that CT for depression reduces relapse by inadvertently facilitating a decentered relationship to negative thoughts and feelings through increased metacognitive awareness. This suggests that an intervention designed to teach such a relationship to one's thoughts directly, without trying to change beliefs, could have similar results. It also suggests that strategic, organized training in mindfulness leads to an essential and lasting change in perspective to one's thoughts that can be linked to psychological health.

Feldman, Greeson, & Senville (2010) compared the short-term effects of mindful breathing (MB) to two alternative stress-management techniques: progressive muscle relaxation (PMR) and loving-kindness meditation (LKM) to determine whether decentering is unique to mindfulness meditation or common to other focused attention approaches. Novice meditators (190 female undergraduates) were randomly assigned to one of three 15-minute audio-recorded exercises. Immediately after the exercise, they completed measures of decentering (subscale of the Toronto Mindfulness Scale; TMS) (Lau et al., 2006), frequency of repetitive thoughts during the exercise, and degree of negative reaction to thoughts (using the Positive and Negative Affect Scale; PANAS; Watson, Clark, & Tellegen, 1988). Participants in

the MB condition reported higher decentering than participants in the other conditions. The frequency of repetitive thoughts and negative reactions to thoughts had a correlation that was relatively weaker in the MB condition than in the PMR and LKM conditions. The relative independence between repetitive thoughts and negative reactions in the MB condition suggests that mindful breathing may help to reduce reactivity to repetitive thoughts through a process of decentering. These results provide support for the hypothesis that decentering is a potential mechanism that distinguishes mindfulness practice from other meditation-based stress-management approaches.

Reduced rumination. Based on the findings above, an exploration of the link between mindfulness meditation and decreased rumination are also explored in the current study because of their relevance to OCD, which will be further elucidated later. This component of mindfulness is also listed in Grabovac and Willett's discussion of a Buddhist Psychological Model of well-being (2011), and falls under the category of change in relationship to thoughts in the current meta-model. On the other hand though, this component is differentiated from other components in the meta-model in that it describes a specific behavioral outcome that is independent of a mechanisms that might explain the connection between the outcome and the intervention (i.e. how does mindfulness lead to decreased rumination? Is it through attention regulation, relaxation, or some other combination of constructs?). Jain, Shapiro, Swanick, Roesch, Mills, and Schwartz (2007) conducted a randomized controlled trial examining the effects of a month-long mindfulness meditation intervention against somatic relaxation training (similar to PMR) in a control group of 83 students (M age = 25; 16 men and 67 women) reporting distress. Psychological distress, positive states of mind, distractive and ruminative thoughts (using the Daily Emotion Report, Rumination Subscale; DER), and behaviors, and spiritual experience were measured, while controlling for social desirability. Statistical analysis suggested that both the meditation and relaxation groups experienced significant decreases in distress and increases in positive mood states over time as compared to the control group, though there were no significant differences between meditation and relaxation groups on distress and positive mood states over time. Effect sizes for distress were large for both meditation and relaxation (Cohen's $d = 1.36$ and $.91$, respectively), while the meditation group displayed a larger effect size for positive states of mind than the relaxation group (Cohen's $d = .71$ and $.25$, respectively). More importantly though, the meditation group also presented significant pre-post

decreases in both distractive and ruminative thoughts/behaviors when compared with the control group ($p < .04$ in all cases; Cohen's $d = .57$ for rumination and $.25$ for distraction for the meditation group), indicating that mindfulness meditation's effects on reducing distress were at least partly mediated by reductions in rumination. These findings suggest that compared with a no-treatment control group, brief mindfulness meditation training or somatic relaxation decreases distress and improves positive mood states. On the other hand, mindfulness meditation may be specific in its ability to reduce distractive and ruminative thoughts and behaviors, and this may suggest a unique way by which mindfulness meditation may decrease psychological distress.

Compared to other studies within this category that studied more general mechanisms, this study focused on a psychological symptom and its potential reduction. In this sense, the mechanism by which rumination is reduced is not explored, but the outcome is the main focus.

Metacognition. Metacognition is a concept that has been explored in the literature pre-dating the introduction of mindfulness to the Western psychological repertoire. On the other hand, the concept shares many similarities with mindfulness, and is also linked to changes in symptoms and increases in psychological well-being in several studies, but has not yet been specifically connected to the concept of mindfulness. Shapiro, Carlson, Astin, and Freedman (2006) used Wells' (2010) proposition that dysfunctional metacognitions are related to such psychopathology as psychosis, generalized anxiety disorder, obsessive-compulsive symptoms, hypochondriasis, and PTSD. The hope is that through mindfulness practice, the metacognitions shift from experiencing thoughts as personal and dangerous, to seeing them as impersonal, temporary, and fleeting from a decentered perspective.

Physiological effects. Several physiological effects have been noted in the practice of mindfulness. These include *increased relaxation*, an improved *mind-body connection*, as well as several improvements in stress-related physiological symptoms. Although the physiological effects of mindfulness have been explored in detail in the literature, this review will focus on the broad types of findings that have been established, focusing on those findings with most pertinence to OCD and other anxiety disorders. A literature review conducted by Holzel et al. (2011) noted links between mindfulness and decreased heart rate (Zeidan, Johnson, Gordon, & Goolkasian, 2010), decreased cortisol levels (Carlson, Speca, Faris, & Patel, 2007), decreased breathing rate (Lazar et al., 2005), lowered oxygen and carbon

dioxide consumption (Young & Taylor, 1998), decreased skin conductance response (Austin, 2006), and decreased muscle tension (Benson, 2000).

Several changes in brain structure and function have also been explored. According to Coffey, Hartman, and Fredrickson (2010), insula activation has been found to be increased in individuals after a mindfulness-based stress reduction course (compared with individuals who had not practiced mindfulness when they focused on their momentary experience. This study also found increased activity in the secondary somatosensory area, which is responsible for processing external sensory events. In a study by Farb et al. (2010), subjects who underwent mindfulness training showed increased activity in the right insula when being presented with sad movie clips. Mindfulness meditators were also more strongly activated in the left anterior, posterior, and mid-insula as well as the thalamus (Grant, Courtemanche, & Rainville, 2011). Two cross-sectional studies compared the gray matter composition of the brains of experienced meditators against controls. They were able to show that meditators had thicker cortices (Lazar et al., 2005) and more concentrated gray matter (Hölzel et al., 2007) in the right anterior insula. Even though eight weeks of mindfulness practice did not indicate significant changes in gray matter concentration in the insula (Hölzel et al., 2011), the same study revealed that eight weeks of practice led to increases in gray matter concentration in the temporo-parietal junction, which is thought to be a central structure for modulating the first-person perspective of the body. Such structural changes in the temporo-parietal junction may thus be associated with an increased awareness of the experience of oneself within the body.

Self-regulatory Processes. Within this section, such concepts are *attention regulation*, *emotion regulation*, *self-regulation*, *behavioral inhibition*, and *response inhibition* will be included. These concepts are explored in several studies, including some of the following. Kristeller and Hallett (1999) suggest that the self-observation developed through mindfulness could increase awareness of satiety cues in their binge eating subjects, and could also lead to a better ability to observe urges to binge without acting on them, which is similar to Marlatt's (1994) findings in patients recovering from addictions (i.e. Urge Surfing in Relapse Prevention). Teasdale et al. (1995) suggest that mindfulness practice increases awareness of all internal events in real-time, including those that could be signs of relapse in major depression. Thus, mindfulness may increase a practitioner's ability to recognize early signs of a problem, at a time when

using previously learned skills is more likely to be effective in preventing further relapse. Linehan (1993b) suggests that nonjudgmental observation and description allows a practitioner to recognize the consequences of behaviors rather than making global judgments about the self. This may lead to behavior change, including reducing impulsive, and often maladaptive behaviors.

Attention regulation. The unique aspect of attention regulation is that unlike the other concepts listed, it by definition truly describes *what* mindfulness practice is about. In other words, through dissecting the research on attention regulation and mindfulness, it is almost impossible to differentiate one from the other. Mindfulness practice is by its nature the disciplined regulation of attention to a chosen object; therefore the practice of mindfulness would be expected to increase this ability. On the other hand, it is only the most obvious behavior being developed by this practice, therefore it will be included among other self-regulatory processes, which are defined by their internally-driven nature and the requirement that the practitioner control his or her awareness by detaching and attaching to chosen stimuli in a continuous and repetitive fashion.

Jha, Krompinger, & Baime (2007) examined two types of mindfulness training programs and examined participants in these programs before and after training. One group was made up of subjects who had no experience with mindfulness techniques and were assigned to participate in a standard eight-week MBSR course. The other group contained subjects who were experienced in mindfulness techniques, and who took part in a one-month intensive retreat. Results of both groups' performance were compared against a group control participants who were meditation naive and received no intervention. Before the meditation intervention, the participants in the retreat group showed better conflict monitoring performance relative to those in the MBSR and control groups. After intervention, the participants in the MBSR course demonstrated significantly improved orienting as compared to the control and retreat participants. In contrast, the participants in the retreat group exhibited improvements in stimulus detection in comparison with the control and MBSR participants. The groups were not significantly different in their aggregate conflict monitoring performance after intervention. These findings suggest that mindfulness training may improve attention-related responses by improving specific subcomponents of attention.

Holzel, Lazar, Gard, Schuman-Olivier, Vago, and Ott (2011) conducted two studies that found that

experienced meditators showed better performance on an executive attention task when compared with nonmeditators, as evidenced by smaller error scores and lower reaction times. While many other studies have suggested that the anterior cingulate cortex (ACC) is affected in meditation (Cahn & Polich, 2013), Hölzel et al. (2007) sought to determine which distinct brain region would be activated when meditators performed focused attention meditation. Compared with controls, experienced meditators showed increased activation in the rostral ACC (Hölzel et al., 2007), indicating an effect of meditation practice on ACC activity. Van den Hurk, Giommi, Gielen, Speckens, & Barendregt (2010) tested a total of 20 mindfulness meditators (mean age 48.1 years, SD 9.0, range 31-60 years; 9 male) and 20 control participants (mean age 48.1 years, SD 9.2, range 30-60 years; 9 male). Participants were seated in front of a 19-inch computer screen at a distance of 65 cm. and presented with stimuli. Results suggest that experienced meditators were stronger at orienting their attention than their matched controls, as reflected by lower scores on the orienting network. This suggests both an improved ability to orient attention as well as a more flexible orienting network. This is thought to be due to an instruction given during most mindfulness practice, which is to continue to detach, attach, and detach attention continuously, consequently improving the flexibility of the orienting of attention. In addition to increasing orienting of attention, this study suggested movement toward better executive attention, as meditators had smaller executive network error scores on the task. These researchers found better orienting and a better executive attention. The difference between these findings and those in the Jha, Krompinger, and Baime (2007) study may be explained by the fact that Holzel's et al. (2011) study included more experienced meditators and that there were more demographic factors considered when assigning a match between meditators and controls.

Anderson, Lau, Segal, & Bishop (2007) conducted a study that was designed to test the hypothesis that mindfulness involves sustained attention, attention switching, inhibition of elaborative processing and non-directed attention. Non-clinical adults were tested before and after random assignment to an eight-week MBSR course (n = 39) or a wait-list control (n = 33). Assessment included measures of sustained attention, attention switching, inhibition of elaborative processing (as tested by Stroop interference), non-directed attention (measured by detection of objects in consistent or inconsistent scenes), and self-report measures of emotional well-being and mindfulness. Participation in the MBSR group was associated with

significant improvements in emotional well-being and mindfulness, but no improvements in attentional control relative to the control group. However, improvements in mindfulness after MBSR were correlated with improvements in object detection, which suggests that an ability to induce a mindfulness state was associated with smaller consistency effects in object detection. This suggests that mindfulness is associated with non-directed attention that increases awareness of present experience that is less influenced by a person's assumptions or expectations. Thus, while this study did not replicate other reports of the positive effects of MBSR on attentional control (Jha et al., 2007; Valentine & Sweet, 1999; Wenk-Sormaz, 2005), it suggested positive effects of mindfulness on awareness of the present moment.

Cognitive flexibility. Moore & Malinowski (2009) conducted a study using two well-established measures, the Stroop task (Stroop, 1935) and the d2-test of attention (Brickenkamp & Zilmer, 1998), to test participants' ability to suppress interfering information and to focus and direct their attention, and the Kentucky Inventory of Mindfulness Skills (KIMS) (Baer, Smith, & Allen, 2004) for estimating their reported levels of mindfulness. The researchers compared meditators with experience in mindfulness meditation with a group of non-meditators. Findings suggest that mindfulness is correlated with processing speed at high levels for both (i.e. high levels of mindfulness linked to high processing speed), good attentional control, good inhibition, and a good coordination of speed with concurrent accurate performance. Negative correlations were found with the d2-errors E, E1, and the Stroop error SE, signifying that higher levels of mindfulness are related to decreased errors across measures. These findings suggest that greater attentional control, accuracy of visual scanning, inhibitory control, carefulness, cognitive flexibility and quality of performance are related to mindfulness practice. This also suggests that attentional performance and cognitive flexibility are positively related to mindfulness practice and that cognitive processes that have become automatic (such as compulsions) can be brought back under cognitive control and either interrupted or inhibited.

Emotion regulation. Modinos, Ormel, & Aleman (2010) sought to explore individual differences in brain activity that occurred during reappraisal of negative emotion. 18 non-clinical subjects completed an fMRI task in which they either paid attention to or changed their appraisal of negative stimuli, and rated their emotional experience after each trial. These subjects were observed on trait mindfulness, as assessed by a self-report questionnaire, and did not undergo any intervention or induction. A regression

analysis showed that one's tendency to be mindful predicted activity in brain regions related to reappraisal, such as the dorsomedial prefrontal cortex. In addition, prefrontal activity was negatively correlated with the amygdala response to negative scenes, further bolstering the hypothesis that it plays a large part in down-regulating emotion regions of the brain. These findings suggest that trait mindfulness, which is defined as the tendency to recognize and regulate internal states, may modulate activity in brain systems involved in the cognitive control of negative emotion.

Goldin & Gross (2010) studied participants with social anxiety disorder (SAD), whose diagnosis is characterized by emotional and attentional biases as well as distorted negative self-beliefs. They examined the brain and behavior changes in emotional reactivity and regulation of negative self-beliefs in participants with SAD related to participation in MBSR. 16 participants underwent fMRI while reacting to negative self-beliefs and attempting to regulate unpleasant emotions using two types of techniques; either breath-focused attention or distraction-focused attention. Compared with their baseline assessments, MBSR completers showed decreased anxiety and depression and increased self-esteem. During the breath-focused attention task only, they also showed decreased negative emotion experience, reduced amygdala activity, and increased attentional effort.

Arch & Craske (2006) investigated whether a 15-minute recorded focused breathing induction in non-clinical undergraduate sample would decrease the intensity and perceived unpleasantness of emotional responses to affectively rich images and increase participants' willingness to stay in contact with these images. The effects of the focused breathing induction were compared with the effects of an unfocused attention and worrying induction. The focused breathing group maintained consistent, moderately positive responses to the neutral slides before and after the induction, whereas the unfocused attention and worry groups responded significantly more negatively to the neutral slides after the induction than before it. The breathing group also reported lower negative affect and overall emotional turmoil in response to the slides presented post-induction than the worry group, and greater willingness to view negative slides than the unfocused attention group when presented with the option. The breathing group was also more willing than the comparison group to accept an optional negative image portion following the initial, required portion. These results indicate that there is an inherently affect regulating property in mindfulness.

Chapter 4. Components of OCD

Early theories of OCD largely focused on the differences between obsessive-compulsive (OC) symptomatology and health, placing much of the problematic affect, cognition, and behavior as internal to the individual. As cognitive and behavioral theory began to rise in prominence though, explanations aimed at describing OC symptomatology on a spectrum with healthy behavior used common human experiences to highlight the processes that lead to clinically significant OC symptoms. The current chapter will present some early modern theories of OCD, and will move into more recent descriptions of psychological processes implicated in OCD. These will include cognitive, behavioral, and affective components of human experience, and will seek to create relatively exclusive categories to produce a component-based model of OCD.

Early Theories

One of the earliest attempts to understand the etiology and maintenance of OCD was put forth by Dollard & Miller (1950), who adopted Mowrer's two-stage theory (1939) to explain the role of fear/anxiety and avoidance in OCD. Mowrer's theory uses classical conditioning and operant conditioning principles to explain this phenomenon. The theory holds that a neutral event stimulus (conditioned stimulus; CS) begins to elicit fear when it is presented with an event that naturally elicits pain/distress repeatedly (unconditioned stimulus; UCS). The CS can be internal stimuli, like thoughts, or physical stimuli, such as bathrooms and dumpsters. After fear/anxiety/distress develops in the face of the CS, escape or avoidance behaviors often naturally arise to reduce the anxiety (Mowrer, 1939). In OCD specifically, the avoidance and escape takes the form of compulsive behaviors. Like other avoidance behaviors, compulsions are maintained because they are successful in reducing the distress, at least temporarily.

Following this line of thought, Rachman and colleagues (Hodgson, Rachman, & Marks, 1972; Roper & Rachman 1976; Roper, Rachman, & Hodgson, 1973) created a series of experiments that demonstrated that the presence of obsessions is linked to increased distress and that compulsions reduce this distress, which represents the first time such a direct link between these symptoms was made. This theory of a functional relationship between obsessions and compulsions influenced the definitions of OCD in the DSM-III (American Psychiatric Association, 1980) and its successors.

Next, Foa and Kozak (1986) introduced the prevailing cognitive conceptualization of psychopathology of time by proposing that OCD is a disorder in which sufferers often present with common erroneous cognitions. They suggested that OCD sufferers assign a high probability of danger to situations that are likely to be safe. For example, an individual with OCD will believe that if he or she does not check the lock on a door after locking it, there is a high likelihood that the door will remain unlocked and the home will be burglarized. They also suggested that individuals with OCD exaggerate the potential consequences of the bad things that they fear will happen. For example, catching a cold from touching a dirty surface is viewed as a terrible thing that may lead to dangerous or catastrophic health outcomes. For those sufferers with more abstract fears, anxious arousal is associated with mistaken meaning rather than with a particular stimulus. An example used for this type of distorted thinking is related to OCD sufferers who are fixated on asymmetry, and who reduce their distress by rearranging objects. These people often do not fear the objects themselves, nor do they anticipate disaster from asymmetry, but instead, they experience distress because of a belief that certain arrangements are improper. Foa & Kozak further suggested that individuals with OCD conclude that in the face of lack of overt evidence for safety, the world is dangerous, they are in danger, and therefore they seek constant evidence for safety. People without OCD, on the other hand, conclude that if they do not have evidence of danger, then things are generally safe.

Salkovskis' (1985) conceptualization focuses on OCD pathology on the level of automatic thoughts. Within this conceptualization, intrusive thoughts, which characterize the disorder, are stimuli that elicit the hallmark negative thoughts associated with OCD pathology. Specifically, an exaggerated sense of responsibility and self-blame are the central themes in the OCD belief system. Compulsive behavior, which is understood as a neutralization effort, reflects the individual's attempt to lessen feelings of guilt and responsibility and to prevent self-blame. Salkovskis further put forth that five dysfunctional assumptions characterize individuals with obsessive-compulsive pathology and differentiate them from persons without OCD: (1) having a thought about an action is like performing the action; (2) failing to prevent (or failing to try to prevent) harm to self or others is the same as having caused the harm in the first place; (3) responsibility is not attenuated by other factors (e.g., low probability of occurrence); (4) not neutralizing when an intrusion has occurred is similar or equivalent to seeking or wanting the harm

involved in that intrusion to actually happen; and (5) one should (and can) exercise control over one's thoughts (Salkovskis, 1985, p. 579). In this case, although the content of the obsession may be experienced as intrusive (ego-dystonic), the automatic thought that comes from it becomes personal and relevant (ego-syntonic). This process of movement from random, irrelevant stimulus to personally relevant, important stimulus helps to explain the sufferer's experience of the thought as important and requiring attention and highlights the difference between intrusions in the general population and OCD intrusions. This formulation began the cognitive treatment trajectory, in which treatment of OCD is largely focused on identifying the erroneous assumptions and modifying the automatic thoughts.

Wegner, Schneider, Carter, and White (1987) conducted an early investigation of the thought suppression paradox (attempting to suppress thoughts leads to an increase in their frequency), known as the White Bear Experiment. They observed that those individuals who were told to avoid thoughts of a white bear actually thought more about white bears than those individuals who did not have the instruction to suppress thoughts, and were more likely to allow thoughts to pass in and out of consciousness. The target thought (white bears in this case) was observed to increase during the suppression task. This phenomenon was dubbed the *immediate enhancement effect*. The increase in thought frequency after suppression discontinued was termed the *rebound effect*, which reflects the longer-term effects of thought suppression on the occurrence and maintenance of personally relevant intrusions. Wegner's (Wegner, 1994; Wegner, Erber, & Zanakos, 1993) related Ironic Process Theory suggests that attempts to suppress thoughts involve two cognitive processes: (1) an intentional search for a distracter thought; and (2) an automatic search for the target thought. Since human automatic monitoring searches for occurrences of the target thought, it paradoxically increases the accessibility of that thought to consciousness. In other words, consciously trying to suppress thoughts of a white bear leads the automatic monitoring process to search for white bear thoughts.

Components of Obsessions

The theories described above represent the majority of modern theories used to explain the phenomena implicated in OCD. More recent research has sought to disentangle these processes further by dismantling the components thought to play in role in the disorder and attempting to link them experimentally with symptom markers.

Rumination. Recent scientific findings have suggested that rumination, characterized by analyzing one's thoughts and behaviors, and seeking to find their causes and consequences, is a common strategy used by OCD sufferers to manage obsessive intrusive thoughts and attempt to neutralize them (Freeston & Ladouceur, 1997). Several studies, including one conducted by Abramowitz, Whiteside, Kalsy, and Tolin (2003), have found worry to be positively associated with OCD compared to anxious and normal controls on the Thought Control Questionnaire and in other measures of worry. Authors like Fresco, Frankel, Mennin, Turk, and Heimberg (2002) and Segerstrom, Tsao, Alden, and Craske (2000) employed a transdiagnostic perspective that holds that worry and rumination are identical in cognitive process but differ in content. For example, an individual suffering from Generalized Anxiety Disorder may suffer from a repetitive, unsatisfying cycle of considering potential negative events in the future, while an individual with Major Depressive Disorder may experience a similar cognitive process, but focused on re-considering past events that had negative outcomes. The similarity in these circumstances is that the individual's cognitive process is focused on understanding and "making right" thoughts relevant to the disorder, leading to large amounts of time spent in negatively focused thought. Thus, higher levels of both worry and rumination would be expected in OCD. Even though the metacognitive model of OCD (Wells, 2010) puts forth the concept that perseveration, including rumination or a ruminative thinking style (RTS), is involved in the maintenance of OCD, similar cognitive processes and their possible relation to the symptoms of OCD have only begun to be studied.

Research conducted by Wahl, Ertle, Bohne, Zurowski, and Kordon (2011) has sought to understand how RTS is related to OC symptomatology in two non-clinical samples. In the first sample, 261 students were assessed using the Ruminative Response Scale, the Padua-Inventory, Revised, and the Beck Depression Inventory. Results suggest that RTS was significantly related to the severity of OC symptoms in general, and obsessive rumination in particular, even after controlling for depression. Results were replicated in a second sample (211 students). These data indicated that RTS and obsessive rumination share common process factors, and support previous hypotheses that presented rumination, worry, and obsessional processes in OCD as overlapping constructs.

Thought suppression. The concept of thought suppression, which is described in more detail above, is one of the central concepts guiding the cognitive behavioral conceptualization of obsessions,

and is a guiding principle in exposure-based treatment. Wegner and colleagues (1987; White Bear Experiment) created a paradigm to study this phenomenon in which study participants were randomly assigned to one of two conditions: (1) initial suppression, with instructions to suppress thoughts about a white bear for 5 minutes, or (2) initial expression, with instructions to actually generate white bear thoughts. During a second five-minute interval, participants received the opposite instructions. Participants monitored their stream of consciousness by speaking into a tape recorder each thought that entered his or her mind and by ringing a bell for each time the thought of a white bear arose. Two important findings came out of this study. First, not a single participant was successful in fully suppressing the target thought during forced suppression, regardless of whether he or she was instructed to suppress the thought in the first or second interval. Interestingly, target thoughts occurred about once per minute for most participants, leading to the conclusion that thought suppression is temporary and not a meaningful way to decrease the frequency of unwanted thoughts, which was previously practiced in the treatment of OCD and other disorders. The second important conclusion of this study was that the total number of target thoughts during the expression interval was significantly higher for participants who were involved in the suppression condition during the first interval. Also, analysis of the stream of consciousness data indicated that during the suppression interval, participants tried to distract themselves from the white bear thought by creating other distracting thoughts, and that the white bear thought was almost always preceded by a previously selected replacement thought. This paradigm led to much additional research in the past 20 years, all of which is based on the findings here, which suggest that thought suppression is an unhealthy and counterproductive way of coping with unwanted thoughts.

Trinder and Salkovskis (1994) responded to the experimental nature of Wegner and colleagues' (1987) study, which studied the phenomenon of thought suppression in an artificial setting. They modified the paradigm to test the effect of thought suppression over a four day period. Each participant (51 undergraduate students, 29 males and 22 females) was asked to identify a negative intrusive thought that he or she experienced and to record each occurrence of it. Participants were randomly assigned to one of three groups: one group was asked to suppress target thoughts when they occurred, the second group was instructed to invite the target thoughts when they arose, and the third group recorded the thoughts. This allowed experimental control of both attention to and manipulation of the target thoughts instead of

previous manipulations, which focused only on modifying attention and active suppression. Results showed that participants who suppressed their intrusive thoughts experienced increased frequency of such thoughts, and found them more uncomfortable than those in the other two groups. This is consistent with the theory that suppression increases thought frequency, and bolsters previous findings by adding evidence to the effects over the course of several days.

Janeck and Calamari (1999) examined whether individuals with OCD had a deficiency in their ability to suppress thoughts. They found that when individuals with OCD tried to suppress thoughts, they experienced a paradoxical increase in those very thoughts, but that this phenomenon did not occur in non-anxious controls or anxious controls. These findings suggest that cognitive inhibitory deficits may play a role in the intrusive, repetitive nature of obsessions in clinical populations, and highlight the fact that thought suppression in and of itself does not cause OCD, but may play a role in the maintenance and intensity of distress.

Other studies sought to understand the relative effectiveness of thought suppression techniques and to categorize them more systematically. Freeston & Ladouceur (1997) sought to systematically describe the repertoire of strategies used by 29 OCD patients with dominant obsessive thoughts. These subjects reported extensive strategies, characterized by low to moderate mean efficacy in removing target thoughts. Most strategies were not rituals or neutralization per se, but were effortful, intentional, and deployed in a strategic way. These strategies included: (1) physical action, (2) thought replacement, (3) analyze, (4) talk about, (5) thought stopping, (6) try to convince oneself, and (7) do nothing. These findings point to the need to broaden the understanding of thought suppression strategies, and highlights the relative short-term effectiveness of the strategy, which underscores the reason for the high level of resistance to reducing such strategies.

Amir, Cashman, and Foa (1997) examined the differences between strategies of thought control used by OCD patients compared to those used by non-anxious controls. Results suggested that OCD patients used punishment, worry, reappraisal, and social control more often than non-patients. On the other hand, distraction was used more often by non-patients than OCD patients. Punishment was the strongest discriminator of OCD subjects and non-patients mostly because of the low frequency of its use by non-patients. In fact, punishment and worry were the only methods of thought control that correlated

with OCD symptomatology. These findings further differentiate OCD sufferers from normal controls, and suggest that thought suppression alone may not lead to clinically significant distress, but that in the context of OCD, that the strategies used for thought suppression are particularly counterproductive, and often maladaptive.

Escape and avoidance behavior. A category of responses particularly related to compulsive behavior is escape and avoidance behavior, which is closely linked with thought suppression, but emphasizes behavioral manifestations of distress reduction over internal attempts. Salkovskis, Thorpe, Wahl, Wroe, and Forrester (2003) studied the cognitive-behavioral hypothesis that the development of neutralizing is central to the onset and maintenance of OC symptoms. Their study included 29 subjects with a DSM-IV-TR (American Psychiatric Association, 2000) diagnosis of OCD, who were randomly assigned to two conditions. Both groups listened to repeated recorded presentations of their unique intrusive thoughts and were instructed to either neutralize or distract. Self-reported discomfort was rated during this first phase and then during a second phase that took place without instruction to either neutralize or distract. The neutralization group showed a similar level of discomfort in the instruction phase, which significantly reduced over time when compared with the distraction. Interestingly though, the neutralization group experienced significantly more discomfort during the non-instruction phase, and significantly stronger urges to neutralize and distract at the end of this phase than the distraction group. This presents strong evidence for the reinforcing power of neutralization, and helps explain the relationship between escape and avoidance and the maintenance of OCD compulsions.

Abramowitz, Lackey, and Wheaton (2009) studied experiential avoidance (EA) in the context of acceptance and commitment therapy. This definition of EA involves an unwillingness to tolerate unpleasant emotions, thoughts, memories, and other private experiences, and is thought to play a large part in OCD within this theoretical framework, but is differentiated from neutralization in that it encompasses a wider repertoire of potential behaviors, including such distal behaviors as substance abuse and social isolation. The Abramowitz et al. study compared the construct of EA compared to other, more traditional cognitive-behavioral theoretical constructs (e.g. dysfunctional core beliefs) that may play a role in OCD symptomatology. The study employed a sample of 353 non-clinical subjects who completed self-report assessments of EA, core beliefs, and OCD symptoms. Results suggest that those

subjects reporting higher levels symptoms endorsed more dysfunctional beliefs about their obsessions and higher EA as compared to subjects with lower levels of symptoms. Interestingly, in those subjects with more OC symptoms, EA did not have a significant relationship with obsessive beliefs, indicating that EA represents a unique and exclusive explanatory category for underlying mechanisms of OC symptoms. Furthermore, EA did not predict OC symptom dimensions above the predictive power of general distress and obsessive beliefs. This suggests that EA is too general a construct to explain OC symptoms in any meaningful way that cognitive-behavioral constructs, such as core obsessive beliefs, can explain. On the other hand, EA likely plays a role in OC symptomatology in a more general sense.

Cognitive distortions. A well-studied construct within OCD symptomatology is the cognitive distortions implicated in the etiology and maintenance of the disorder. With the increase in interest in cognition that grew in the second half of the 20th century, such theorists as Rachman (1997) began to propose and study the particular cognitions implicated in the disorder. Rachman proposed a model that held that obsessions are caused by catastrophic misinterpretations of the significance of one's internal experiences, including thoughts and behavioral urges. This theory begins from an assumption that intrusive thoughts provide the content of obsessive thoughts, and the modern understanding that intrusive, ego-dystonic thoughts are a virtually universal experience shared by both clinical and non-clinical populations. The universal occurrence of this phenomenon coupled with the cognitions associated with the disorder gave Rachman the idea that the difference between intrusions in non-OCD afflicted individuals and OCD sufferers is due to the misinterpretation of the significance of the thought. The interpretation of the thought or impulse as important, personally significant, revealing and threatening or catastrophic, makes that thought that much more important and necessary to eradicate. The particular interpretations of thoughts common to OCD identified in this early research include the following: immoral, sinful, disgusting, dangerous, threatening, alarming, predictive, insane, bewildering and criminal. Additionally, OCD sufferers identified these thoughts in the following ways: "these obsessions mean that deep down I am an evil person," "I am dangerous," "I am unreliable," "I may become totally uncontrollable," "I am weird," "I am going insane (and will lose control)," "I am a sinful person," and "I am fundamentally immoral." These thoughts lead to the following interpretations: "it is meaningful, "it is revealing about me, "it is important, "it is my thought, "it has special meaning for me, "it has potential

consequences,” “these potential consequences are serious,” “I have to do whatever I can to stop the thought (or its consequences),” and “I have to take special care to avoid acting on the thought.”

Taylor, McKay and Abramowitz (2005) developed the Obsessive Beliefs Questionnaire (OBQ), which was designed to measure dysfunctional beliefs related to OCD in a targeted and exclusive way, relying on cognitive models of OCD etiology and maintenance as primary. Their initial testing of the questionnaire found that subscales of the measure tend to be highly correlated; this indicates that OCD-related beliefs are potentially hierarchically structured, consisting of lower-order factors loading on one or more higher-order factors. These investigators studied the questionnaire in a clinical sample (n=202), and found one higher-order (general factor) and three lower-order factors: (1) responsibility and overestimation of threat; (2) perfectionism and intolerance of uncertainty, and (3) importance and control of thoughts. The general factor, accounting for 63% of variance, accounted for more variance in OBQ scores (22%) than did the lower-order factors (6–7%), thereby underscoring the importance of the higher-order factor. On the other hand, although the higher order factor was predictive of general symptomatology, the lower-order factors significantly predicted variation in symptom profile, including severity of compulsions.

Calamari, Cohen, Rector, Szacun-Shimizu, Riemann, and Norberg (2006) worked to identify relevant subgroups based on differences in dysfunctional beliefs. They assessed 367 OCD participants using the Obsessional-Beliefs Questionnaire. Respondent scores on sub-sections related to inflated personal responsibility and the tendency to overestimate threat, perfectionism and intolerance of uncertainty, and over-importance and over-control of thoughts were clustered for statistical analysis. Analysis discovered both a simple and complex subgroup model containing two large groups (high beliefs and low beliefs) and five sub-groups. The high belief and low belief groups delineated respondents based on the number of beliefs identified in the questionnaire, separating respondents into one group with a higher number of identified thoughts and another with a lower number. The contamination symptom subgroup was under-represented in the high beliefs group, and was over-represented in the low belief group. The obsessional symptom subgroup was over-represented in the responsibility/threat subgroup. The symmetry symptom subgroup was under-represented in the importance/control of thoughts beliefs subgroup, but over represented in the perfectionism/certainty subgroup. The certainty symptom subgroup

was over-represented in the responsibility/threat symptom subgroup. The contamination/harming symptom subgroup was over represented in the high beliefs group, and underrepresented in the perfectionism/certainty and low beliefs subgroups. These findings suggest connections between contamination obsessions and low beliefs, pure obsessions and responsibility/threat, symmetry and perfectionism/certainty, certainty and responsibility/threat, and contamination/harming and high beliefs.

More recent studies, such as the large scale study conducted by Taylor, Coles, Abramowitz, Wu, Olatunji, Timpano, and colleagues (2010), have sought to better understand the relationship between symptoms and beliefs. They found that in a large clinical sample (n=5,015), inflated personal responsibility and the overestimation of threat (RT) significantly predicted each of the six main types of OC symptoms (checking, hoarding, neutralizing, obsessing, ordering, and washing), beyond the effects attributable to overimportance of one's thoughts and the need to control these thoughts (ICT) and perfectionism and the intolerance of uncertainty. Intolerance of uncertainty predicted ordering rituals beyond the effects due to ICT and RT. Need to control thoughts predicted obsessing, neutralizing, and washing compulsions, beyond the effects attributable to overestimation of threat and perfectionism. The three types of beliefs were strongly correlated with one another, which is consistent with similar findings above, which suggest that one type of belief can influence other beliefs, which influence the severity and manifestation of OC symptoms. On the other hand though, this study employed a large non-clinical sample, which suggests that findings are certainly applicable to that population, but may be less valid in considering clinical samples with pathological levels of OCD symptomatology.

Overall, the studies above draw a link between certain dysfunctional thought patterns and the etiology and maintenance of OCD symptoms. They have been studied in the context of normal manifestations of OC behavior, as well as in clinical samples, but what seems clear is that an individual's particular beliefs about his or her thoughts and the importance placed on thoughts is likely linked, either etiologically or correlationally, with clinically significant OC symptomatology.

Low distress tolerance/negative emotionality. Whittal, Woody, McLean, Rachman, and Robichaud (2010) found that stress management training (SMT), which consist mostly of psychoeducation and relaxation training, led to similar outcomes for obsessions as a full-scale cognitive intervention directed at altering dysfunctional thought patterns (as discussed above), and were both

markedly more effective than a waitlist condition. These findings are particularly interesting given that SMT was found to be relatively ineffective in earlier treatment studies of mixed OCD symptom subjects. The difference between the Whittal et al. study and others before it was that it employed such applied strategies as interpersonal training and focused relaxation for managing life stressors and tension, and studied only individuals with primary obsessional symptoms. Participants were also taught to identify situations in which obsessions are more likely to occur and to learn to relax when they begin obsessing. This deviation in expected findings has led more recent researchers to examine the link between general distress, distress tolerance, and negative emotionality in the onset and maintenance of OC symptoms, and obsessions in particular.

Cogle, Timpano, Fitch, and Hawkins (2011) used this information to study distress tolerance (DT) in relation to OCD. Since DT is considered a general factor that is made up of several lower-order constructs, including tolerance of uncertainty, pain tolerance, and ability to withstand negative emotional states, these researchers sought to connect these specific constructs with the more general theoretical implications suggesting a link between low DT and OCD. In their first study, these authors examined the specificity of DT as a predictor of obsessions at a single time-point. In particular, they examined whether a self-report measure of DT (DTS; Simons & Gaher, 2005) could be correlated to OC symptoms when covarying for anxiety, depression, anxiety sensitivity, and obsessive beliefs. In their second study, these authors examined whether DT would prospectively predict increases in obsessing symptoms over time. In a third study, they tested whether the particular constructs identified within DT would predict response to a neutralization task that measures different processes related to obsessions, including emotional reaction to a experimentally manipulated equivalent of intrusion and neutralization. Findings for all three studies were consistent with the hypothesis that DT was specifically related to OCD, and found a specific role for DT in OCD.

Results of the first study suggest that lower DT was predictive of obsessions, even when controlling for other highly relevant variables, such as depression, anxiety, anxiety sensitivity, and obsessive beliefs (Cogle et al., 2011). Interestingly though, statistical analysis suggests that the link between DT and OC symptoms was specific to obsessions, and highlights a particular explanatory area for the role of DT in this disorder. The specificity of the link between DT and obsessions may help explain

the earlier findings (above) that indicate that SMT was ineffective when applied to mixed OCD types, but it was recently found effective for the primarily obsessive presentations of the disorder. Results of the second study indicated that lower DT was predictive of changes in obsessing symptoms one month later. The incremental specificity of the DT and obsessions link was re-created in this study, as lower DT was predictive of increased obsessional thinking but not other OC symptoms, even after covarying for depression and anxiety. Results of the third study suggest that lower DT was predictive of neutralization in the experimental task, in addition to higher post-neutralization anxiety, but not with initial anxious reaction to imagining the experimental intrusion. These findings elucidate the link between DT and obsessions, suggest in particular that lower DT does not lead to increased anxious response to intrusions, but may lead individuals with lower DT to use maladaptive strategies, such as neutralization, to cope with intrusive distress that they experience as unbearable. Also, lower DT may contribute to longer lasting distress post-intrusion, which may be a factor in the increase of obsessional symptomatology over time.

More recent studies support these findings. For example, a study conducted by Macatee, Capron, and Schmidt (2013) sought to test the specificity of the link between lower DT and obsessions in relation to other OC symptoms in a clinical sample. For the first study, 22 outpatients with a diagnosis of OCD and 37 healthy controls completed measures of DT, depression, and OC symptoms. The second study involved a longitudinal investigation with a non-clinical sample (102 undergraduate students) examining DT and daily stressors in the prediction of daily obsessions. Results of the first study suggest that OCD diagnosis was not a significant predictor of DT, though greater obsessions, but not other OC symptoms, were uniquely associated with lower DT. In the second study, lower baseline DT was predictive of higher levels daily obsessions among those participants who had more daily negative life events, though this relationship was absent among those with elevated DT. The specificity of DT as a predictor of obsessions in such studies as this study and those above suggests further that low DT increases obsessions in the context of life stress for both clinical and non-clinical populations.

Thought-action fusion. The concept of thought-action fusion is a complex and deeply researched topic that has recently come to the forefront of research on the underlying components of OCD. The current review will not go into the details of the various outcomes, but will explore pertinent

results as they relate to validating the link between this construct and OCD (for a detailed review, see Shafran & Rachman, 2004).

Early on, an analysis of the relationship between obsessions, responsibility and guilt led to anecdotal evidence that responsibility for thoughts can “even extend to a psychological fusion of the thought and the action” (Rachman, 1993, p. 151). This fusion goes beyond simply the belief that having a thought is equivalent to completing the associated action, and more of a psychological (i.e. emotional) experience of the thought being equivalent to the action. The first study investigating the role of perceived responsibility for harm (Rachman, Thordarson, Shafran, & Woody, 1995) found thought-action fusion (TAF) was a separate and coherent construct that is significantly associated with obsessions. Further, assigning overestimated significance to intrusive thoughts came to be seen as separate from inflated responsibility, which is more of a cognitive concept, even though these two concepts are now thought to be intertwined complexly (Rachman, 1993)

Rassin, Merckelbach, Muris, and Spaan (1999) sought to test the idea that thought-action fusion plays a role in the etiology of obsessive intrusions as an extension of Rachman’s theoretical work on the topic. Nineteen OCD sufferers underwent a feigned EEG recording session that served as an experimental analogue to the heightened responsibility commonly associated with TAF. Participants were informed that the EEG monitor could identify occurrences of the word *apple*, and that each time this thought went through the participant’s mind, electrical shocks would be administered to another person. After spending 15 minutes in the EEG laboratory, experimental subjects and controls (n=26) completed an assessment of the characteristics of the target thought (*apple*), including how often the thought occurred and how aversive the thought was experienced as being. Results suggest that thought-action fusion increases the likelihood that thoughts are experienced as intrusive in that they occur more frequently, lead to more discomfort, and make the sufferer more resistant to them.

Rassin, Diepstraten, Merckelbach, and Muris (2001) took this further by seeking to differentiate OCD sufferers from individuals with other anxiety disorder. They examined scores on TAF and thought suppression before and after treatment in patients with OCD (n=20) and in patients with other anxiety disorders (n=20). They found no difference between scores on TAF between groups, and found significant correlations between TAF and psychopathology in both groups that improved significantly with

treatment. They also found no correlation between TAF and thought suppression. These findings suggest that TAF is a construct common to anxiety disorders that is particularly implicated in anxious arousal, but does not uniquely explain OCD symptomatology over and above other anxiety disorders.

Amir, Freshman, Ramsey, Neary, and Brigidi (2001) conducted an important cross-sectional study using a modified TAF scale that also included positive TAF items ("If I think something positive, it is more likely to happen"). In the first study, 126 undergraduates were separated into groups of 15 high and 15 low OCD symptoms. The second study involved 298 undergraduate students who were divided into groups of 29 with high OCD symptoms and 29 with low OCD symptoms. High symptoms participants in both studies had significantly higher estimates of Likelihood-Other, Likelihood-Self, and Likelihood of positive events happening related to their thoughts and had higher beliefs that their thoughts could help them avoid harm. This study found no significant differences between groups on Moral TAF.

The findings described above provide a snapshot of the important findings in this area of research, and suggest that TAF is a central component of anxiety disorders in general, and OCD in particular. On the other hand, such constructs as thought suppression and rumination might be differentiating factors between OCD and other similar disorders (e.g. GAD, etc.).

Cognitive inflexibility. Although there are several neurological correlates implicated in OCD, reviewing the literature on all the specifics is beyond the scope of this project (for a more complete review, see Stein, 2000b). The most pertinent and applicable neuropsychological construct pertaining to OCD involves frontal lobe functioning as it relates to cognitive flexibility in particular. The other correlates are more anatomically focused, and related studies do less to examine the functional correlates of these regions as they relate to the disorder.

Schmidtke, Schorb, Winkelmann, and Hohagen (1998) were the first to take the divergent structural knowledge regarding the brain and OCD and focused on the cognitive processes implicated in the particular frontal lobe differences (dysfunction within associative frontostriatal circuits; e.g. Head, Bolton, & Hymas, 1989) that have been studied previously. This study examined 29 OCD patients who were not receiving pharmacotherapy and who were compared to a control group of normal comparisons who were matched for age, sex, and intelligence, a step that had not been taken in any previous study, which may help explain the divergent results. 12 neuropsychological tests were employed to capture

unique aspects of frontal lobe functioning as it relates to cognition. Results suggested that OCD patients were unimpaired in tests of abstraction, problem solving, set-shifting, response inhibition, active memory search, and choice reaction speed. Deficits of about one standard deviation were noted at timed tests of verbal and nonverbal fluency, attentional processing, and weight sorting. OCD patients also showed deficits in some tasks that involved controlled attentional processing and self-guided, spontaneous behavior. This profile of deficient functioning is thought to be consistent with decreased functionality of the anterior cingulate, but not the dorsolateral prefrontal circuit, and was the first step in beginning to specify the particular regions at play in the disorder.

Bradbury, Cassin, and Rector (2011) sought to examine the possible neurocognitive differences between obsessive beliefs subgroups by employing the Wisconsin Card Sorting Test (WCST) in a Low Beliefs OCD subgroup, a High Beliefs OCD subgroup, and two anxious control groups: one containing individuals with Panic Disorder with Agoraphobia (PDA) and one with subjects diagnosed with Social Phobia (SP). These researchers used the model set forth by the OBQ to delineate groups, and were also interested in understanding the particular brain differences in those people who endorsed high levels of identifying with cognitive distortions and those who did not and their relevant levels of cognitive flexibility. In this study, The High Beliefs subgroup performed significantly poorer on WCST subscales compared to the other groups when not accounting for severity of OCD or depressive symptoms. The Low Beliefs subgroup performed similar to the anxiety disorder control groups, which suggest a potential interplay between heightened obsessive beliefs and neurocognitive inflexibility.

Chamberlain, Fineberg, Blackwell, Robbins, and Sahakian (2006) examined motor inhibition and cognitive flexibility in subjects with OCD and trichotillomania. They employed the Stop-Signal Task and the Intradimensional/Extradimensional Shift Task on 20 patients with OCD, 17 patients with trichotillomania, and 20 healthy comparison subjects. Both subjects with OCD and those with trichotillomania showed impaired inhibition of motor responses. For trichotillomania, the deficit was worse than for OCD, and the degree of the deficit correlated significantly with symptom severity. Only patients with OCD showed deficits in cognitive flexibility. The fact that impaired inhibition of motor responses (impulsivity) was found in both OCD and trichotillomania subjects, but cognitive inflexibility was limited to OCD suggests that these functions are impaired in both disorders, that these disorders exist on a

spectrum with one another, and that cognitive inflexibility is a component of OCD that is unique to the disorder.

Finally, Vriend, de Wit, Remijnse, van Balkom, Veltman, and van den Heuvel (2013) sought to extend previous findings regarding deficits in the fronto-striatal system by adding consideration of the temporal stability of cognitive flexibility impairments in OCD. They observed 16 OCD patients using an fMRI version of a task-switching paradigm twice, intervened by a follow-up period of approximately six months. Results suggest that functional abnormalities in the dorsal frontal-striatal circuit and anterior cingulate cortex at baseline normalized at follow-up and that these changes in the recruitment of task-related brain circuits was associated with change in disease severity, which supports the theory that the imbalance between the dorsal and ventral frontal-striatal circuits is partly state-dependent, and is linked to symptom severity. This naturalistic follow-up design allowed the researcher to see improved speed and lowered accuracy during switch task performance and a decrease in disease severity over time in the sample, although these changes were not correlated. Also, at the structural level, changes in symptom severity were uniquely correlated with increased activity in the dorsolateral prefrontal cortex and thalamus, and decreased activity of the dorsal anterior cingulate cortex during the task. The fact that these dysfunctions were found to be state dependent in this study suggests that the brains of OCD patients may not be inherently different from normal comparisons, but that the particular pathological processes lead to neural changes that reflect the symptoms present in the chronic and fluctuating course commonly observed in the disease. For an overview of the components discussed above, see Figure 3 below.

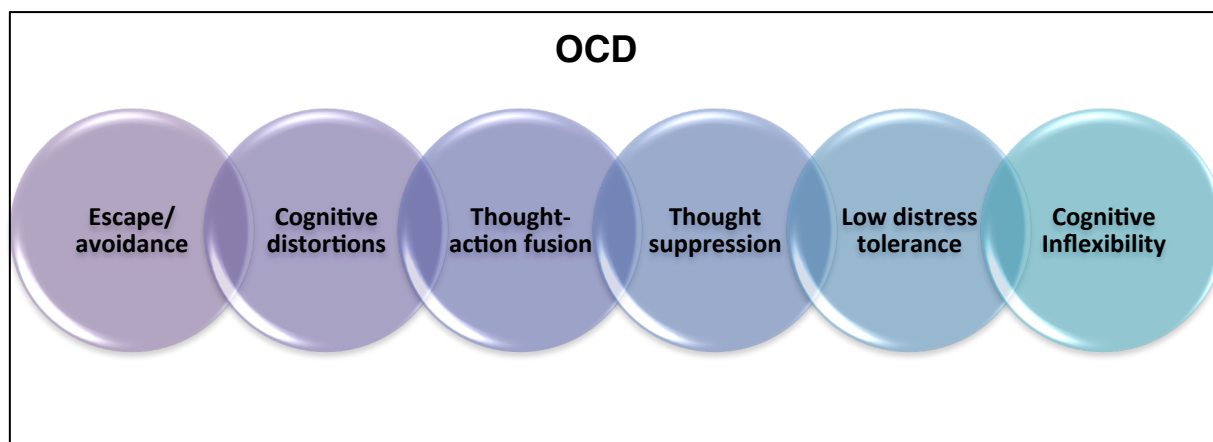


Figure 3. Components of OCD from meta-model.

Chapter 5. Discussion and Application

Summary of Findings

The current critical review of literature began with an exploration and deconstruction of the constructs underlying mindfulness. The review uncovered several proposed models of mindfulness that share some components, and possess some unique components as well. These models include:

- Baer (2006) - exposure, cognitive change, self management, acceptance and relaxation
- Brown, Ryan and Creswell (2007) - insight, exposure, nonattachment, enhancing mind-body functioning, and integrated functioning.
- Holzel and colleagues (2011) - attention regulation, body awareness, emotion regulation (via reappraisal and exposure), and change in perspective on the self.
- Shapiro, Carlson, Astin, and Freedman (2006) - re-perceiving as a meta-mechanisms of change, which leads to self-regulation, values clarification, cognitive, emotional and behavioral flexibility, and exposure.

This relatively exhaustive list of the most commonly cited and researched models were selected on the basis of their completeness and applicability to the current research. This author analyzed and combined these models to develop a meta-model comprised of categories capturing the components proposed in all of the models. This proposed meta-model of the components of change in mindfulness includes: exposure, relationship to thoughts, self-regulation, physiological effects (including relaxation), and values clarification. Next, these constructs captured within them were examined through existing findings in the literature linking each component with psychological change. Each component was validated as pertinent to psychological change through several empirical studies, and included in the model in related but mutually exclusive categories.

A similar process was undertaken to disentangle the processes thought to underlie OCD. The focus of this portion of the study involved only cognitive, behavioral, and emotional variables, as these are the primary variables targeted through psychosocial treatment such as mindfulness-based interventions. Studies examining genetic, structural, and other biological processes were excluded. This portion of the research was conducted until relevant components could no longer be found in an extensive search of related research. The components described in this section include: escape/avoidance behavior,

cognitive distortions, thought-action fusion, thought suppression, low distress tolerance, and rumination. Next, the research base for each of these components was explored and put forth to support their role as a relevant factor in understanding OCD symptomatology. Each of the factors has adequate support in the existing literature to draw a line between each component and general OCD symptom presentation.

The final step of this process will involve making theoretical connections between the components of mindfulness to the particular underlying processes in OCD to determine if there is a fit between the benefits one could expect from mindfulness and the areas that are sought to be changed in OCD. The section below will provide a visual representation of the proposed model, and will describe the connections between each component with attention paid to logical connections, and empirically studied connections wherever possible.

Proposed Model

The final process of this research involves making logical connections between the components of mindfulness and OCD proposed in the previous chapters. Some connections, such as that between exposure and escape/avoidance have both logical connections, as well as empirically supported connections that inform existing treatments for OCD. Other links, such as the link between self-regulation and rumination, have not been systematically studied, and can only be linked using a logical process involving the operational definitions established before. The process will begin with each component of mindfulness, and will be applied to each component of OCD that can be connected in some way. Where possible, empirical findings will also be included.

Exposure is the first component of mindfulness that will be linked to specific OCD processes. The first link is the between exposure and escape/avoidance behavior. These concepts are, by definition, opposites, and exposure in its systematic form (Exposure and Response Prevention [ERP]) has been validated as a viable treatment for both obsessions and compulsions (e.g. Franklin, Abramowitz, Kozak, Levitt, & Foa, 2000; Foa et al., 2005). As reviewed in the Introduction, ERP is currently the psychotherapeutic treatment of choice for OCD, and is incorporated in standard cognitive-behavioral treatment of the disorder. Thus, enhancement of the effects of exposure on escape and avoidance (i.e. negative reinforcement) can be expected from mindfulness treatment when added to such a protocol. This effect has been theoretically conceptualized by Treanor (2011), who views mindfulness as an

occasion setter for extinction learning, which would logically enhance exposure procedures, and could counteract the often-documented difficulty with OCD patients in engaging with obsessional stimuli (Whittal & McLean, 1999). An occasion setter, in this context, refers to the potential of mindfulness serving as a cue to more easily access other exposure-related cues, leading to enhanced extinction. Exposure also has a logical link to thought suppression in that the processes are incompatible. For example, in exposure, obsessive thoughts are invited and escape is delayed, which by definition counteracts efforts toward thought suppression. Authors such as Wegner (2011) propose that exposure is a viable treatment for pathological thought suppression. Finally, exposure is thought by some to be linked to emotion regulation, and thus, distress tolerance. Further, negative emotions are less arousing through mindfulness practice as the practitioner learns to turn toward them, rather than away, which leads to a habituation in the intensity of the subjective emotional experience (Santorelli, 2000), leading to increased distress tolerance.

Another important component of mindfulness is the change in relationship to thoughts. This connection has been well documented, and is of particular importance in the enhancement of cognitive interventions for OCD, which focus on changing maladaptive thought patterns leading to heightened responsibility and guilt. Such cognitive distortions, which have traditionally been targeted through such cognitive therapy methods as Socratic questioning and the downward arrow technique (Olatunji et al., 2013). Existing research has discussed cognitive distortions and mindfulness in the context of negative beliefs potential buffers against the positive effects of mindfulness (Sears & Kraus, 2009), but research has not yet sought to explain whether mindfulness affects the practitioner's belief in distorted thoughts or decreases their prevalence. Another important connection is the change in relationship to thoughts and potential effects on thought-action fusion (TAF), a central component of OCD that differentiates normal and pathological intrusions. This component of OCD is particularly challenging because it rises above the level of pure cognitive distortion and veers into the affective arena of the sufferer's belief and the associated distress elicited by the target thought (Shafran & Rachman, 2004). The addition of mindfulness has the potential to enhance existing cognitive techniques to challenge such thoughts as it would allow the practitioner to relate to thoughts in a more open, accepting way, and could potentially increase insight related to the nature of such thoughts. In this regard alone, mindfulness has promise as

an adjunctive treatment for OCD as it may address particularly treatment-resistant aspects of the disorder. Openness to thoughts and the goal of viewing thoughts as random, occasionally meaningful stimuli in the present moment can also be connected to thought suppression. Since thought suppression is seen as one aspect that differentiates normal and pathological obsessions, the introduction of a structured, organized way of opening oneself to thoughts in the form of mindfulness may be a promising way of reducing sufferers' tendency to suppress unwanted thoughts. This could lead to symptom reduction through increased willingness to accept such thoughts and see them as less personally relevant, which describes a more normal relationship to such thoughts.

Self-regulation is a component of mindfulness that includes behavioral, cognitive, and emotional forms of regulation that are internally driven. Self-regulation is related to escape and avoidance behavior in that it supports and increases insight into behavior, and allows the practitioner to make more "choiceful" decisions, rather than the more common reflexive reactions descriptive of compulsive behavior (Shapiro, 1982). Self-regulation is also implicated in the inverse relationship between anxious arousal and level of mindfulness (Ostafin, Brooks, & Laitem, 2013). This research suggests that mindfulness increases an individual's emotion regulation capacity through decreased reactivity to negative stimuli, and allows for a faster return to baseline and increased tolerance of distress. Finally, as rumination is conceptualized as a cognitive style that is at least partially under cognitive control (Ramel, Goldin, Carmona, & McQuaid, 2004), the insight and ability to think differently, to be aware of thought patterns, and to break the chain of rumination, draws a link between increased self-regulation and decreased rumination.

Lastly, physiological effects such as relaxation and decreased nervous system activation that are achieved through mindfulness practice can be linked to both improved distress tolerance and decreased rumination. Relaxation is a state that is incompatible with anxiety and worry, and has been used traditionally in systematic desensitization to create an environment in which a previously conditioned anxious response to a stimulus could be re-conditioned with a state of relaxation through repeated exposure (McGlynn, Smitherman, & Gothard, 2004). In a similar fashion, ongoing levels of anxious arousal that are commonly seen in OCD (Schmidtke et al., 1998) can be mitigated through increased access to the relaxation response. Similarly, rumination, which is closely linked to worry and anxiety, can be viewed as incompatible with states of relaxation and well-being (Jain et al., 2007). An increase in such

a state of relaxation, then, would suggest a likelihood that rumination would also decrease, or at least that alternative coping in the form of relaxation could arise.

There did not appear to be any obvious link between values clarification and the particular components of OCD described above. On the other hand, individuals suffering from OCD are likely to dedicate significant time to compulsive behaviors, and may experience losses in their ability to aspire toward important personal values. Thus, values clarification could improve overall well-being, as in the

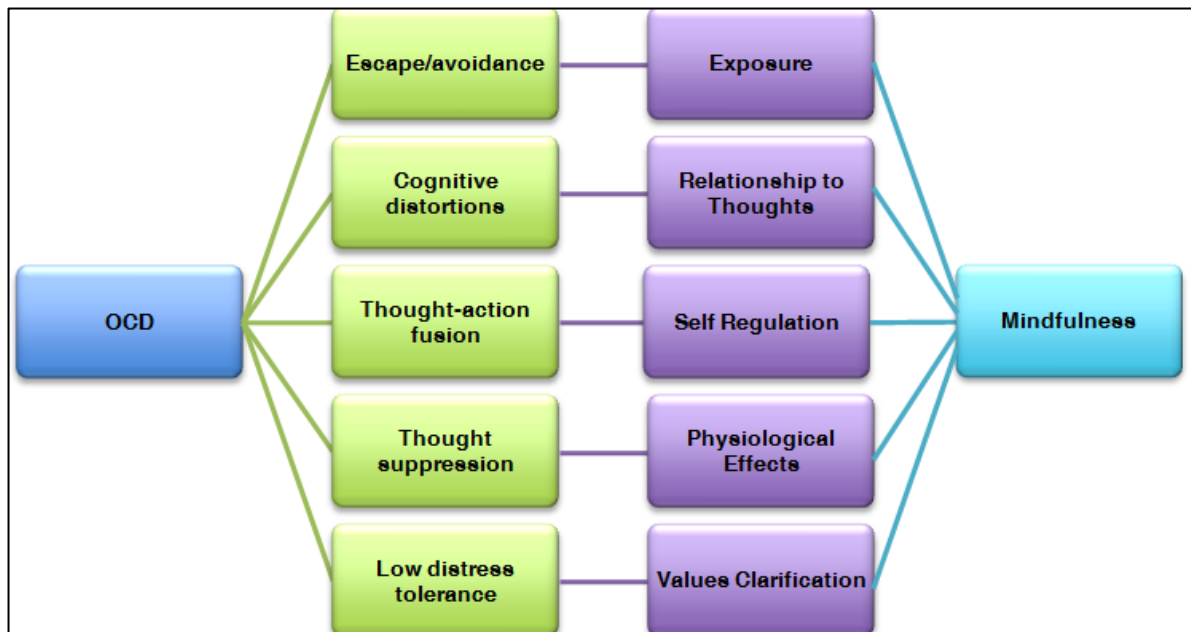


Figure 4. Interconnections between OCD and mindfulness as determined by meta-model.

context of such third-wave approaches as ACT (Hayes & Wilson, 2006), and would be a goal in and of itself above symptom reduction.

Additionally, clarification of values may also aid individuals undergoing the often-challenging work of psychotherapy for OCD (including ERP and other interventions) to maintain the motivation to improve long term functioning in spite of current discomfort. The studies discussed in the context of values clarification point to the link between this construct and well being, and may result in improvements in overall anxiety and depression, but could not presently be linked to a particular component of OCD. See Figure 3 below for an overview.

Limitations

There were two primary limitations in this research; the first being researcher limitations, and the second being limitations in available research on the topic. A researcher of a critical analysis project is limited by his or her understanding of the topic, ability to conceptualize the topic, and the search terms available to the researcher. In addition, the researcher does not have access to the nearly infinite sources of information on the topic, including less available journals, studies conducted informally, and other alternative types of research (e.g. some dissertations, clinical evidence). In addition, this researcher chose to focus on the cognitive, behavioral, and regulatory processes within mindfulness and OCD, and did not include a connection between mindfulness and OCD as defined by alternative schools of thought; in particular, psychodynamic conceptualizations of the problem were not utilized since they have not yet been operationally defined in the mindfulness literature, which is currently linked to cognitive-behavioral interventions.

Next, whereas research on OCD therapies such as CBT and proposed mechanisms of action are fairly extensive, mindfulness as a psychosocial intervention is a burgeoning field that is still in its relative infancy. As such, findings regarding particular mechanisms of action within mindfulness are scarcer, and lead to more tenuous conclusions in this area. This researcher made every effort to search for available literature that was pertinent to the topic, but certain areas are better researched than others, and this project will hopefully lead to further dismantling studies that seek to uncover the underlying mechanisms of change within mindfulness as applied to particular disorders.

Clinical Implications

The findings of this analysis suggest that mindfulness-based intervention, particularly mindfulness-based stress reduction, a standardized transdiagnostic intervention, is a promising intervention for OCD worthy of additional study. In the meantime, clinicians can safely implement mindfulness interventions into existing treatments for OCD, particularly those focusing on exposure and response prevention. This critical analysis suggests that there are several mechanisms of action within mindfulness that are particularly suited to treating OCD, and that are unique to mindfulness. Forms of OCD that have been more difficult to treat, such as a purely obsessional OCD, may also benefit from the additive influence of mindfulness into existing treatment protocols. Additionally, mindfulness training is a

promising buffer against relapse, and is likely to support OCD sufferers in their ongoing attempts to avoid relapse after treatment, and has been proven in a similar context for the treatment of depressive relapse (Teasdale, Segal, & Williams, 1995). The most relevant note of caution relates to timing for mindfulness intervention within a ERP protocol. To date, this concept has not yet been studied, but it is clear that concurrent mindfulness induction with exposure would not likely be effective. What is not known is whether mindfulness training before, concurrently, or after ERP would be most beneficial for enhancing extinction.

Current MBSR protocols based on Kabat-Zinn's (1984) *Full Catastrophe Living* can be implemented with little adjustment for this population, especially because the focus of practice is on the individual's experience, and does not require extensive education. OCD sufferers, though, may benefit from additional connection between cognitive concepts taught through CBT interventions and mindfulness skills. For example, teaching mindfulness may be the first step in a potential application of MBSR to OCD, but an additional aspect of treatment could involve connecting the patient's need to resist compulsive behavior with newfound abilities to non-judgmentally observe such urges. Another application might involve teaching observation of thoughts as a potential intervention for cognitive distortions rather than traditional rational disputation. Such examples highlight the relevant applicability of MBSR to the treatment of OCD. These findings do not suggest that MBSR should replace current treatments, which are well-established and relatively effective, but may serve to augment outcomes and address the gap in recovery outlined earlier.

Further Research

As described above, the area of mindfulness as a psychosocial intervention is a fast-growing field of inquiry. Nevertheless, there are several areas within this field that are yet to be studied. For example, the theoretical underpinnings of mindfulness within psychology and neurobiology are weak at best, and systematic dismantling of the constructs within it are limited. This study sought to organize the variety of data existing in this area, but there were no studies that provided models for understanding the application of mindfulness to psychopathology, and no specific explanatory theories linking pathology to change processes in mindfulness. Acceptance and Commitment Therapy, one of the primary third-wave cognitive-behavioral theoretical frameworks, incorporates mindfulness as an intervention, but relies on

contextual-frame theory as its driving force (Hayes, Strosahl & Wilson, 1999). This theory places the etiology and maintenance of pathology in language, and views thoughts as inextricably tied to linguistic representations. It also views avoidance as central to the exacerbation of pain, and conceptualizes many symptoms (e.g. compulsions in OCD, rumination in depression) as attempts to avoid pain that lead to more pain (i.e. suffering). Within this context, mindfulness is used to help people distance themselves from their ties to the language inherent in thinking, and allows for choice in deciding whether or not a thought is applicable or not.

A conceptualization of mindfulness as a stand-alone treatment is yet to be created, and has only been seen as part of other treatments or as augmenting existing treatments. Uncovering the unique benefits of mindfulness over and above other interventions would assist clinicians in applying such interventions to particular populations, and improve the viability and accessibility of such treatments.

The current study in particular serves as a potential springboard for empirical research. For example, a dismantling study using an experimental design in which individuals receiving treatment as usual (TAU) compared to those receiving TAU + MBSR could be tested pre- and post-intervention using a variety of assessments aimed at measuring the various constructs described here to see whether each of these constructs is actually at play in the change process, and in what way each component is related to the others. Studies have begun to find efficacy in the application of mindfulness to OCD specifically (e.g. Fairfax, 2008), but without much attention to the underlying mechanisms of action. Thus, this area of inquiry would likely be fruitful in providing additional information for clinicians, and determining whether MBSR is viable as an adjunctive or primary treatment for some disorders.

Conclusion

The present study explored the existing psychological literature on mindfulness and obsessive-compulsive disorder using Pawson's realist synthesis method. This cyclical, open-ended process allowed the researcher to explore various types of research (empirical, observational, case studies, etc.) in order to develop an inclusive model explaining the potential connections between mindfulness as an intervention and the particular symptoms of OCD that could be targeted. This meta-model includes components of several existing theories, but aims to connect these components using existing data or logical inference. The result is a model that outlines the ways in which mindfulness may be a particularly

salient intervention for OCD, and provides a framework for future research in which such connections can be more systematically examined. The result provides a rationale for exploring this area of research further, and answers the original goal, which was to determine the underlying mechanism of action that may effect change when applying mindfulness to OCD. This growing area of research has been in need of identification of conceptually sound mechanisms that may account for changes produced by these interventions, and this study begins the process of identifying these processes.

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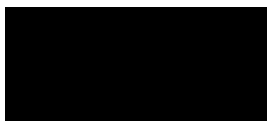
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APPENDIX A: GPS IRB Exemption Notice

PEPPERDINE UNIVERSITY

Graduate & Professional Schools Institutional Review Board

2/17/2014

**Protocol #:** N0214D01**Project Title:** Developing a Model for Understanding Mindfulness as a Potential Intervention for Obsessive Compulsive Disorder

Dear Mr. Rudoy,

Thank you for submitting the Non-Human Subjects Verification Form and supporting documents for your above referenced project. As required by the Code of Federal Regulations for the Protect for Human Subjects (Title 45 Part 46) any activity that is research and involves human subjects requires review by the Graduate and Professional Schools IRB (GPS-IRB).

After review of the Non-Human Subjects Verification Form and supporting documents, GPS IRB has determined that your proposed research activity does not involve human subjects. Human subject is defined as a living individual about whom an investigator (whether professional or student) conducting research obtains (1) data through intervention or interaction with the individual, or (2) identifiable private information. (45 CFR 46102(f))

As you are not obtaining either data through intervention or interaction with living individuals, or identifiable private information, then the research activity does not involve human subjects, therefore GPS IRB review and approval is not required of your above reference research.

We wish you success on your non-human subject research.

Sincerely,

A handwritten signature in cursive script that reads "Thema Bryant-Davis".

Dr. Thema Bryant-Davis
Chair, Graduate and Professional Schools IRB
Pepperdine University

cc: Dr. Lee Kats, Vice Provost for Research and Strategic Initiatives
Mr. Brett Leech, Compliance Attorney
Dr. Stephanie Woo, Faculty Chair

¹ *Research* means a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge. Activities which meet this definition constitute research for purposes of this policy, whether or not they are conducted or supported un-der a program which is considered research for other purposes. (45 CFR 46.102(d)).