Outcomes and Predictors of Treatment in an Intensive Outpatient Program for Pediatric Obsessive-Compulsive Disorder

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Abstract

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Obsessive compulsive disorder (OCD) is a common and often debilitating mental illness in children and adolescents affecting 1.5 to 4% of the pediatric population, with exposure and response prevention (ERP) being the gold standard for treatment (Torp et al., 2015; Walitza et al., 2011). However, there has been little investigation of the impact of ERP on treatment outcomes in intensive outpatient programs (IOP's), particularly for children and adolescents. In addition, there is little consensus regarding factors that may predict treatment success. Through analysis of a clinical sample using a one-group treatment-only design, the current study examined key primary treatment outcomes including OCD severity and time spent in treatment, as well as secondary outcomes including depressive symptomology and family accommodation. In addition, this investigation looked at the relationships between individual and family factors on primary indicators of treatment success. The evidence suggests that this IOP is related to significant reductions in OCD severity, depressive symptomology and family accommodation, and statistically significant relationships between higher levels of family accommodation, higher levels of depression, and poorer treatment outcomes were uncovered. Discussion of the implications along with future directions for research conclude this dissertation.

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Chapter 1: Introduction

Background

Obsessive-compulsive disorder (OCD) was once thought to be a rare illness, however it is now considered to be one of the most common psychological disorders affecting children and adolescents (Stewart et al., 2004; Walitza et al., 2011). It is estimated that between 1.5 and 4% of children and adolescents are affected by this neuropsychiatric disorder, many of whom experience debilitating symptoms in multiple domains of functioning (Barrett, Farrell, Dadds, & Boulter, 2005; Pittenger, Kelmendi, Bloch, Krystal, & Coric, 2005; Torp et al., 2015; Walitza et al., 2011). OCD often begins in childhood or adolescence, with 20% of all affected individuals in the United States showing symptoms prior to age 10, and approximately 80% of adults with the disorder having shown some OCD symptomology prior to age 18 (Keeley, Storch, Merlo, & Geffken, 2008). A bi-modal distribution of symptom onset has been proposed, with a first peak in symptoms at age 11, and a second peak in early adulthood (Delorme et al., 2006).

OCD is considered to be a heterogeneous disorder, with symptom presentation differing significantly between affected individuals (Mataix-Cols, Nakatani, Micalli, & Heyman, 2008; Williams et al., 2010). However, most individuals with an OCD diagnosis experience obsessions (e.g., repeated, intrusive, unwanted thoughts) and compulsions (e.g., ritualized or repetitive thoughts or behaviors aimed at reducing distress or anxiety caused by obsessions; Hojgaard et al., 2015). Obsessions are organized into a variety of categories such as contamination, aggressive, sexual, hoarding, somatic, and magical/superstitious obsessions (Scahill et al., 2007). Compulsions fall into categories such as checking, repeating, saving, ordering, and counting compulsions (Scahill et al., 2007). Individuals may have obsessions and compulsions that fall into one or more of these categories (Pittenger et al., 2005). Understanding the symptom

presentation of a child's or adolescent's OCD is critical to effectively diagnosing and treating this complex and often sneaky disorder, as treatment targets are derived from the constellation of symptoms reported by youth and their caregivers, and it is critical to extinguish as much symptomology as possible to avoid relapse (March, 2007).

Unfortunately, the path to receiving an accurate diagnosis and appropriate treatment for OCD is often challenging, and there is often a long delay before a correct diagnosis is made (Krebs & Heyman, 2010; Pinto, Mancebo, Eisen, Pagano, & Rasmussen, 2005). Walitza et al. (2011) found that treatment typically begins on average two years after the average age of OCD onset in children, and Pinto et al. (2006) reported that from the time symptoms begin to effective diagnosis and treatment is an average of 11 years for adult populations. OCD that is diagnosed in childhood or adolescence is considered to be early-onset and takes a chronic, lifetime course in approximately 40% of cases (Keely, Storch, Merlo & Geffken, 2007; Walitza et al., 2011). With a prevalence rate of 1.5-4% in the pediatric population and approximately 2.5% in the adult population, it becomes clear that early-onset OCD is not always a lifelong, chronic condition. If all children and adolescents with OCD had symptoms that persisted into adulthood, prevalence rates would rise above 2.5% as new cases are diagnosed across the life span (Stewart et al., 2004). In short, a significant portion of children and adolescents diagnosed with OCD prior to age 18 become subsyndromal as adults (Stewart et al., 2004). In addition, Thomsen (1995) found that the only predictor of poor OCD outcomes in adulthood was the severity of OCD in childhood (as defined by the duration of OCD symptoms). By identifying and developing effective treatments for children and adolescents with severe OCD, long-term consequences of the disorder may be avoided.

These optimistic findings make it even more important that children and adolescents receive timely evidence-based treatment for the disorder. Currently, cognitive behavioral therapy (CBT) with exposure and response prevention (ERP) is the only evidence-based therapeutic practice for OCD, with supplemental pharmacological treatment being recommended from the outset in moderate to severe cases, and when behavioral therapies are ineffective (Garcia et al., 2010; NICE, 2005). Even with the implementation of evidence-based practices for OCD, a portion of children and adolescents do not achieve an adequate treatment response. Although numbers vary depending on the study, most trials demonstrate that approximately 20% to 40% of youth have persistent symptomology after exhausting all available treatment options (Keeley et al., 2008). The existence of highly variable outcomes for pediatric OCD begs the question of what interventions, individual and family characteristics, and other factors may be responsible for early remittance of the disease, or its persistence into adulthood.

Problem Identification

Although CBT with ERP is now widely understood to be the gold-standard treatment for pediatric OCD, access to this evidence-based treatment continues to present a significant challenge for families and its effectiveness is not guaranteed (Lewin et al., 2016). Most treatment is offered on an outpatient basis, with residential programs available for children and adolescents with extremely severe symptoms that cannot be managed at home. Many families are unable to travel to receive high quality outpatient services, and residential treatment is often unaffordable, unavailable, not covered by insurance, or deemed by families to be inappropriate for their child (Leonard et al., 2016). Intensive outpatient programs (IOPs) offer an alternative by giving families the option to receive more intensive services more likely to be covered by insurance companies, while still involving families in treatment and allowing temporary relocation to

reduce travel barriers if necessary (Marien, Storch, Geffken, & Murphy, 2009). However, the dearth of clinical outcomes research in the intensive outpatient setting for pediatric populations is problematic. It remains unclear if this setting is effective for treating OCD in children and adolescents, and for whom it is most appropriate.

The highly variable treatment outcomes also indicate a need to better understand what factors may forecast success or failure in all OCD treatment. Not only is more research needed regarding setting, there is little knowledge regarding predictors of OCD treatment outcomes, regardless of setting (i.e., outpatient, IOP, residential). While several potential predictors have been identified in the research literature, few have yielded consistent relationships with OCD treatment outcomes (Torp et al., 2015). Researchers have started to conceptualize predictor variables into four categories: demographic (e.g., age, gender, socioeconomic status), comorbidity with other disorders (e.g., externalizing symptoms, anxiety disorders, depression), symptom presentation (e.g., presence of hoarding, checking compulsions, sexual obsessions), and family factors (e.g., family history of OCD, parental psychopathology, family dysfunction, family accommodation; Garcia et al., 2010; Keeley et al, 2008; Torp et al., 2015).

These predictors have been examined primarily in the context of traditional weekly outpatient therapy, with few studies looking into how predictors are related to outcomes in more intensive settings for children and adolescents with severe baseline OCD symptoms. It is possible that relationships between predictors and outcomes remain the same across settings, however it is virtually unexplored. As noted above, intensive outpatient programs offer a potentially highly effective environment in which to treat more severe cases of OCD, and understanding specifically how certain variables are related to outcomes in this setting compared to outpatient settings is important to developing targeted treatments. Children and adolescents

with more severe OCD symptomology require high-quality, individualized intervention (perhaps even more so than youth with mild to moderate symptoms), as the long-term consequences and functional impairments related to this disorder for those with severe symptoms are often more acute and long-lasting.

Significance of the Current Investigation

Taken together, it becomes clear that more needs to be understood about symptomology, diagnosis, and treatment for children and adolescents with OCD. Few studies have examined the effectiveness of treatment in an intensive outpatient setting, and fewer still have examined what factors predict outcomes in that setting. The current study aims to answer both of these questions and expand the current body of research by investigating a relatively new and promising treatment setting (i.e., IOPs) and exploring several potential predictor variables that can be specifically targeted as part of treatment to ameliorate outcomes for youth. The predictors explored as part of this study include comorbid depression, presence of sexual obsessions, and family accommodation, which represent three of the four predictor categories proposed by Keeley et al. (2008). A demographic predictor was not included due to the relative lack of use for potential treatment modifications, even if found to be significant. This study provides insight on whether treatment in the intensive outpatient setting is associated with significant decreases in OCD symptomology for children and adolescents with severe baseline symptoms, and factors that may predict treatment with the aim of making treatments more targeted, effective, and improving long-term outcomes for children and adolescents with OCD.

Chapter 2: Literature Review

Pediatric Obsessive-Compulsive Disorder

Obsessive-compulsive disorder (OCD) is a chronic anxiety disorder that is characterized by the presence of intrusive, persistent, and unwanted thoughts, images or urges (i.e., obsessions), and/or repetitive or ritualistic behaviors (i.e., compulsions; Hojgaard et al., 2015; Pittenger et al., 2005). These obsessions provoke significant anxiety, fear, disgust, or guilt and compulsions are typically performed in response to these obsessions with the purpose of neutralizing the unpleasant feeling associated with the thought or urge (Hojgaard et al., 2015; Pittenger, 2005). Obsessive thoughts are recognized by the child or adolescent as their own thoughts, however they come into the mind involuntarily and are challenging or feel impossible to dismiss (Walitza et al., 2011). Obsessions originate from the normal thought intrusions that make up the stream of consciousness thought processes (Clark & Radmosky, 2014). However, for children and adolescents with OCD, these otherwise typical intrusive thoughts are misinterpreted as being more significant than just a passing thought, and become difficult to ignore (Clark & Radmosky, 2014; Rachman, 1998; Rachman & De Silva, 1978). Compulsions may be obvious to an outside observer, such as handwashing or checking locks, or they may be more covert, such as repeating numbers or phrases internally (i.e., mental rituals; Boschen, Drummond, Pillay, & Morton, 2009). Compulsions can also include avoiding situations or stimuli that may trigger anxiety (Clark & Radomsky, 2014). These obsessions and compulsions are distressing, time-consuming and can interfere with peer and family relationships, academic functioning, and household routines in children and adolescents (Farrell, Waters, Milliner, & Ollendick, 2012; Keeley et al., 2008). Although the DSM-V states that individuals do not need to display both obsessions and compulsions to meet criteria for an OCD diagnosis, only 2% of

individuals with an OCD diagnosis report experiencing only obsessions with no compulsions (Williams et al., 2011). It has been suggested that patients thought to have this "purely obsessional" form of OCD may be experiencing primarily mental rituals that are not captured accurately in factor analysis studies, or well understood in clinical interviews (Williams et al., 2011). Although adults must engage in some form of resistance to these obsessions and compulsions to receive a diagnosis, children and adolescents do not have to show any insight into the inappropriate nature of their obsessions or compulsions, or attempt to resist them (Walitza et al., 2011).

For children and adolescents diagnosed with OCD, comorbidity with other psychiatric disorders is common. One review found that between 68% and 100% of children and adolescents with OCD present with a secondary diagnosis (Walitza et al., 2011). Another study found 86% of youth had a secondary comorbid diagnosis, and 74% presented with a third psychiatric condition (Farrell et al., 2012). This high degree of comorbidity is another factor that makes pediatric OCD complex, debilitating, and often difficult to treat (Farrell et al., 2012; Krebs & Heyman, 2010; Storch et al., 2008). A review of several studies found the most common comorbid diagnoses include another anxiety disorder (e.g., social anxiety disorder, generalized anxiety disorder; 26-70%), depression (10-73%), tic disorders (17-59%), attention deficit/hyperactivity disorders (10-50%), and behavioral disorders (e.g., oppositional defiant disorder; 10-57%; Farrell et al., 2012). Other less common, but frequently co-occurring disorders include developmental disorders (e.g., autism spectrum disorder), eating disorders, body dysmorphia, and trichotillomania (Farrell et al., 2012). In OCD, comorbidity should be assumed, and the understanding and successful treatment of individuals with OCD must take this into account.

Etiology

Despite a considerable amount of research, the etiology of pediatric OCD is not well understood (Krebs & Heyman, 2014). Several factors are thought to contribute to the development of OCD symptoms, including genetic, neurological, and environmental. Data from twin and family studies show that genetic factors explain between 45% and 65% of the variance of OCD in children and adolescents, which is significantly higher than heritability rates for other anxiety and depressive disorders (Elay et al., 2003; Van Grootheest et al., 2005). In addition, the heritability rates for pediatric onset OCD appear to higher than those for adult onset OCD, making the case that OCD that develops in childhood or adolescence may be a distinct sub-type of the disorder (Van Grootheest et al., 2005). Genome-wide association studies (GWAS) and candidate gene studies show that OCD is polygenic, with many genes each exerting a relatively small influence on the development of the disorder (Pauls et al., 2014). Specifically, genes related to serotonin, dopamine, and glutamate transport are most commonly implicated in the development of OCD symptomology (Pauls et al., 2014).

Neuropsychological explanations for the development of OCD implicate the orbitofrontal cortex. Functional neuroimaging studies have shown increased activation in this area of the brain in both individuals with OCD, as well as their unaffected family members who are at genetic risk for OCD (Chamberlain et al., 2008). More importantly, studies have found that behavioral treatment alone (ERP) can reduce activity in the orbitofrontal cortex and lead to a decrease in potentially debilitating OCD symptoms (Pauls et al., 2014). This finding that ERP can change brain function in children and adolescents with OCD has been important for developing and implementing effective interventions.

Environmental factors are also known to play a critical role in the development of OCD, however with few studies and inconsistent results, the specific environmental factors are not well understood (Krebs & Heyman, 2014). Predictors have included social isolation, physical abuse, negative emotionality, and family dysfunction; however, studies attempting to replicate these types of findings often fail to do so and find other predictors in their stead (e.g., depressive disorders; Grisham et al., 2011).

Finally, some clinical evidence from the past several decades suggests some children experience the sudden onset of OCD and other neurological symptoms after contracting streptococcal infections (Marcello, 2013). The term PANS (pediatric acute-onset neuropsychiatric syndrome) is used to describe the subset of children who develop OCD symptoms after a strep infection (Marcello, 2013). It is currently unknown why PANS occurs; however, the symptom presentation of children with PANS differs from other children with OCD in that they typically have more widespread neurological challenges such as impulsivity and fine motor difficulties (Krebs & Heyman, 2014). Fortunately, children with PANS and related OCD have been found to respond to the same behavioral and pharmacological treatments as other children and adolescents with pediatric OCD (Krebs & Heyman, 2014).

Pediatric OCD Symptomology and Clinical Features

OCD encompasses a broad array of symptoms that fall into a variety of categories. Obsessions typically fall into the following categories: contamination, aggressive, sexual, hoarding/saving, magical thoughts/superstitious, somatic, religious/scrupulosity and miscellaneous, and compulsions into: washing/cleaning, checking, repeating, counting, ordering/arranging, hoarding/saving, games/superstitious, rituals involving others, and miscellaneous (American Psychiatric Association, 2013; Scahill et al., 2010; Pittenger, 2005).

Contamination. Worries about contamination center around the sense of being unclean, dirty or fears about becoming ill. They can include body fluids such as urine, feces, blood, and saliva, becoming sick or making others sick, environmental or household contaminants (e.g., radiation, bleach), dirt, sticky substances, animals, and insects. Children or adolescents may also be uncomfortable or anxious about the way certain contaminants might feel. Compulsions used to neutralize or relieve the anxiety caused by these obsessions may include ritualized or excessive handwashing, showering, grooming, toileting, toothbrushing, and cleaning of personal items (e.g., sheets, books, clothing; Clark & Rodomsky, 2014; Scahill et al., 2007).

Aggressive. Aggressive obsessions are a relatively broad category of an array of fears related to losing control and harming oneself or others. It is important to note that these thoughts are egodystonic—meaning the person having them does not identify with the urges and is distressed by the intrusive thoughts (Pittenger et al., 2005). Aggressive obsessions can include fear of violent or horrific images, blurting out insults, harming oneself (e.g., suicide), harming another person physically or emotionally on purpose or due to carelessness (e.g., saying something offensive, stabbing a family member), being responsible for something terrible happening (e.g., starting a fire, a home break-in), or stealing (Clark & Rodomsky, 2014; Scahill et al., 2007). Compulsions related to these harm-related obsessions may include checking for lack of harm to self or to someone else (e.g., asking for reassurance that everyone is ok, or that no one is upset), checking that nothing bad happened (e.g., driving back home several times to ensure it is not on fire), or avoiding all scary movies or television (Clark & Rodomsky, 2014; Scahill et al., 2007).

Sexual. Sexual obsessions are frequently sources of shame and are therefore hidden by the child or adolescent who is experiencing them, making them particularly challenging to

identify and treat (Gordon, 2002). Sexual obsessions can include the fear of sexual assault by another person, fear of sexually assaulting others, excessive worry regarding sexuality, having unwanted or perverse sexual images or thoughts, and fears regarding pedophilia or incest (Clark & Rodomsky, 2014; Scahill et al., 2007). Children and adolescents who experience obsessions in this category may engage in similar compulsions as those who struggle with aggressive obsessions. Compulsions might look like checking they have not harmed or assaulted anyone, seeking reassurance they have not been harmed, checking body parts, engaging in excessive internet research, or mental rituals such as praying or replaying events to prevent harm or in an attempt to reassure oneself that nothing terrible happened (Wilhelm & Skeketee, 2006). Individuals may also avoid even typical or age-appropriate sexual content or activity due to their sexual obsessions (Gordon, 2002).

Hoarding/Saving. Hoarding and saving occurs when children and adolescents are afraid of losing items due to perceived value, importance, or having memories attached (Clark & Rodomsky, 2014). They may have difficulty throwing things away, have unusually large collections, retain items from infancy or very early childhood (e.g., baby books, clothes, toys, decorations) or save unimportant items (e.g., every receipt, candy wrappers; Scahill et al., 2007).

Magical/Superstitious. Some children and adolescents with OCD may be excessively superstitious and have lucky or unlucky numbers (e.g., only even numbers are safe), colors, or words. Individuals with these superstitious worries may engage in compulsions or repeating rituals such as only doing tasks in multiples of their lucky number, avoiding “bad” numbers, not wearing or touching unsafe colors, mental rituals regarding lucky numbers or words, and counting compulsions (Wilhelm & Skeketee, 2006). It is important to distinguish these behaviors from age-appropriate magical or imaginative play (Scahill et al., 2007). Children engaging in

play likely would not report any distress or anxiety if asked to stop the behavior, however those with a true compulsion would report distress.

Somatic. Somatic obsessions occur when an individual is overly worried about contracting a disease or illness that is not contamination related (e.g., cancer), overly focused on certain bodily sensations (e.g., mild headaches or stomach aches) or worried about the way a certain body part looks (i.e., dysmorphophobia). Compulsions related to these obsessions often include checking on physical condition, seeking reassurance by going to the doctor or conducting internet research, or checking their reflection in the mirror excessively or avoiding their reflection in the case of dysmorphophobia.

Religious/Scrupulosity. Religious obsessions center around the fear of offending God; however, scrupulosity includes broader set of worries. Scrupulosity includes excessive worries about right and wrong or morality, strictly following rules that others may disregard, or feeling excessively guilty when any rule is broken or a white lie is told (Scahill et al., 2007). Children and adolescents may cope with these obsessions by apologizing excessively, confessing their "wrongdoings," engaging in mental rituals such as praying, seeking reassurance from others that they are a good person, or checking that nothing terrible has happened (Wilhelm & Skeketee, 2006).

Miscellaneous/Other. Not all obsessions and compulsions are easily categorized, and many fall into a miscellaneous category. Behaviors such as needing to touch, tap, or rub surfaces, rituals involving blinking or staring, trichotillomania (i.e., hair-pulling), dermatillomania (i.e., skin-picking), ritualized eating behaviors and eating a narrow range of foods are often observed OCD-related compulsions. Miscellaneous obsessions can include the fear of embarrassment or not saying the right thing, intrusive non-violent images, sounds, words, or music (Scahill et al.,

2007). Even with inclusion of these miscellaneous obsessions and compulsions, no diagnostic tool includes a complete list of possible symptoms. It is important to probe children, adolescents, and their caregivers for other thoughts or behaviors that may be related to OCD.

Perfectionism. Although not a distinct category on the Children's Yale-Brown Obsessive-Compulsive Scale (CYBOCS; Scahill, 2007), which is the gold standard for pediatric OCD diagnosis, perfectionism is a common trait in children and adolescents with OCD and often has a severe impact on multiple domains of functioning (Frost, Novara, & Rheaume, 2002). Individuals experiencing high levels of perfectionism-related obsessions may experience things "not feeling just right," worries about schoolwork, concern with needing to know or remember information, or concern with things being even or exact (Clark & Rodomsky, 2014; Scahill et al., 2007). Compulsions used to relieve the distress associated with these worries might include repeating activities until it "feels right" (e.g., tuning on or off lights, goodnight routine), rereading or rewriting, excessively checking they did not make a mistake on homework or tests, or evening up or arranging things in a specific manner (Scahill et al., 2007; Wilhelm & Skeketee, 2006). In severe cases, perfectionism related obsessions often interfere with academic functioning and can lead to failure to attend or be successful in a typical school setting (Frost et al., 2002).

Doubt. Like perfectionism, doubt is not a defined category on the CYBOCS, however it is known characteristic of OCD. Doubt in the context of OCD has existed since the 19th century, with William James (1890) explaining the disorder as a "pathological excess of doubt," and Janet (1903) conceptualizing compulsions as a way for patients to compensate for a lack of certainty. The need to seek reassurance, engage in excessive checking behaviors, struggle with making decisions, or engage in perfectionistic tendencies may come from the core feeling of doubt, or

the inability to be 100% certain if for example, a choice is correct or if a family member is safe (Samuels et al., 2017). Individuals with OCD may ask themselves questions such as "Am I sure I turned off the oven?" or "How do I know for sure that I am not suicidal?" This lack of conviction in one's ability to experience the feeling of being "sure enough" about something is still considered to be an important feature of OCD in terms of successful diagnosis and treatment (Samuels et al., 2017).

Symptom dimensions. Based on the symptoms described above, it seems unsurprising that OCD is considered to be a clinically heterogeneous disorder (Bloch, Landeros-Weisenberger, Rosario, Pittenger, & Leckman, 2008; Mataix-Cols, Nakatani, Micalli, & Heyman, 2008; Williams et al., 2010). In other words, it is possible for two different children or adolescents to both have a diagnosis of OCD and share no overlapping symptoms. One method by which researchers have worked to better understand the disorder is by identifying clusters of obsessive and compulsive symptoms that tend to occur together (i.e., symptom dimensions; Bloch et. al, 2008). Although not all studies have agreed on the number of dimensions or factors, a meta-analysis conducted by Bloch et al. in 2008 identified four symptom dimensions that explain 79% of the variance in individuals with OCD across the lifespan: Symmetry, forbidden thoughts, cleaning, and hoarding. When limited to children and adolescents only, the same four factors explained 81.7% of the variance (Bloch et al., 2008). The symmetry dimension includes children and adolescents with obsessions related to symmetry and compulsions related to ordering/arranging, counting, and repeating. The forbidden thoughts dimension includes individuals with sexual, aggressive, and religious/scrupulosity obsessions. The cleaning dimension includes individuals with contamination obsessions (e.g., dirt, germs, illness), and the hoarding dimension includes children and adolescents with worries about losing items and being

unable to discard them (e.g., hoarding/saving obsessions and compulsions; Bloch et al., 2008). Several researchers have argued that these four symptoms dimensions should be included as specifiers in the DSM-V diagnostic formulation of OCD (Bloch et al., 2008; Mataix-Cols et al., 2007). Including these specifiers could aid in the clinical interviewing process, as well as in creating a more specific and accurate diagnosis for current and future clinicians to develop treatment plans.

Course of OCD

While a significant amount of research has been conducted on the course of OCD in adult populations, far less is known about how the disorder affects child and adolescent patients over the life course (Mancebo et al., 2014). Only 16 studies were published on the topic between 1950 and 2004 (Stewart et al., 2004). Studies of adults consistently show that OCD is chronic and lifelong, however studies in pediatric populations demonstrate a more episodic course (Mancebo et al., 2014). Depending on methodology, treatment follow-up studies of pediatric OCD show remission rates of between 32% and 77%. Bloch et al. (2009) found that 44% of children treated with CBT with ERP and selective serotonin reuptake inhibitors (SSRIs) were in full remission (CYBOCS score < 8) when re-interviewed an average of 9 years later. Micalli et al. (2010) found that 55% of individuals treated at an OCD specialty clinic over a period of 9 years had no OCD symptoms at follow-up an average of 5 years later. The main predictors of persistent OCD were the amount of time the participant struggled with OCD during childhood (i.e., duration of illness; Micalli et al., 2010). Mancebo et. al. (2014) conducted a 3-year follow-up and found that 53% of child and adolescent participants had achieved partial or full remission (i.e., no longer met criteria for OCD diagnosis for 8 weeks), and 79% of those who achieved a remission sustained it for the duration of the study, approximately 2 years. For comparison, only 34% of adults in the

same study achieved remission (Mancebo et al., 2014). Their findings indicated that better functioning at the beginning of treatment as well as latency to treatment (i.e., less time between onset of symptoms and treatment) predicted better long-term outcomes.

Results from studies examining the course of pediatric OCD are promising. Unlike adults, children and adolescents who are diagnosed and treated in childhood are more likely to achieve remission or have an episodic, as opposed to chronic, course of the disease. In addition, results suggest that swift and effective treatment as soon as possible after the onset of symptoms predicts the best outcomes (Mancebo et al., 2014; Micalli et al., 2010). Effective early intervention on OCD symptomology clearly presents a benefit to the individual, the family, and society—lowering the burden of the disorder on all parties. This, in turn, makes it of utmost importance that we better understand the most efficacious ways to intervene with children and their families, as well as what factors may hinder, or help, during treatment.

Evidence Based Treatments for OCD

Throughout the years, a variety of treatments and therapeutic approaches have been used to treat pediatric and adult OCD (Krebs & Heyman, 2008). Most of the treatments however, have not been empirically validated. Psychodynamic psychotherapy, psychosurgery, acceptance and commitment therapy (ACT), and modular techniques such as progressive muscle relaxation have all been utilized, however with no proven effectiveness (Krebs & Heyman, 2008). In 2005, the National Institute for Health and Clinical Excellence (NICE) published guidelines for the treatment of pediatric OCD based on existing evidence (NICE, 2005). The NICE concluded that there are two treatments for OCD with established efficacy: cognitive behavioral therapy (CBT) with exposure and response prevention (ERP), and selective serotonin reuptake inhibitors

(SSRIs). Since 2005, no changes have been made to this guideline and continuing evidence indicates this line of treatment remains the gold standard (e.g., Garcia et al., 2010).

CBT with ERP

The efficacy of CBT with ERP for children and adolescents with OCD has been explored in several open trials, as well as a limited number of randomized control trials (Barrett, Healy-Farrell, & March, 2004; Bolton & Perrin, 2008; Franklin et al., 2011; Garcia et al., 2010). The results of these trials consistently show that CBT with ERP is associated with significant symptom reduction, with 45-65% showing symptom reduction and 40-88% achieving remission. As discussed previously, many of these gains have been shown to last for several years and even into adulthood (Mancebo et al., 2014; Micalli et al., 2010). CBT with ERP that follows a semi-standardized protocol is recommended as the first-line treatment against mild to moderate OCD (e.g., baseline CYBOCS score between 8-24; Krebs & Heyman, 2010). Evidence-based protocols that outline CBT with ERP for OCD include three treatment phases: psychoeducation, exposure and response prevention tasks, and relapse prevention. One course of this treatment in the outpatient setting typically takes place over 12-20 weeks (Krebs & Heyman, 2010).

The psychoeducation phase provides a rationale for treatment, and helps children and adolescents understand their OCD, how anxiety works to maintain obsessions and compulsions, and how ERP works to break that cycle (Krebs & Heyman, 2014). The ERP portion of OCD treatment involves confronting a feared situation or stimulus (e.g., touching a contaminated person, being responsible for a fire) and then resisting the urge to perform the compulsion typically used to neutralize the anxiety, fear, or disgust (e.g., handwashing, not returning home to check appliances are off; Olatunji, Davis, Powers, & Smits, 2012). Exposures can be imaginal in nature (e.g., writing a “feared fantasy”) or in-vivo (e.g., actually tackling the feared situation),

and are often implemented gradually in order to avoid flooding, which can lead to panic and be counterproductive (O'Connolly, 2015). Eventually, the brain and body habituate to the feared situation or stimuli, and treatment that was once anxiety provoking becomes a relatively easy task (Krebs & Heyman, 2014). By engaging in the same feared task many times, the child or adolescent realizes that while they are initially anxious, their anxiety will diminish over time without carrying out a compulsion or ritual (Krebs & Heyman, 2014). Because initial exposure trials can be aversive and patients are often skeptical as to whether the treatment will work, less distressing fears are often targeted first before moving to more challenging exposure trials (Krebs & Heyman, 2014).

Recently, researchers have begun to explore modified versions of the typical habituation model which is based on emotion processing theory and emphasizes the reduction of distress both within and between sessions as the primary mode by which treatment is successful (Foa et. al., 2006; McGuire & Storch, 2019). While still employing a base of ERP, researchers are finding evidence for an inhibitory learning approach that may lead to more lasting and robust outcomes (McGuire & Storch, 2019). Inhibitory learning uses strategies such as more varied exposures (e.g., touching many different dirty surfaces as opposed to just one), and straying from the typical stepwise "fear hierarchy" by writing down all of patients' fears regarding contamination, for example, and then randomly drawing one out of a hat for an exposure trial without regard for whether it would produce a "level 1" amount of anxiety or a "level 10" (McGuire & Storch, 2019). This method is thought to be more beneficial for long-term outcomes, as patients will invariably encounter highly distressing fears or situations in the real world that they will not have the opportunity to habituate to, and this modification to ERP allows

them to have the experience of tolerating extremely high levels of anxiety (McGuire & Storch, 2019).

Exposure and response prevention (ERP) is known to be the active ingredient in CBT for OCD, and sessions should consist primarily of engaging in exposure trials and planning for at-home exposures to be completed between sessions (Foa et al., 1984; Griest et al., 2003; Krebs & Heyman, 2014; NICE, 2005). However, some evidence suggests that supplementing ERP with cognitive techniques may be appropriate for some children and adolescents as well (Krebs & Heyman, 2014; Salkovskis et al., 2008; Williams et al., 2002). Cognitive techniques may include working with children and adolescents to realistically appraise the risk that their obsessions present, and then to challenge their erroneous beliefs (Krebs & Heyman, 2014). These cognitive strategies can also focus on modifying dysfunctional beliefs about the existence and importance of intrusive thoughts (Olatunji et al., 2012). The challenge of relying primarily on cognitive techniques when treating OCD lies in one of the characteristic features of the disorder itself—doubt (Samuels et al., 2017). It becomes challenging to reason with an individual who may rarely feel certain about their thoughts or perceptions (e.g., "How can I be sure that I don't want to harm my brother?"). Of course, there is no way to be 100% sure of anything, making it difficult to convince individuals with OCD that their irrational thoughts are in fact, irrational. Used in conjunction with ERP, cognitive techniques may be helpful, however used on their own, there is little evidence that they are effective tools for treating OCD (Krebs & Heyman, 2014).

Finally, an important factor to consider when treating children and adolescents with OCD is the extent to which family members should be directly involved in treatment. Termed "family-inclusive treatment" (FIT), this departure from individual treatment has garnered some attention and demonstrated effectiveness in pediatric OCD populations (Thompson-Hollands, Edson,

Tompson, & Comer, 2014). Because OCD often revolves around activities of daily living (e.g., washing, eating, grooming), it can be especially disruptive to functioning at home (Marien, Storch, Geffken, & Murphy, 2009; Thompson-Hollands et al., 2014). Family members often inadvertently accommodate their child's anxiety in an attempt to smooth interactions and ease distress, and greater family accommodation has been related to more severe OCD symptoms (Marien et al., 2009). This often has deleterious effects on the long-term functioning of children and adolescents with OCD by legitimizing obsessional beliefs and further engraining the need to complete rituals (Marien et al., 2009). In the early stages of treatment, it is often helpful and even critical that a family member be present during at-home exposures to ensure they are completed with fidelity and to provide encouragement or coaching (Marien et al., 2009). Children and adolescents often find ways to subtly avoid distress brought on by exposure (e.g., averting eyes downward while watching an anxiety provoking video), and family members can monitor to ensure the child is not defeating the purpose of the exposure trial.

Family-inclusive treatment protocols vary considerably in terms of inclusion of family members. Some approaches only include the family in the psychoeducation portion of treatment (Bolton & Perrin, 2008), whereas others include families throughout treatment and provide skills training, as well as therapy around family interactions and dynamics in relation to OCD (Freeman et al., 2008; Marien et al., 2009; Peris & Piacentini, 2013). A meta-analysis of 29 studies of family-inclusive CBT treatment for OCD conducted by Thompson-Hollands et al. (2014) found that family-intensive treatments are not only as effective as individual CBT with ERP, they likely result in enhanced outcomes (d = 1.68, compared to d = 0.99 to 1.45 for meta-analyses of OCD treatments that have not focused on family involvement). Families are highly involved and impacted by the OCD symptoms in their children and adolescents, and the findings

of this meta-analysis as well as the studies that came before it highlight the importance of incorporating the family in the treatment of pediatric OCD (Thompson-Holland et al., 2014). With the knowledge that swift and early intervention on OCD symptoms often yields the best long-term outcomes for youth, it is critical to capitalize on any elements that may increase the effectiveness of treatment.

Pharmacological Treatments

Pharmacological interventions, specifically selective serotonin re-uptake inhibitors (SSRIs), are considered to be the only other evidence-based treatment for pediatric OCD at this time (NICE, 2005). For children and adolescents with OCD in the severe or extremely severe range (i.e., scores between 24-40 on the CYBOCS) it is recommended to begin medication alongside behavioral treatment (Garcia et al, 2004; NICE, 2005). SSRIs should be considered the next line of treatment for all children and adolescents regardless of severity whose OCD symptoms did not respond to a typical course (12-20 weeks) of CBT with ERP. A range of SSRIs have been found to be effective, and if one is not tolerated or does not improve symptoms, a different one should be tried.

The pediatric obsessive compulsive treatment study (POTS) was an RCT that examined the outcomes of children and adolescents randomly assigned to receive either sertraline (an SSRI), CBT with ERP, sertraline and CBT with ERP (combination), or a placebo pill. Garcia and team (2010) found the combined treatment (sertraline and CBT with ERP treatment) to be the most efficacious compared to CBT with ERP alone ($p = 0.008$), sertraline alone ($p = 0.006$), and placebo ($p < 0.001$). The team also found that CBT with ERP alone and sertraline alone did not differ from each other ($p = 0.80$), and that both CBT with ERP and sertraline alone were superior than the placebo pill ($p = 0.003$ and $p = 0.007$; Garcia et al., 2010). Although CBT with ERP and

combined treatment are preferred, there is a dearth of clinicians who are equipped to provide CBT with ERP. There continues to be a lack of expertise in treating OCD and many families seeking CBT with ERP will not be able to find a provider, making pharmacological treatment with SSRIs the most widely available treatment for pediatric OCD at this time (Franklin et al., 2012).

In addition to SSRIs, there are additional pharmacological treatments that have shown some effectiveness and may be recommended for children and adolescents who do not respond to a course of CBT with ERP and trials of at least two SSRIs. The tricyclic drug clomipramine has been shown to be a useful medication to attempt in SSRI resistant cases, and augmenting an SSRI with a low dose of risperidone demonstrated symptom improvement in 50% of previous non-responders, however these medications are generally less well-tolerated (Masi, Pfanner, & Brovedani, 2013). A randomized control trial examining the effects of risperidone augmentation and high-quality ERP demonstrated that the ERP treatment led to greater symptom reductions than the medication augmentation (Simpson et al., 2013).

When determining a course of treatment for children and adolescents with OCD, it is important to note that high-quality CBT with ERP is effective and well-tolerated. Unfortunately, the majority of families with children struggling with OCD face geographical barriers or a shortage of adequately trained OCD therapists in their area (Schwartz et al., 2013). The lack of access to high quality ERP is problematic, and pharmacological treatment options are acceptable in isolation if no psychological or behavioral treatment is available.

OCD Treatment Settings

The vast majority of studies examining treatment effectiveness of pediatric OCD take place in the outpatient setting. This is not, however, the only setting in which OCD treatment can

or should take place. In addition to traditional weekly outpatient therapy, residential and intensive outpatient settings have gathered attention as potential options for children and adolescents who do not respond to once per week treatment.

Outpatient. At this time, outpatient CBT with ERP is a first-line behavioral treatment for OCD, regardless of severity. Outpatient treatment may take place at a community mental health clinic, counseling center, private practice, or hospital. Sessions typically take place once per week, for an average of 50 minutes (Krebs & Heyman, 2014). For the majority of children and adolescents, this level of intensity in combination with medication, if appropriate, produces at least a moderate reduction in symptoms (Brennan et al., 2014). However, for some children and adolescents, weekly outpatient treatment produces little relief, and more intensive treatment approaches are required (Brennan et al., 2014). This type of OCD is known as treatment-resistant, where patients display an inadequate response to treatment, or as treatment-refractory, where patients fail to respond to treatment, and it is not altogether uncommon (Krebs & Heyman, 2014). One meta-analysis recently found that 27% of children and adolescents receiving outpatient treatment failed to show clinically significant improvement following ERP and pharmacological treatment (Bjorgvinsson et al., 2008). When a child or adolescent fails to make adequate improvement after trialing at least two SSRIs and two full courses of good CBT with ERP, it is recommended to intensify the level of care (Brennan, 2014).

Residential/intensive inpatient. One alternative to outpatient treatment is a residential or intensive inpatient setting. Treatment refractory and treatment resistant OCD make up the majority of all acute psychiatric OCD-related hospitalizations and are responsible for a large portion of the functional and social impairments caused by the disorder, making it critical to find effective interventions for this portion of the OCD population (Ruscio, Stein, Chiu, & Kessler,

2010). Treatment protocols typically resemble those of outpatient treatment: exposure and response prevention, cognitive interventions, and medication management with a psychiatrist (Bjorgvinsson et al., 2008; Leonard et al., 2016). Residing in the treatment setting allows for constant staff monitoring to extinguish rituals and help with treatment targets, and removal from family members ensures there is no accommodation of symptoms (Leonard et al., 2016). Other benefits of residential treatment for youth with severe treatment-refractory OCD include the ability to address comorbid conditions and interact with peers with similar symptoms (Leonard et al., 2016).

Few studies have been conducted on the effectiveness of treatment of individuals with OCD in a residential setting, and even fewer have examined outcomes for children and adolescents in particular (Leonard et al., 2016). Bjorgvinsson et al. (2008) found that CYBOCS scores decreased significantly from pretreatment to posttreatment and 70% of their child/adolescent sample demonstrated a reliable change. Leonard et al. (2016) conducted an 8-year study of 172 children and adolescents with a primary diagnosis OCD admitted for the first time to an OCD specific residential treatment program. Ninety-two percent of the sample had at least two diagnoses (i.e., one comorbid condition), and 44% had three or more diagnoses (Leonard et al., 2016). Participants typically presented with complex treatment histories, and all had received outpatient pharmacological treatment prior to admission, with 90% having received a course of CBT. Leonard and team found that 79% of participants experienced some symptom response and 42% had mild to minimal symptoms at discharge. A small subsample of the participants (n = 20) provided follow-up data 18 months after treatment, and results indicated that CYBOCS scores did not change significantly from post-treatment to follow-up. Of those 20 participants, 15 maintained an excellent response (Leonard et al., 2016).

Despite the reported success of intensive inpatient and residential treatment for children and adolescents, downsides to this setting should not be ignored. While many inpatient settings exist, not all are equipped to specifically treat individuals with OCD because they typically allow for a brief stay and there is lack of specialty providers (Leonard et al., 2016). Few hospitals in the United States can provide this level of care for children and adolescents with OCD. Two well-known hospitals are Rogers Memorial Hospital which primarily has locations in the midwestern region of the United States and McLean Hospital in Boston, both of which typically have long waitlists (Marien et al., 2009). Private settings exist as well, however access continues to be limited due to the financial costs associated with treatment (IOCDF, 2018).

In addition, families have been shown to be important in the treatment of youth with OCD and involving them in treatment can enhance outcomes (Krebs & Heyman, 2014). For children and adolescents in residential treatment settings, parents are not present, making it challenging to work on family dynamics or parental accommodation—issues thought to effect OCD outcomes—that youth will invariably face upon discharge (Garcia et al., 2010; Storch et al., 2007). Residential treatment is costly, and youth and families may not be given all the tools they need to maintain outcomes after discharge. Although Leonard et al. (2016) demonstrated promising long-term outcomes, the follow-up sample was quite small. As discussed previously, it is critical to treat children and adolescents with OCD effectively in order to prevent a potential long-term and chronic course of the disorder (Mancebo et al., 2014; Micalli et al., 2011). Providing evidence-based therapy in the most appropriate setting is an important component of optimizing treatment, and while residential care is likely the appropriate treatment setting for some, it is no longer the only alternative to weekly outpatient therapy.

Intensive outpatient programs. Intensive outpatient programs provide families with another potential treatment option for cases of moderate to severe or treatment-resistant OCD. Intensive outpatient programs can yield reduced symptomology and decrease functional impairment in a faster period of time, and provide more coaching and oversight compared to weekly outpatient treatment (Lewin et al., 2005; Marien et al., 2009). These programs also have the benefit of involving caregivers in treatment, as well as the opportunity to practice exposures in the home setting. Treatment in the residential setting may maximize learning of therapeutic ideas and concepts, however those concepts and exposure trials may not generalize easily to the home setting after discharge (Lewin et al., 2005, Marien et al., 2009; Storch et al., 2007).

Intensive outpatient programs (IOPs) have the potential to address numerous other limitations and barriers related to more standard treatment modalities (Marien et al., 2009). As discussed previously, there is a general lack of providers who are willing or able to provide CBT with ERP for pediatric OCD. Many families who have children with OCD live in areas where there are no providers in close proximity to allow for travel to weekly outpatient therapy sessions (Marien et al., 2009). However, in an intensive outpatient treatment format, children and their families can temporarily re-locate to an area for a short period of time relative to traditional outpatient therapy. While this course of action is not free of cost, it is typically less of a financial burden than residential treatment or ineffective weekly outpatient treatment, and the overall cost of sustained impairment due to OCD is arguably much greater than the cost of intensive outpatient treatment (Marien et al., 2009). In addition, insurance companies often prefer to pay for outpatient services over funding residential treatment (Marien et al., 2009). Intensive outpatient treatment is also typically better tolerated by families than inpatient treatment.

Families may view residential treatment as overly invasive and may continue with inadequate interventions over sending their child or adolescent to an unfamiliar facility (Marien et al., 2009).

As noted previously, OCD often results in social and academic impairment, particularly when it is severe. Children and adolescents are often unable to attend school, and important social development and relationships may suffer (Marien et al., 2009; Storch et al., 2007). Intensive outpatient treatment formats often allow for quicker improvement in symptomology than weekly outpatient therapy, restoring functionality and allowing children to return to school full-time and re-engage with peers (Marien et al., 2009). Participating in daily (or almost daily) treatment allows families to focus their attention on treatment and make it a priority. Intensive outpatient treatment also makes it more challenging for children and adolescents to avoid or escape treatment targets and exposure homework due to increased accountability on a daily basis (Marien et al., 2009). These frequent treatment sessions allow for close monitoring of compliance as well as any family dynamics that may be deleterious to treatment (Storch et al., 2007). While children may be reluctant at first to engage in exposures because they are unavoidably aversive, they may more quickly buy-in due to the relatively fast progress and noticeable improvement in symptoms (Marien et al., 2009).

While support for IOPs exist in adult populations (Abromowitz et al., 2003; Foa et al., 2005), few studies have conducted rigorous examinations of this model for pediatric patients (Storch et al., 2007). With scant research on this setting and no standard protocol, there is variation in the delivery and definition of intensive outpatient CBT with ERP for OCD (Storch et al., 2007). Whiteside, Brown, and Abromowitz (2008) conducted an intensive 5-day treatment protocol where intervention occurred all day for five straight days. Other researchers have examined treatment protocols that are longer in duration (e.g., 4-12 weeks), with fewer hours per

day engaged in treatment (e.g., 90-180 minutes; Marien et al. 2009; Olino et al., 2011; Rudy et al., 2014; Storch et al., 2007, Storch et al., 2010). Thus far, the evidence suggests that these intensive outpatient treatments are related to reductions in OCD symptomology in pediatric patients, however only one randomized control trial has explored the efficacy of this relatively new treatment.

Storch et al. (2007) examined the efficacy of weekly versus intensive CBT with ERP for children and adolescents with moderate to severe OCD (i.e., baseline CYBOCS score > 16). Children were assigned randomly to a condition, and 24 of the 40 participants were using pharmacological intervention as well. Overall, results indicated that CBT with ERP delivered in an intensive format was as effective as traditional weekly outpatient therapy, with some advantages. At post-treatment, 75% of children and adolescents in the intensive outpatient condition met criteria for remission, whereas 50% in the weekly outpatient condition met criteria for remission (Storch et al., 2007). Ninety percent of participants in the intensive treatment condition, and 65% in the weekly outpatient condition were considered "treatment responders." Finally, effect sizes for CYBOCS change scores indicated clear improvements regardless of condition; however, the effect size for youths in the intensive outpatient condition was $d = 2.62$ compared to $d = 1.73$ for the weekly treatment condition. These differences became less marked, however, at a 3-month follow-up, with effect sizes of $d = 2.33$ and $d = 2.20$, respectively (Storch et al., 2007). These results at follow-up indicate that it is likely critical for children and adolescents to continue with OCD booster sessions or weekly outpatient treatment, if available, to maintain the expediated results seen in intensive outpatient formats (Storch et al., 2007). It is possible that the intense exposure practice over a short period of time in intensive treatment may work to boost immediate results. However, the lack of longer-term intervals may decrease

generalizability and retention of skills over time, leading to similar end-points for weekly versus intensive treatment if no follow-up intervention is administered (Abromowitz et al., 2003; Storch et al., 2007).

Olino et al. (2011) conducted a naturalistic study of a group-based intensive outpatient program ($N = 41$) and found robust treatment effects, gathering evidence that group-based CBT delivered in an intensive outpatient format was effective in reducing OCD symptom severity in children aged 6-17 after an average of 12 weeks of treatment. Rudy et al.'s (2014) results from three clinical samples of youth participating in intensive outpatient treatment ($N = 81$), found that 88.5% were considered treatment responders, and 62.8% achieved remission. Their results provide evidence that intensive outpatient treatment may be a good option for children and adolescents without access to weekly outpatient treatment who have not responded adequately to weekly treatment, who have moderate to severe symptom severity, and for those who would like to see symptom improvement in a shorter period of time (Rudy et al., 2014).

Despite the growing evidence for the effectiveness of OCD treatment in the intensive outpatient setting, it is important to note that it may not be appropriate for everyone. Many children and adolescents with OCD have significant comorbidity with other mental health disorders (e.g., depression, autism, conduct problems, substance use) that may make the continuation of outpatient treatment of any kind impossible or unsafe. Children or adolescents who pose a risk to themselves or others due to an inability to engage in exposures and remain safe would likely be better served at a residential facility were safety can be monitored 24 hours per day, 7 days per week (Marien et al., 2009). In addition, there are sacrifices that must be made in intensive outpatient treatment settings. Caregivers often must take significant time off work and children still attending school may miss classes or extracurricular activities (Marien et al.,

2009). While treatment may be a shorter duration than weekly outpatient therapy, the temporary disruption to life it imposes may be more immediately apparent. For these reasons, it becomes critical to gather more information on both the overall effectiveness of this treatment setting, as well as gain a better understanding for whom specifically intensive outpatient intervention may be most (or least) appropriate. We must begin to gather evidence regarding whether this treatment setting works and for whom it works in order to better inform clinicians and families as to whether it may be the right option for their patients or children.

Individual and Family Factors Related to Treatment Outcomes

"What treatment, by whom, is most effective for this individual with that specific problem and under which set of circumstances?" (Paul, 1967). Garcia et al. (2010) highlighted this quotation to begin their highly influential review of predictors and moderators of treatment outcome for pediatric OCD (i.e., POTS I). While CBT with ERP is shown to be an effective treatment for pediatric OCD, there remains huge variability in treatment response (Olino et al., 2011). Gaining a more complete understanding of primary and secondary treatment outcomes, as well as what factors may predict the success or failure of a particular intervention in a setting, will help clinicians direct children and families to the most appropriate treatment for their needs.

A number of studies have examined potential predictors of pediatric OCD treatment outcomes in a variety of settings with different samples of children and adolescents. There remains little consistency in how OCD treatment outcome and predictor variables are measured, making identification of reliable predictors an even greater challenge. Ginsburg et al. (2007) summarized 21 randomized control trials (RCTs) conducted between 1985 and 2007. Of those 21 studies, 6 examined predictors of OCD treatment outcomes. In these 6 studies, 9 "candidate" predictors were established: age, gender, duration of illness, baseline OCD severity, symptom

presentation (e.g., presence of hoarding, sexual obsessions), neuropsychological factors and family factors. In addition to the RCTs reviewed by Ginsburg and team, naturalistic studies have examined and identified other potential predictors of treatment outcomes. They include, age at symptom onset, socio-economic status, comorbidities such as internalizing symptomology and disorders (e.g., depression, anxiety disorders) and externalizing symptomology and disorders (e.g., ADHD, conduct disorders), levels of functional impairment, comorbid tic disorders, substance use, parental psychiatric history, family history of OCD, parenting styles, and family accommodation of anxiety (e.g., Barrett et al., 2008; Bloch e al., 2009; Brennan et al., 2014; Ferraro et al., 2006; Merlo, Lehmkuhl, Geffken, & Storch, 2009; Rudy et al., 2014; Torp et al., 2015). Further, these candidate predictors have been organized by several researchers into four categories: demographic predictors, aspects/presentation of OCD symptomology, comorbidity, and family factors (Keeley et al., 2008; Torp et al., 2015)

Unsurprisingly, many studies have found disparate effects of each of these candidate predictors, and a consensus has not yet been reached on whether or how these factors influence OCD treatment outcomes in a variety of settings (i.e., outpatient, intensive outpatient, residential). While the predictive utility of many of these factors is challenging to replicate, a few potential predictors remain on the forefront and have shown more consistent relationships to pediatric OCD treatment outcomes. Several of these relatively well-established candidate predictors from three of the four aforementioned predictor domains (i.e., comorbidity, symptom presentation and family factors) are explored as part of this investigation, one of which is less well understood particularly in pediatric samples in terms of symptom presentation, but may be a particularly salient predictor of treatment outcomes.

Depression and comorbidity. Because comorbidity with other psychiatric conditions for children and adolescents with OCD is extremely common, it should be considered the rule, not the exception (Walitza et al., 2011). One of the most commonly observed and investigated comorbid conditions in the treatment of OCD is depression (Keely et al., 2008). Despite this, the relationship between depression and OCD outcomes remains unclear, and findings are highly inconsistent with regard to the predictive utility of depression on treatment outcomes (Brown et al., 2014).

Numerous studies have demonstrated a relationship between baseline depressive symptomology and poor OCD treatment outcomes (e.g., Overbeek, Schruers, Vermetten, & Griez, 2001; Rufer, Grothusen, Mab, Peter, & Hand, 2005; Storch et al., 2008; Torp et al., 2015). Other studies however, have found no connection between depression and treatment outcomes (e.g., Anholt et al., 2011; Garcia et al., 2010; Mataix-Cols et al., 2002). Overbeek et al. (2001) found that despite matched OCD symptom severity at baseline, patients with comorbid depression showed less improvement than non-depressed patients on a variety of scales including measures of OCD, depression, and overall anxiety. Storch et al. (2008) found that compared to a 92% remission rate (e.g., CYBOCS < 10) for youth in their study with no comorbid conditions, only 42% ($p < 0.05$) of children and adolescents with depression achieved remission status. Interestingly, the treatment response rates defined as at least a 30% decrease in CYBOCS score from baseline to post-treatment for non-depressed youth compared to depressed youth was not statistically significant at 92% versus 71% (Storch et al., 2008). Torp et al. (2015) examined a large number of predictors and found that children and adolescents with higher levels of parent-reported depressive symptoms had higher post-treatment CYBOCS scores after controlling for pre-treatment CYBOCS scores.

Overall, these studies suggest that youth with elevated depressive symptoms and OCD may have an attenuated response to CBT with ERP compared to youth without depressive symptoms. These results may be representative of findings from outpatient samples, however this is not the only setting in which OCD can be treated. Leonard et al. (2014) examined depressive symptoms as a predictor of OCD treatment outcome in a residential sample of adolescents with severe OCD. Their results differed from many of the studies on youth outpatient samples and found that depression severity was not associated with duration of treatment, and depression severity upon admission was not associated with a worse OCD treatment outcome (Leonard et al., 2014). In addition, the team found that after controlling for OCD severity on admission, greater change in depression severity significantly predicted lower OCD severity at discharge, indicating that beginning treatment with high levels depression did not detract from OCD treatment outcomes.

Contrary to the potential effect depression has on the outpatient treatment of OCD, it is possible that the intensive residential setting may reduce the negative impact of depression on OCD treatment outcomes (Leonard et al., 2014). Specific aspects of residential treatment may have features that both directly and indirectly affect depressive symptomology for adolescents, such as more frequent and intensive CBT with ERP, group-based therapy, increased daily structure and consistency, regular sleep schedules, required hygiene practices, healthy meals, increased social contact with same-age peers, and planned enjoyable activities (Leonard et al., 2014). These activities and lifestyle changes are consistent with those recommended for youth in the outpatient setting with depressive symptomology under a behavioral activation for depression protocol; however, in the residential setting, children and adolescents are fully immersed and have reduced choice around “opting out” of these healthy activities (Leonard et al., 2014).

Additionally, it is possible that taking a child or adolescent out of a stressful home setting may also work to indirectly decrease depressive symptomology. Family conflict or problematic dynamics can invariably lead to an increase in depression symptoms, therefore removal from that setting may work naturally to decrease symptomology (Keeley et al., 2008; Leonard et al., 2014).

Based on the research regarding the relationship between of depressive symptoms and OCD treatment outcomes, there does not appear to be a consensus, particularly when considering both outpatient and intensive settings. Abromowitz (2004) put forth one suggestion as to why depression has failed as a reliable predictor of OCD treatment outcomes. He hypothesized that it may be due to the lack of distinguishment between depression severity levels. His research suggests that severe depression (i.e., Beck Depression Inventory scores > 30; Beck, Steer, & Brown, 1996) may be a more dependable predictor than low to moderate levels of depression. Studies that have made this distinction or used DSM criteria for a major depressive disorder (MDD) diagnosis more consistently report statistically significant relationships between depression and worse treatment outcomes (Abromowitz, 2004). However, as Leonard et al. (2014) demonstrated, this may not apply to youth in more intensive settings.

Several researchers have put forth theories as to why depressive symptomology has predicted less favorable outcomes in outpatient OCD treatment. One hypothesis, which also applies to any comorbid condition, is that when depressive symptomology is present, the clinician must focus not only on the OCD symptoms, but also the comorbid condition. This may reduce the available time each session to engage in OCD-related treatment tasks, thus decreasing effectiveness of treatment if the number of sessions is pre-determined or leading to longer treatment duration if the number of sessions is variable (Storch et al., 2008). Abromowitz (2004) also posited that the presence of depressive symptoms and associated emotional reactivity may

hinder the typical habituation process that occurs during ERP, drawing out the length of therapy or causing it to be less effective. It is also possible that children and adolescents with depressive symptomology may have less motivation to engage in exposures, have less hope that treatment will work, and may struggle more than non-depressed individuals to imagine the benefits of their OCD symptoms improving. They may also become more discouraged by the typical challenges related to engaging in ERP (Storch et al., 2008). Finally, Abromowitz, Storch, Keeley, and Cordell (2007) demonstrated children and adolescents with comorbid OCD and depression are more likely than patients without depression to mis- or over-interpret the importance of their intrusive thoughts, indicating that perhaps the poorer treatment response may be due to susceptibility to obsessional thoughts. Rumination (i.e., the tendency to repeatedly go over thoughts or problems in the mind) is often a core feature of depression and may compound individual's vulnerability to obsessions and intrusive OCD thoughts.

Several studies have found that depression symptoms tend to ameliorate after OCD treatment even when depression symptoms are not specifically targeted (Anholt et al., 2011; Olino et al., 2011). While this is good news for the efficacy of CBT with ERP for OCD in treating several forms of psychopathology, it also does not diminish the possible impact of depression on OCD treatment response and the clinical implications for treatment planning (Storch et al., 2008). If the presence of depressive symptomology is associated with a weaker or slower response to therapy, it may be beneficial to consider specific treatment protocols for depression alongside typical CBT with ERP for OCD. To date, no studies have looked specifically at the relationship between depressive symptomology and OCD treatment outcomes in an intensive outpatient program (IOP). IOPs have aspects of both outpatient and residential programs, and it is currently unclear how depressive symptoms may be related to OCD treatment

outcomes including OCD severity scores and length of treatment in this setting and at this level of care. The proposed research aims to explore these questions and add to the body of literature on the relationship between depressive symptomology and IOP treatment outcomes in pediatric patients, and how it may be linked to the course and effectiveness of treatment.

Sexual obsessions. Although thoroughly unexplored in the pediatric OCD literature, OCD symptom presentation (i.e., obsessions and compulsions present based on CYBOCS interview) may be an important predictive factor in treatment outcomes. One under-researched symptom dimension that may have specific applicability in pediatric populations is the presence of sexual obsessions.

A number of studies and one large scale review paper reported that sexual obsessions are associated with a variety of poorer outcomes in both behavioral and pharmacological treatments in adult OCD populations (Boschen et al., 2010; Keely et al., 2008; Steketee et al., 2011). Alonso et al. (2001) found a significantly greater frequency of sexual obsessions in patients who were considered non-responders to outpatient treatment. Mataix-Cols, Marks, Griest, Kobak and Baer's (2002) research demonstrated that higher scores on a sexual obsessions factor predicted worse treatment outcomes for adults who underwent ERP behavior therapy. Only 21% of patients with sexual obsessions were treatment responders compared to 50% of patients without these symptoms, a statistically significant difference (Mataix-Cols et al., 2002). Ferrao et al. (2006) found the presence of sexual obsessions was significantly associated with treatment refractory OCD (i.e., less than 25% symptom reduction from initial YBOCS score after at least 3 medication trials and 20 hours of ERP therapy). Rufer, Fricke, Moritz, Kloss, and Hand's (2006) research indicated that adult inpatients with sexual obsessions tended to respond less frequently to CBT with ERP intervention, however the results did not reach statistical significance (p =

0.07). Sexual obsessions predicting poorer outcomes is not limited to psychological treatments either. Shetti et al. (2007) found that the presence of sexual obsessions was a significant predictor of nonresponse to SSRI medications.

However, not all results have pointed to the same conclusion. In contrast with the aforementioned studies, Skeketee et al.'s research team found that the presence of sexual obsessions actually predicted better OCD treatment outcomes (Skeketee, 2011). However, these conflicting findings may be due to differences in treatment protocol compared to the majority of other OCD treatment studies. As opposed to the more commonly employed and heavily researched behavioral model of therapy emphasized in ERP, Steketee et al. (2011) delivered a comprehensive cognitive therapy treatment. These findings present interesting potential evidence that ERP may be less effective for certain obsessional beliefs, namely sexual obsessions.

Despite sexual obsessions demonstrating potential as a reliable predictor for treatment outcomes in adults, relatively few studies examining predictors of OCD treatment outcomes have explored symptom presentation as a factor. In addition, no studies to date have looked at sexual obsessions as a predictor of OCD treatment outcome in pediatric populations. Sexual obsessions may be of particular interest as a potential predictor based on a study that examined OCD over the lifetime and identified that sexual obsessions (e.g., obsessions often comprised of taboo thoughts, impulses, or ideas) typically onset during puberty—an average of four years earlier than non-taboo related obsessions such as contamination (Grant et al., 2006). It is hypothesized that the onset of these symptoms during puberty and adolescence may be related to the specific developmental, psychological, and hormonal changes occurring during this age range (Grant et al., 2006). Grant and team also found that patients with these sexual obsessions tended to spend a longer amount of time in treatment than those without. If sexual obsessions are frequently

present in pediatric populations, it is critical to understand how they may be related to treatment outcomes.

Sexual obsessions are often difficult to treat, as the social implications of discussing these types of obsessions may make individuals less likely to disclose their thoughts. Patients, especially children and adolescents who are often engaging in treatment with their caregiver, may feel embarrassed about the thoughts and be reluctant to disclose them, potentially leading to a delay in treating those symptoms (Grant et al., 2006). The moralistic component of sexual obsessions may increase general distress as the child or adolescent struggles to understand the meaning of or reason behind their obsession. Each time the brain experiences distress around a thought, it signals that the thought must be important and attended to, making the unwanted thought even "stickier" in the mind (March & Benton, 2006). This increased focus may lead to greater concern that obsessions are actual manifestations of what they believe, how they will act, or what might happen to them (Keely et al., 2008).

It is also more difficult to design exposures for sexual obsessions, as in-vivo exposures are generally not an option (i.e., a clinician cannot repeatedly expose a patient to the actual experience of sexually assaulting someone). Instead, imaginal exposures which are often slower to produce change, and cognitive restructuring techniques are often employed instead (Steketee et al., 2011). It also more challenging to monitor rituals around sexual obsessions, as they are often more covert (i.e., mental rituals). Determining what the mental rituals are and then subsequently preventing them is much more challenging than, for example, preventing a child or adolescent from washing their hands due to contamination fears (Keeley et al., 2008).

The relationship between sexual obsessions and treatment outcomes for children and adolescents with OCD is currently unknown, however the presence and potential salience of this

symptom dimension during early adolescence makes it an important potential predictor to consider. Should the presence of sexual obsessions be related to similar poor outcomes in youth as they are adults (e.g., higher post-treatment symptom severity, high percentage of treatment refractory cases, longer time spent in treatment), it will be important to consider this factor from the outset when determining treatment strategies for children and adolescents with this presentation of symptoms.

Accommodation of OCD. One particularly challenging aspect of treating OCD is that symptoms do not only affect the diagnosed child or adolescent. Parents, caregivers, and siblings are often impacted heavily by the disorder, and response to the OCD symptoms of the affected family member may play a role in the course of the disorder (Derisly, Libby, Clark, & Reynold, 2005, Lebowitz & Bloch, 2011; Storch et al., 2009). The importance of family in the development and maintence of OCD symptoms has gained attention over the last several decades (Calvocoressi, 1995; Garcia et al., 2010; Peris et al., 2008; Storch et al., 2007). In particular, the role and prevalence of family accommodation in pediatric OCD began its rise to prominence after Calvocoressi et al. (1995) suggested that accommodation by caregivers of patients with OCD may be related to family distress and dysfunction. After finding support for this hypothesis, other researchers began exploring whether family accommodation may be related to OCD treatment outcomes as well. Because family variables and the environment in which OCD exists can be manipulated, unlike the genetic component of OCD for example, there is an undeniable practical component to understanding the role family accommodation plays in OCD treatment.

One of the ways in which families may affect OCD outcomes is through the accommodation of symptoms. In this context, the term accommodation refers to the ways family members or caregivers help their child engage in compulsive rituals either knowingly or

unknowingly, provide reassurance, and modify their own routines or behaviors to alleviate distress experienced by their child with OCD (Lebowitz & Bloch, 2012). Other accommodation behaviors might include being lenient on rules that apply to others in the house, helping a child complete age-appropriate tasks they should be able to complete on their own, or providing specific objects a child might need to engage in a ritual (Storch et al., 2007).

Family members accommodating OCD symptoms typically do so with good intentions. Parents often feel that their accommodation behaviors are making life easier at home (Merlo et al., 2009). While this may be true in the short-run, accommodating OCD typically maintains or worsens symptoms in the long-run by providing immediate relief, thereby negatively reinforcing the behavior and preventing any sort of habituation from occurring (Merlo et al., 2009). CBT with ERP for OCD aims to teach adaptive ways of coping with anxiety and helping youth re-engage in age-appropriate tasks and activities, whereas family accommodation allows the child or adolescent to avoid feared situations and stimuli or get reassurance about unrealistic worries and obsessions (Merlo et al., 2009).

When studies have assessed levels of accommodation, generally high levels are found in families of youth with OCD. Perris et al., 2008 found that on a daily basis, 56% of caregivers in their sample provided reassurance, 46% participated in rituals, and nearly 100% of caregivers reported engaging in some form of accommodation. Other studies reported the prevalence of family accommodation based on the total of the scale used (FAS-PR; Pinto et al., 2015) and reported average scores of between 20 and 30 out of 50, indicating generally moderate to severe levels of accommodation (Merlo et al., 2009; Storch et al., 2008; Storch et al., 2010). Storch et al. (2007) found that higher levels of accommodation are also associated with more severe baseline OCD symptoms, functional impairment, and internalizing and externalizing behavioral

challenges. Overall, research suggests that family accommodation is prevalent, highly counterproductive to the goals treatment for OCD, and can and should be targeted as part of a family inclusive treatment plan (Peris et al., 2008). For these reasons, family accommodation of anxiety has emerged as both a predictor of interest, and as a specific intervention target to consider when designing a comprehensive treatment protocol for pediatric OCD.

Despite interest in the relationship between family accommodation and OCD, few studies have examined it as a predictor for OCD treatment outcomes in youth. One of the first studies to examine its predictive utility was conducted by Amir, Freshman, and Foa (2000), who found that after controlling for baseline OCD severity, family accommodation was significantly related to symptom severity at post-treatment. In addition, their study replicated Calvocoressi's 1995 findings, demonstrating that higher levels of accommodation were related to more family distress and depression in relatives of patients with OCD, factors that have been shown to increase the chances of relapse (Foa & Wilson, 1991). Merlo et al. (2009) extended this research and found that participation in a family-based treatment for OCD resulted in a decrease in family accommodation behaviors in caregivers, and larger decreases in family accommodation over the course of treatment predicted lower symptom severity at post-treatment even when controlling for baseline severity. Their results suggest that directly targeting family accommodation as part of an OCD treatment protocol may be critical in improving treatment outcomes (Merlo et al., 2009).

Garcia et al.'s (2010) POTS I (Pediatric Obsessive-Compulsive Treatment Study) also examined family accommodation as a potential predictor for OCD treatment outcomes in a randomized control trial comparing CBT, sertraline, a combination treatment, and placebo pill. The POTS team found that across all conditions, youth with higher levels of family

accommodation at pre-treatment had a poorer response to treatment than those with lower levels of family accommodation (Garcia et al., 2010). Similar to Merlo et al. (2009) their team suggested that when levels of family accommodation are high, it may be warranted to focus explicitly on reducing accommodation symptoms and increasing family participation in treatment (Garcia et al., 2010). The POTS I team described their work as "hypothesis generating" and have encouraged more OCD treatment outcome studies to explore the potential impact of family accommodation (Garcia et al., 2010).

The most recent study examining family accommodation in pediatric OCD patients was conducted by Rudy et al. (2015) in the context of an intensive outpatient treatment format consisting of 14 daily sessions lasting 90 minutes each. Their findings were consistent with previous research, demonstrating that children and adolescents who achieved remission (e.g., post-treatment CYBOCS < 10) had significantly less family accommodation at baseline compared to those who did not achieve remission (Rudy et al., 2015). These results contribute to a growing body of evidence that higher levels of family accommodation contribute to poorer OCD treatment outcomes such as higher symptom severity at post-treatment and lower remission and treatment response rates.

Finally, it should be noted that not all studies have found family accommodation to be a significant predictor of treatment outcomes. One large, long-term study (NordLOTS), which utilized a family-based weekly outpatient treatment approach, found results contrary to their original hypothesis that family accommodation would be associated with an attenuated response to treatment (Torp et al., 2015). Their results did not show that family accommodation levels at baseline predicted whether children and adolescents would be treatment responders with a CYBOCS score of 15 or lower at post-treatment (Torp et al., 2015). Torp and team postulated

that this may be due to the family approach to treatment, which explicitly encouraged parental involvement and may have worked to address family accommodation from the very beginning of treatment (Torp et al., 2015).

Overall, family accommodation shows significant promise as an important factor in pediatric OCD treatment outcomes. However, like most other predictors of OCD outcomes, the small body of evidence requires that far more research be conducted on the topic. Family accommodation as a predictor is particularly interesting considering the potential ease with which it can be targeted as part of treatment. Whereas a better understanding of how demographic variables may be linked to treatment can be informative, and understanding how comorbidity is related to outcomes can be treatable if time and resources allow, treating high levels of family accommodation may be comparatively easy. Children and adolescents typically already have a caregiver involved in treatment in some capacity, and simply being more intentional about discussing and intervening on family accommodation of symptoms can be a natural addition to treatment in a variety of settings. The proposed research aims to explore these questions and add to the body of literature on how family accommodation is related to treatment outcomes in this family-inclusive pediatric IOP treatment, and how it may predict the course and effectiveness of treatment.

Purpose of Proposed Study

High-quality treatment for OCD, particularly in severe cases, is difficult to access and many first line treatments are not effective initially (Olino et al., 2011). It is critical that children and adolescents begin treatment as soon as possible after symptom presentation and diagnosis in order to avoid a chronic life-long course of the disorder (Mancebo et al., 2014). It is also important that the intensity and duration of care fits with the individual level of need in order to

avoid failed treatment attempts and prolong the challenges associated with severe and acute OCD symptoms (Mancebo et al., 2014).

The current knowledge of OCD treatment outcomes and predictors remains sparse, with a particularly low number of studies specifically examining the overall treatment efficacy and predictors of OCD treatment outcomes in intensive outpatient programs (IOPs). Intensive outpatient treatment for OCD is a promising venue, however it is critical for researchers and clinicians to better understand if this setting is effective, and potential ways to maximize its utility. By beginning to gather this important information, IOPs can demonstrate significant relationships with improved treatment outcomes, in turn increasing access to high quality CBT with ERP treatment in the community. This study aims to better understand whether one intensive outpatient program in the pacific northwest region of the United States is related to significant OCD symptom reduction, as well as some individual and family factors that may be related to or predictive of treatment outcomes in this setting.

This research expands on the current knowledge by exploring treatment outcomes and predictors of treatment outcomes in pediatric OCD where baseline OCD severity scores fall in the severe or extremely severe range, whereas most previous studies have examined outpatient samples with baseline OCD severity scores in the moderate range ($M = 23.4$; Abromowitz, Whiteside, & Deacon, 2005). In addition, findings from this study will add to the body of evidence pointing towards the possible effectiveness of intensive outpatient programs for significantly reducing OCD severity in pediatric populations, and explore a potential predictor not previously examined in child or adolescent populations. Finally, this research identifies potentially salient predictors that can be modified or ameliorated though targeted intervention with the goal of augmenting treatment response.

Procedurally, general effectiveness of the OCD-IOP was reviewed in order to determine if treatment was associated with a significant decrease in OCD severity scores. Then, predictors' relationships with each other, as well as their relationships with primary treatment outcomes (days in program and OCD severity scores over time) was explored. Finally, secondary outcomes of depressive symptomology and family accommodation were explored through the following research questions:

Research Question #1

Is there a significant decrease in OCD severity after 8 weeks of treatment, 12 weeks of treatment and after discharge from an OCD intensive outpatient program (OCD-IOP) employing a CBT with ERP treatment protocol?

Hypothesis #1. The objective of question one is to determine whether there is a significant relationship between this intensive outpatient program for OCD and a reduction in OCD severity scores. The aim is to determine whether the OCD-IOP is associated with significantly lower OCD symptom severity after 8 weeks of treatment, which is the standard treatment duration upon which the program was originally built, 12 weeks of treatment, which is close to the average amount of time participants spent in this program, and after discharge. The literature strongly supports that CBT with ERP is the first-line psychological treatment for pediatric OCD, and it is hypothesized that OCD severity ratings will be significantly lower at the 8-week mark of treatment, 12-week mark of treatment, as well as after discharge from the program. The effectiveness of ERP has been well-documented in the outpatient setting, however, the intervention's relationship with OCD severity is not well explored when delivered in an intensive outpatient format.

Research Question #2

What are the relationships between specific child and family predictor variables (i.e., depression, family accommodation, and presence of sexual obsessions) and primary outcome variables, (i.e. OCD severity scores and days in program)?

Hypothesis #2. Previous research suggests that some predictor variables may be related to one another, depression and family accommodation in particular (Amir et al., 2000; Wu, Lewin, Murphy, Geffken, & Storch, 2014). How predictor variables and outcome variables are related remains unclear, however, research suggests that significant relationships between each predictor and outcome variables may be present.

Research Question #3

Do baseline depression scores, and baseline family accommodation of OCD predict the number of days spent in the intensive outpatient treatment program?

Hypothesis #3. Based on the current literature, there is some evidence that depression and family accommodation may be related to OCD treatment outcomes in terms of duration of time spent in program or number of sessions necessary to achieve significant symptom reduction (Keeley et al., 2008). The majority of research studies on OCD treatment outcomes only examine post-treatment OCD severity after a pre-determined number of sessions and have found that children and adolescents with these high levels of depression and family accommodation do not experience as much symptom reduction as those without them (e.g., Garcia et al., 2010; Merlo et al., 2009; Rudy et al., 2015; Torp et al., 2015). The IOP from which these data were sourced does not predetermine number of days in program, making it an ideal opportunity to better understand how baseline depressive symptomology and family accommodation may be linked to the amount of time spent in treatment. Because IOP treatment can be highly disruptive to other

domains of life, it is important to explore factors that may predict a longer period of time spent in the program. It is hypothesized that children and adolescents with higher levels of family accommodation and depression at baseline will spend more days in the IOP compared to children and adolescents with lower levels of family accommodation and depression at baseline.

Research Question #4

How do OCD severity, family accommodation, and depression scores change over 12 weeks of treatment in this intensive outpatient program? Do the presence of sexual obsessions at baseline and the amount of family accommodation and depressive symptomology at each timepoint predict OCD severity scores and their change over 12 weeks of treatment?

Hypothesis #4. Answering this final multi-part question has important implications when determining potential secondary or ancillary treatment targets that may boost OCD treatment outcomes. First, it is important to understand how 12 weeks of treatment in the OCD-IOP is related to OCD symptom severity, depressive symptomology, and family accommodation scores over time. It is hypothesized that all three measures will decrease significantly over the course of treatment. Because parents are heavily involved in treatment and attend a weekly parent group, family accommodation is addressed at least indirectly as part of the CBT with ERP protocol. While depressive symptoms are not a main focus of treatment, Anholt et al. (2011) and Olino et al. (2011) found that depressive symptoms tend to decrease in youth treated with outpatient CBT with ERP regardless. In fact, aspects of the intensive outpatient setting more closely resemble residential treatment settings (e.g., increased frequency of treatment, group-based approach, social contact with peers, daily structure) potentially contributing to a greater reduction of depressive symptoms compared to traditional outpatient treatment (Leonard, 2014). Second, based on Merlo et al.'s (2009) study, it is hypothesized that greater decreases in family

accommodation and depression during the course of treatment will be associated with greater change in OCD severity scores over 12 weeks of treatment in the IOP. In other words, a greater change in depressive symptomology and family accommodation will be linked to a greater change in OCD severity scores as well. The current literature has also identified the presence of sexual obsessions as a factor that may attenuate OCD treatment response in children and adolescents (e.g., Ferraro et al., 2006; Garcia et al., 2010; Keeley et al., 2008; Storch et al., 2008; Torp et al., 2015). However, sexual obsessions as a predictor of OCD treatment outcomes has been examined primary in weekly outpatient settings, whereas the current study examines its predictive value in an IOP. Despite the different treatment setting, it is hypothesized that a similar relationship will be found, and that the presence of sexual obsessions at baseline will be related to higher OCD severity scores.

Chapter 3: Method

Study Overview

The present study was a one-group treatment-only design and employed secondary data analysis using data collected at an Obsessive-Compulsive Disorder Intensive Outpatient Program (OCD-IOP) in the Pacific Northwest region on the United States. The following sections describe the study participants, sample, measures, and procedures used for analysis. Finally, this chapter includes a description of the data analysis procedures.

Participants

Participants in this study included children and adolescents from the Pacific Northwest region of the United States with a primary diagnosis of OCD in the severe or extremely severe range on the Children's Yale Brown Obsessive Compulsive Scale (CYBOCS; Scahill et al., 2007) who were being treated in a hospital based IOP for OCD. To be eligible to participate in

the IOP and this study, families were required to have a caregiver attend and participate in treatment with their child every session. Prior to beginning the IOP, parents and participants consented for their data to be used for both clinical and research purposes. The final sample included a total of $N = 30$ child and adolescent participants, with 23 females and 7 males from primarily Caucasian backgrounds (90% White/Caucasian, 10% Asian/Pacific Islander). Participants' ages ranged from 11 to 20 with a median age of 14.5 years. All participants had a primary diagnosis of OCD, with 60% of participants having no other diagnoses, 30% having one additional diagnosis, 7% having two additional diagnoses, and 3% (1 participant) with three additional diagnoses. 40% of participants in the sample reported experiencing sexual obsessions upon entry into the program. See table 1 for a breakdown of additional diagnoses present in this sample and further details on categories of obsessive and compulsive symptoms experienced by participants upon entry into the program.

Due to the challenging and often triggering nature of Exposure and Response Prevention therapy, exclusion criteria included being actively engaged in self-harm or attempting suicide in the last two weeks to ensure participants were able to safely engage in ERP without engaging in any form of self-harm. Any children and adolescents with intellectual disabilities were also excluded from the study due to the higher-level cognitive functioning necessary to engage in CBT and ERP.

Measures

CYBOCS semi-structured interview. Obsessive compulsive disorder symptoms and severity were assessed using the CYBOCS. This scale is intended for use in children and adolescents and can be administered by either a clinician or a trained interviewer in a semi-structured fashion (Scahill et al., 2007). In general, the interview should be conducted with the

primary caregiver and child together, and ratings should be made based on symptoms experienced over the prior two weeks. Ratings depend on the child's and the primary caregiver's report of symptoms, however the final rating is based on clinician judgement (Scahill et al., 2007).

The CYBOCS measures a wide variety of obsessive symptoms including contamination, aggressive and sexual obsessions, hoarding/saving, magical/superstitious thoughts, somatic, and religious obsessions including scrupulosity. Measured compulsions include washing/cleaning, checking, repeating, counting, ordering/arranging, hoarding/saving, games/superstitious behaviors, rituals involving others (e.g., reassurance seeking), and other miscellaneous symptoms (Scahill et al., 2007). Once the symptoms are defined by the child and primary caregiver, the informants are asked 10 severity questions, including five relating to obsessions and five relating to compulsions such as, "How much time is spent on the obsessions/compulsions," "How long can you go without doing a compulsion" and "How much do these thoughts upset you?" Responses to each of these questions is rated by the clinical interviewer on a scale from 0 (None) to 4 (Extreme). Scores on the CYBOCS range from 0 to 40, with scores in the 0-7 range considered sub-clinical, 8-14 mild, 15-23 moderate, 24-31 severe, and 32-40 extremely severe (Scahill et al., 2007).

The CYBOCS was developed to be used primarily in research settings and to document treatment outcomes (Goodman et al., 1989). It is the most widely used clinician-rated interview to assess OCD and response to treatment, and it shows sensitivity to change, with a 25% to 35% reduction in score (i.e., approximately 8 points) considered a good response to treatment (Koen & Stein, 2015). The CYBOCS takes approximately 45 to 60 minutes to complete, however this may vary depending on age and developmental level of the child, and whether the clinician

deems it appropriate to also interview the child and primary caregiver separately (Scahill et al., 2007).

The reliability and validity of the CYBOCS was evaluated using a sample of 65 children and adolescents with OCD between the ages of 8 and 18 years. The sample included 25 girls and 40 boys. Because the CYBOCS is a semi-structured interview that requires a degree of clinical judgement, interrater agreement was established using 4 raters in a subsample of the study population (n = 24). The interclass correlation for the Total CYBOCS score was r = 0.84, r = 0.91 for the obsessions score, and r = 0.66 for the compulsions score, suggesting evidence of good interrater reliability for compulsion scores, and evidence of excellent reliability for the obsessions and total score (Scahill et al., 1997). The 10 items on the CYBOCS demonstrated strong internal consistency (r = 0.87) with the norming sample, indicating that the CYBOCS likely measures one distinct construct (Scahill et al., 1997). Discriminant and convergent validity were assessed on the same population of 8 to 18-year-olds by comparing CYBOCS scores to self-report ratings of depression using the Children's Depression Inventory (CDI; Kovacs, 2010; r = 0.34), anxiety using the Children's Manifest Anxiety Scale (RCMAS; Reynolds & Richmond, 1978; r = 0.37) and self-reported OCD symptoms using the Leyton survey (r = 0.62; Scahill et al., 1997). The correlation with the Leyton survey (Berg et al., 1986) was significantly higher than with the CDI and RCMAS, providing evidence that the CYBOCS is a valid measure of OCD in children (Scahill et al., 2007). Because the Leyton survey is a self-report measure and the CYBOCS is a clinician administered interview, it is unsurprising that the correlation between the two is not especially high.

Pediatric accommodation scale-parent report. The Pediatric Accommodation Scale-Parent Report (PAS-PR; Benito et al., 2015) assesses the frequency and impact of family

accommodation on youth and families with OCD. Accommodation is typically defined as the participation of a family member in OCD rituals (Flessner et al., 2011). Accommodation can look like helping the child complete a ritual, facilitating or allowing avoidance, or giving frequent reassurance (Flessner et al., 2011). The pediatric accommodation scale-parent report was developed as an alternative to the clinician-administered pediatric accommodation scale (Grabhill, 2011). The original pediatric accommodation scale (Grabhill, 2011) was developed by a 5-member writing committee and was based on a review of the current literature and the original Family Accommodation Scale (Calvocoressi et al., 1999).

The PAS-PR is a 5-item parent-report with two questions per item: one regarding frequency of the accommodation, and the other regarding the degree to which it interferes with daily functioning. Each item has several examples to illustrate the principal of accommodation. The items on the PAS-PR were selected from the most frequently endorsed items on the original PAS. Each item regarding frequency is rated by the caregiver on a scale from 0 (never) to 4 (always), and each item for interference is rated from 0 (none) to 4 (extreme). Examples of items include “In the past week, how often did you or other family members reassure your child about his/her fears”, “In the past week how much has needing reassurance from family members gotten in the way of things for your child, like school, spending time with friends, or family life?”, “In the past week, how often have you changed your family’s routine in any way to reduce your child’s anxiety?”, and “In the past week, how much has changing the family routine gotten in the way of things for you or your family like your family life, at work, with your friends, or your spouse?”.

The psychometric properties of this measure were investigated by Benito et al. (2015) and found evidence of good overall reliability and validity. The scale was broken down into 3

subscales: frequency of accommodation (F), impact of accommodation on the parent (PI), and impact of accommodation on the child (CI; Benito et al., 2015). The research team employed a sample of 105 youth ages 5-17 with a primary diagnosis of anxiety disorder for this study. The PAS-PR demonstrated good internal consistency (PAS-PR-F α = 0.84, PAS-PR-PI α = 0.82, PAS-PR-CI α = 0.80 (Benito et al., 2015). Construct validity was evaluated in part using a clinician related anxiety scale (PARS; r = 0.58), parent reported anxiety symptoms on the child behavior checklist (r = 0.41) and parent-rated anxiety impairment in the home setting on the child anxiety impact scale (r = 0.38), and all were all significantly related to all three subscales on the PAS-PR (Benito et al., 2015). In addition, the PAS-PR-F and PAS-PR-CI subscales were significantly correlated with child rated impairment at school (r = 0.50), the PAS-PR-CI was positively related parent-rated anxiety impairment at school (r = 0.48), and the PAS-PR-F was related to parent reported anxiety symptoms on the SCARED (r = 0.42) and the child rated anxiety impairment at home (r = 0.40). Finally, the PAS-PR subscales were all positively related to the PAS subscales (PAS-PR-F r = 0.64; PAS-PR-CI r = 0.60; PAS-PR-PI r = 0.57) (Benito et al., 2015). Collectively these findings suggest good construct validity of these scales with the PAS-PR. Discriminant validity was evaluated using the child behavior checklist externalizing symptoms scale and child-reported depression symptoms, none of which had significant relationships with the PAS-PR. The lack of statistically significant relationships found between the PAS-PR and these measures suggests at least an adequate ability to discriminate family accommodation of anxiety from other constructs. Overall, the findings support the use of the PAS-PR to measure accommodation of OCD in pediatric populations (Benito et al., 2015).

Measures of Depression in Participants

Depressive symptomology in participants was assessed using self- and parent-report T-scores on the Child Depression Inventory, Second Edition (CDI-2; Kovacs, 2010)

Children's depression inventory-2 self-report. Participant depression symptoms were assessed in part by using the CDI-2 self-report. The CDI-2 measures depressive symptoms in youth ages 7-18 with 28 items. Each item has 3 choices and respondents rate each item on a scale from 0 (none) to 2 (definite; Kovacs, 2012). The CDI-2 has two specific scales related to depression: Emotional Problems and Functional Problems. The Emotional Problems subscale is divided further in Negative Mood/Physical Symptoms and Negative Self-Esteem, which are meant to capture symptoms such as sadness, guilt, loss of interest in activities, and disturbed sleep (Kovacs, 2012). The Functional Problems subscale is also divided into two sub-categories: Ineffectiveness and Interpersonal Problems. These scales are meant to capture challenges in social relationships, issues in school such as declining grades, and troubles with peers or family due to irritability resulting from depression (Kovacs, 2012). The CDI-2 provides raw scores, which are then totaled, and converted to standardized T-scores with a mean of 50 and standard deviation of 10. T-scores are categorized into five classifications: Very Elevated (T-score ≥ 70), Elevated (T-score = 65 to 69), Higher Average (T-scores = 60 to 64), Average (T-scores = 40 to 59), and Low (T-scores ≤ 40; Kovacs, 2012). The CDI-2 can be administered individually or in a group setting, and can be used for screening purposes, treatment monitoring, or to better understand the severity or nature of a child or adolescent's depressive symptoms.

The CDI-2 was standardized using a sample comprised of 1,100 youth ages 7 through 18 from 28 states throughout all four geographic regions of the United States (Kovacs, 2012). The data that were collected were further categorized based on gender/sex, age, race/ethnicity and

location in order to create more accurate norms. The CDI-2 demonstrated acceptable to high internal consistency with Cronbach's alpha values ranging from 0.67 to 0.91 for both the total and all subscales for all age and sex groupings (Kovacs, 2012). Test-retest reliability was assessed using 79 children within a 2 to 4-week time interval, and showed evidence of excellent stability with nearly no change in scores during that time interval (Kovacs, 2012). Longer interval tests were not conducted, as the CDI-2 is intended to measure state-dependent attributes (i.e., temporary) as opposed to stable, or "trait" attributes (i.e., personality; Kovacs, 2012). Construct validity was analyzed via a confirmatory factor analysis (CFA) taking into account the four subscales, two scales, and total score. The model fit was found to be very good with high CFA indexes. There was a high correlation between the two scales—Emotional Problems and Functional Problems ($r = 0.77$), and moderately high correlations between among subscales from $r = 0.58$ to 0.69, indicating a hierarchal association among the three levels (e.g., total, scales, and subscales; Hong & O'Neil, 2001). Discriminant validity was evaluated by examining how well the CDI-2 could distinguish between children and adolescents with and without major depressive disorder (MDD) symptoms. The MDD group had significantly higher scores ($p < 0.01$) on the CDI-2 than all other groups, indicating that the CDI-2 can accurately differentiate youth with MDD symptoms from those without (Kovacs, 2012). Finally, convergent validity was evaluated with a sample of 266 children completing the BDI-Y (Beck Depression Inventory-Youth) or the CBRS (Conner Comprehensive Behavior Rating Scales) and the CDI-2. All correlation coefficients for the total score and the scale scores were statistically significant at the $p < 0.01$ level, with moderate effect sizes (Kovacs, 2012).

Children's depression inventory-2 parent-report. Participant depression was also assessed using parent report of the severity and presence of depressive symptomology, utilizing

the CDI-2 parent report (CDI-2; Kovacs, 2010). Parents often provide another perspective on their child's depression symptoms that are important to incorporate when understanding depressive symptomology in children and adolescents (Kovacs, 2012). Similar to the CD-2 self-report, the CDI-2 parent-report includes two scales—Negative Mood and Physical Symptoms, however they are not further divided into more specific subscales as on the self-report. In addition, parents rate each question on a Likert-type scale from 0 (not at all) to 3 (much or most of the time; Kovacs, 2012). The CDI-2 parent report includes 17 items, it was derived from the self-report, and it focuses on common, observable depression symptoms (Kovacs, 2012).

The CDI-2 parent report was standardized using a sample of 800 adult caregivers with a balanced number of male to female children between the ages of 7 and 18 (Kovacs, 2012). Like the self-report form, internal consistency ranged from acceptable to high, however test-retest reliability was not conducted for the parent-report form (Kovacs, 2012). The CDI-2 parent report also demonstrated good discriminant validity, with the sample of individuals with MDD having significantly higher scores on the CDI-2 than all other groups (Kovacs, 2012). Moderate but significant correlations between the CDI-2 self-report and parent-report indicate both are measuring the same construct but are representing unique aspects of the child's functioning and negative emotionality (Kovacs, 2012).

Sexual obsessions. Sexual obsessions were considered "present" at baseline if any items under the sexual obsessions category on the CYBOCS were endorsed. Those items include: "Forbidden or perverse sexual thoughts, images or impulses," "Content that involves homosexuality (or heterosexuality if the individual identifies as homosexual)," "Sexual behavior towards others (aggressive)," or any "Other" routine, repetitive and unwanted or disturbing specific sexual thoughts described by the child or adolescent.

Outcome variables. Outcome variables were chosen based on previous literature, as well as their practical significance. Primary outcome variables examined as part of this study include OCD severity (CYBOCS) score and the number of days spent receiving treatment in the IOP. CYBOCS score is representative of treatment response, with decreasing scores representing a positive response to treatment, and number of days spent in program representing treatment duration. In addition, family accommodation and depressive symptomology (with decreasing scores representing a positive response to treatment) were examined on a limited basis as secondary outcome variables in order to better understand the trajectory they take over the course of treatment as well.

Procedures

Participants and their families were recruited as a clinical sample from families enrolling in the OCD-IOP. All study procedures were approved by the hospital's Institutional Review Board (IRB) as well as by the University of Washington IRB. Screening for entry into the OCD-IOP was conducted by one of three attending psychologists in the program. Participants were required to have OCD in the severe or extremely severe range (as indicated by a CYBOCS score of 24 or higher, or by clinical judgement if the clinician believed the patient underreported symptoms), have a caregiver attend each session, and have experienced failure in at least once course of weekly outpatient CBT with ERP for OCD as reported by parents or referring provider. If screening for the program took place more than one week before beginning the program, another baseline CYBOCS was administered on the first day of the program.

The OCD-IOP consisted of up to 6 families at a time. Patients were admitted on a rolling basis, with a new patient and their family joining the group upon discharge of a previous patient. On the first day of treatment the primary caregiver and child/adolescent patient completed a

CYBOCS interview with an attending psychologist and a new patient packet which consists of a variety of individual, parent, and family mental health measures, including the measures utilized in this study: The CDI-2 (self and parent report), and the PAS-PR. For the purposes of this study, the primary caregiver was defined as the person attending the majority of treatment sessions with the child/adolescent. The CYBOCS, CDI-2 (self and parent report), and PAS-PR were administered every four weeks of treatment. A discharge packet and CYBOCS were also administered on the last day of treatment, regardless of the number of weeks since measures were last collected (e.g., if a child discharged after 10 weeks in the program, they were administered a CYBOCS and complete measures packets four times: at baseline, week 4, week 8, and week 10/discharge). All measures were completed in a paper-pencil format with a clinician present.

Intensive outpatient treatment for OCD. The core ingredient of treatment at the OCD-IOP was ERP. As discussed in previous chapters, ERP is a subtype of CBT, and considered the "gold standard" treatment for OCD, as the only psychological intervention with empirical support (Rowa, Antony, & Swinson, 2007). ERP involves exposing the individual to something they fear (e.g., fear of becoming ill), and not allowing them to engage in the compulsion intended to decrease or halt the anxiety, fear, or disgust. CBT with ERP begins by teaching the individual about their OCD and anxiety symptoms (i.e., psychoeducation), and building a "fear ladder" and ranking fears from lowest to highest (Rowa et al., 2007). Then, each fear is confronted via exposure (Rowa et al., 2007). Interspersed with the core element of ERP are aspects of psychoeducation and cognitive restructuring as appropriate, such as determining what behaviors might be OCD, how to recognize anxiety in the body, the importance of not accommodating OCD behaviors, or helping individuals gain insight into irrational fears or beliefs (Rowa et al.,

2007). As with any treatment modality, treatment at the OCD-IOP followed a protocol of exposure and response prevention, however the specifics of each session were individualized for each participant.

Patients and their families attended treatment four days per week for approximately three hours per day and engaged in both group and individual components on each day. The first day of treatment was dedicated to the completion of all child and parent measures, discussion of rules, and general orientation to the program. Parents and children were briefed on the importance of attending every day as more than one absence resulted in discharge, completing all assigned homework each night, and having each homework item witnessed by a parent or caregiver. Patients and families were generally highly motivated to engage in treatment and follow program rules, as the wait-time for entry into the program was typically several months, with the alternative being residential treatment. Any challenges or lapses in compliance with program rules or the attendance policy was taken very seriously, and attending psychologists discussed the natural consequences of non-compliance with the patient and family, as well as alternative treatment options should they be unable to abide by the program requirements.

On each subsequent day, the first 45 minutes of treatment was spent with the whole group (n = ~ 6 families and n = ~ 6 therapists) on psychoeducation and review of the previous night's OCD exposure homework. In addition to being informative to therapists, this group review of homework worked to increase accountability and compliance regarding homework completion. While reviewing homework, participants reported their symptoms during each exposure using "SUDS" (subjective units of distress rating) on a scale of 0 to 10 (0 = no anxiety or distress, and 10 = extremely anxious). This SUDS rating was utilized both at home and in session to aid the therapist in calibrating exposures and determining when a particular symptom was no longer an

issue (e.g., exposures holding a spider ceased once the participant's SUDS rating was consistently at a 0 or 1 and they do not report intrusive thoughts about spiders). The following 90 minutes was spent in individual therapy with a trained therapist (typically with caregiver present) engaging in psychoeducation, ERP, and CBT depending on the treatment targets for each participant. Patients and their families were randomly assigned a clinician on each day of treatment by a program coordinator. The final 45 minutes of the 3-hour session were spent with the group reviewing what each participant did in session, sharing SUDS for each exposure, and clarifying homework for the evening. Treatment targets for each participant were determined in weekly grand rounds and based on symptoms reported in the most recent CYBOCS. Homework assignments typically took a total of 2-3 hours each night and were based upon exposures conducted during the session, however new exposures were often completed at home that were not possible in the clinic (e.g., taking a short shower).

Data Analysis

Due to the clinical nature of the sample, measures were not always taken at precise timepoints and participants often discharged between the four-week interval (e.g. at week 11). In order to best represent and maximize useable data, all data were binned and placed into evenly spaced timepoints at baseline, week 4, week 8, and week 12. Data that were taken between week 1 and week 4 were considered week 4 data. Data gathered between weeks 5 and 8 were considered week 8, and data gathered between weeks 9 and 12 were considered week 12 data.

Preliminary data analyses included descriptive statistics, distributions, and a review for missing data to ensure all assumptions were met prior to further investigation. In order to test the research questions for this study, a variety of procedures were used. Data were analyzed using paired samples *t*-tests, correlation, multiple linear regression with sequential predictor entry in

SPSS statistical software (SPSS Inc., n.d.), and hierarchical linear modeling in R software. Procedures analyzing for each research question are detailed in each subsequent section.

Research question 1. Is there a significant difference in OCD severity after 8 weeks of treatment, 12 weeks of treatment, and after discharge from an OCD intensive outpatient program (OCD-IOP) employing a CBT with ERP treatment protocol? Essentially, this question asked how well all participants responded to treatment given the same amount of time in the program (8 weeks and 12 weeks), as well as the amount of change in symptom severity when number of days in program was not pre-determined. The measure of whether the IOP was related to significant reductions in OCD severity was based on CYBOCS scores from baseline to week 8, baseline to week 12, and baseline to discharge, respectively. This question was answered using pre-post paired samples *t*-tests to determine if change scores were significantly different from zero.

Research question 2. What are the relationships between specific child and family predictor variables and outcome variables throughout the intensive outpatient program? The second research question aimed to investigate any direct one-to-one relationships between predictor and outcome variables included in subsequent research questions. Variables included measures of depressive symptomology (CDI-2 T-score on self- and parent-report), family accommodation scores on the PAS-PR, and the presence of any sexual obsessions at baseline (binary), CYBOCS scores, and number of days spent in program. A simple Pearson Product-moment correlation matrix was employed to examine direct relationships between all variables.

Research question 3. Do baseline depression scores and baseline family accommodation predict the number of days spent in the intensive outpatient treatment program for OCD? The third research questions aimed to answer the question of whether family accommodation and/or

depressive symptomology at baseline predicted the number of days children and adolescents spend in program. Because IOP can be highly disruptive to family life, school attendance and activities (Marien et al., 2009), gaining a better understanding of what factors may predict longer stays in the IOP can help inform treatment targets while in the program and prior to enrollment so that children and adolescents can limit disruptions and complete treatment efficiently. Multiple linear regression with sequential predictor entry was used to test the incremental variance in number of days spent in the program accounted for by each of the respective predictors. Family accommodation and depressive symptomology were standardized (re-coded into Z-scores) for ease of interpretation. Below are the regression models used to examine this question.

$$\hat{Y}\text{DaysInProgram} = b_0 + b_1\text{*ZFamAccomm} + b_2\text{*ZParentReportDepress}$$

$$\hat{Y}\text{DaysInProgram} = b_0 + b_1\text{*ZFamAccomm} + b_2\text{*ZSelfReportDepress}$$

In the models above, the outcome (days in program) is equal to the conditional mean (b_0) plus the unique effects of family accommodation and depression (parent- or self-report).

Research question 4. How do OCD severity scores change over 12 weeks of treatment in the IOP, and do the presence of sexual obsessions at baseline, depression, and family accommodation predict OCD severity scores change over time? Additionally, how do family accommodation and depression scores change over 12 weeks of treatment in the IOP? This final research question examined the relationship between 12 weeks of IOP treatment and OCD severity symptoms, depressive symptoms, and family accommodation symptoms. It also asked

whether sexual obsessions at baseline predicted OCD severity score change over 12 weeks of treatment, and whether the amount of family accommodation and depressive symptomology at each timepoint was predictive of OCD severity scores.

Longitudinal growth modeling using hierarchal linear modeling software was used to complete these analyses in order to account for measurements (Level 1) being nested within participants (Level 2). Several models were employed to answer research question 4, beginning with empty/unconditional models to determine the functional form of all three variables being modeled (OCD severity, family accommodation, and depression). Below are the unconditional growth models for OCD severity, family accommodation, and self- and parent-report depression.

$$OCDSeverityScore_{ti} = \pi_{0i} + \pi_{1i}(Weeks_{ti}) + e_{ti}$$

$$\pi_{0i} = \beta_{00} + r_{0i}$$
$$\pi_{1i} = \beta_{10} + r_{1i}$$

$$FamilyAccomodation_{ti} = \pi_{0i} + \pi_{1i}(Weeks_{ti}) + (Weeks_{ti})^2 + e_{ti}$$

$$\pi_{0i} = \beta_{00} + r_{0i}$$
$$\pi_{1i} = \beta_{10} + r_{1i}$$

$$SelfReportDepress_{ti} = \pi_{0i} + \pi_{1i}(Weeks_{ti}) + e_{ti}$$

$$\pi_{0i} = \beta_{00} + r_{0i}$$
$$\pi_{1i} = \beta_{10} + r_{1i}$$

$$ParentReportDepress_{ti} = \pi_{0i} + \pi_{1i}(Weeks_{ti}) + e_{ti}$$

$$\pi_{0i} = \beta_{00} + r_{0i}$$
$$\pi_{1i} = \beta_{10} + r_{1i}$$

Then, predictors were added to the OCD severity model starting with the time-invariant predictor of presence of sexual obsessions at baseline. Below is the model used to examine only the time-invariant predictor of sexual obsessions at baseline.

$$OCDSeverityScore_{ti} = \pi_{0i} + \pi_{1i}(Weeks_{ti}) + e_{ti}$$

$$\pi_{0i} = \beta_{00} + \beta_{01}(Sexual\ Obsessions) + r_{0i}$$
$$\pi_{1i} = \beta_{10} + \beta_{11}(Sexual\ Obsessions) + r_{1i}$$

Next, family accommodation and depression scores, as well as their interactions with time were entered as time-variant predictors of OCD severity. The first model below represents the time-varying predictors without their interactions with time, and the second model includes the predictors' interactions with time.

$$OCDSeverityScore_{ti} = \pi_{0i} + \pi_{1i}(Weeks_{ti}) + e_{ti}$$
$$\pi_{0i} = \beta_{00} + \beta_{01}(Depression) + \beta_{02}(Family\ Accommodation) + r_{0i}$$
$$\pi_{1i} = \beta_{10} + r_{1i}$$

$$OCDSeverityScore_{ti} = \pi_{0i} + \pi_{1i}(Weeks_{ti}) + e_{ti}$$
$$\pi_{0i} = \beta_{00} + \beta_{01}(Depression) + \beta_{02}(Family\ Accommodation) + r_{0i}$$
$$\pi_{1i} = \beta_{10} + \beta_{11}(Depression) + \beta_{12}(Family\ Accommodation) + r_{1i}$$

Finally, a full model for OCD severity was run with all predictors and their interactions with time. The model used to analyze this portion of the research question is below.

$$OCDSeverityScore_{ti} = \pi_{0i} + \pi_{1i}(Weeks_{ti}) + e_{ti}$$
$$\pi_{0i} = \beta_{00} + \beta_{01}(Depression) + \beta_{02}(Family\ Accommodation) + \beta_{03}(Sexual\ Obsessions) + r_{0i}$$
$$\pi_{1i} = \beta_{10} + \beta_{11}(Depression) + \beta_{12}(Family\ Accommodation) + \beta_{03}(Sexual\ Obsessions) + r_{1i}$$

Chapter 4: Results

Descriptive Statistics

Descriptive statistics for time spent in program, OCD severity, depressive symptomology, family accommodation, and presence of sexual obsessions are provided in Table 2. Time in program, OCD severity, and family accommodation are reported as raw scores, depression is reported in T-scores, and presence of sexual obsessions is binary. Upon

examination of descriptives statistics, a large difference was noted between average baseline parent-reported depression scores and self-reported depression scores. This difference was tested and found to be statistically significant $t(4.12)$, $p < 0.001$. For this reason, research questions investigating depression as a predictor or outcome were examined using both parent and self-reported depression in separate models.

Results for Question 1: Paired Samples *t*-Tests

To test the hypothesis that the OCD intensive outpatient program examined in this research study is effective in significantly decreasing obsessive compulsive symptomology, paired samples *t*-tests were performed for OCD severity scores (using the CYBOCS) for baseline to week 8, baseline to week 12, and baseline to discharge (see Table 3). In addition, paired sample *t*-tests were conducted to examine whether there was a significant difference between scores from week 8 to week 12, and week 12 to discharge. Prior to conducting the analysis, the assumption of normality was examined and was satisfied. The Dunn-Sidak adjustment for multiple comparisons was used to control for familywise Type I error, as six paired samples *t*-tests were conducted. Results showed a significant difference between OCD severity scores at baseline ($M = 30.38$, $SD = 3.98$) and week 8 ($M = 18.25$, $SD = 8.06$), $t(8.86)$, $p < 0.001$, baseline and week 12 ($M = 15.26$, $SD = 7.33$), $t(10.54)$, $p < 0.001$, and baseline and discharge ($M = 11.72$, $SD = 6.30$), $t(14.16)$, $p < 0.001$. In addition, there was a significant difference between OCD severity scores at week 8 and week 12 $t(5.90)$, $p < 0.001$, however the difference between week 12 and discharge did not reach significance after accounting for multiple *t*-tests $t(2.72)$, $p = 0.013$.

Results for Question 2: Correlations Between Predictor and Outcome Variables

Pearson product-moment correlations were examined to better understand the zero-order relationships between outcome and predictor variables, answering question number 2. All correlations are provided in Table 4, and notable relationships are highlighted in this section.

Days in program. A moderate, positive relationship was found between days spent in program and family accommodation scores at baseline with 15% shared variance between the variables. A moderate, positive correlation was also found between days spent in the IOP and parent reported depression at baseline, indicating 19% shared variance. Interestingly, no significant relationship was found between self-reported depression scores at baseline and days spent in program.

Sexual obsessions and OCD severity. The presence of sexual obsessions at baseline was not significantly correlated with any outcome measures (OCD severity scores or time spent in program). However, a moderate, positive relationship was found between sexual obsessions at baseline and self-reported depression scores at baseline, indicating 19% shared variance.

Family accommodation and OCD severity. Family accommodation scores showed significant positive correlations across timepoints with OCD severity scores. Baseline family accommodation had a large, positive correlation with baseline OCD severity (28% shared variance). Week four family accommodation had a large, positive correlation with week four OCD severity (36% shared variance). Week eight family accommodation had a large, positive correlation with week eight OCD severity (42% shared variance). Week twelve family accommodation had a moderate, positive correlation with week twelve OCD severity (20% shared variance). Finally, discharge family accommodation had a large, positive correlation with discharge OCD severity (50% shared variance).

Parent-report depression and OCD severity. Parent reported depression also showed significant, positive correlations with OCD severity at several timepoints. Week 4 parent-reported depression had a large, positive correlation with week 4 OCD severity indicating that they share 31% variance. Week 8 parent reported depression also had a large, positive relationship with week 8 OCD severity (36% shared variance), and parent reported depression at discharge had a moderate, positive correlation with discharge OCD severity with 23% shared variance. No statistically significant relationships were found between baseline and week 12 parent reported depression and baseline and week 12 OCD severity.

Self-report depression and OCD severity. Similar, but smaller relationships were found between self-report depression scores and OCD severity. A moderate, positive correlation was found between week 4 self-reported depression and week 4 OCD severity (21% shared variance), as well as week 8 self-reported depression and week 8 OCD severity (17% shared variance). No significant relationships were found between baseline, week 12 or discharge self-reported depression, and baseline, week 12 and discharge OCD severity.

Relationships between predictor variables. Lastly, significant correlations were found between parent reported depression and family accommodation at each respective week (26% shared variance at baseline, 28% shared variance at week 4, 46% shared variance at week 8, 42% shared variance at week 12 and 26% shared variance at discharge). There were no significant relationships between family accommodation and self-reported depression scores.

Results for Question 3: Regression Analyses for Time Spent in Program

Multiple linear regression with sequential predictor entry was used to test the incremental variance in number of days spent in the OCD intensive outpatient program accounted for by each predictor. Family accommodation of OCD at baseline, which was entered into the model first,

accounted for 16% of the variance in days spent in the IOP $F(1,26) = 4.77$, $p = 0.038$, $R^2_{Adjusted} = 0.12$. Parent reported depression was entered into the model next, and had a significant zero-order correlation (direct) correlation of $r = 0.46$ with days spent in the IOP, but only accounted for an additional 7% of the variance in days spent in the IOP, after controlling for parent accommodation, $F_{change}(1, 25) = 2.39$, $p = 0.135$, $R^2_{Adjusted} = 0.17$.

In the final model, with both predictors entered, the mean predicted number of days spent in the IOP for participants with average family accommodation of OCD and average parent reported depression at baseline was estimated to be $b = 43.85$, ($SE = 2.42$) $t(25) = 18.11$, $p < 0.001$. Family accommodation of OCD's relationship with days spent in the IOP was estimated to be $b = 3.19$, ($SE = 2.83$) $t(25) = 1.13$ $p = 0.270$, $sr^2 = 0.04$; for every standard deviation increase in family accommodation of OCD, a 3.19 day increase in time spent in the IOP is expected, holding all else constant. Parent reported depression's relationship with days spent in the IOP was estimated to be $b = 4.36$, ($SE = 2.82$) $t(25) = 1.54$, $p = 0.135$, $sr^2 = 0.07$; for every standard deviation increase in parent reported depression, a 4.36 day increase in time spent in IOP is expected, holding all else constant. With both family accommodation and parent-reported depression entered into the model, neither was uniquely predictive of days spent in the IOP. This is not surprising based on the statistically significant zero-order correlation between parent reported depression and family accommodation of OCD.

Because of the significant difference between self and parent reported depression at baseline, this regression model was also run using self-reported depression in place of parent-reported depression as the measure of depressive symptomology. Family accommodation at baseline, which was again entered into the model first, accounted for 15% of the variance in days spent in the IOP $F(1,25) = 4.56$, $p = 0.043$, $R^2_{Adjusted} = 0.12$. Self-reported depression was entered

into the model next, which not did not have a significant zero-order correlation (direct) correlation with days spent in the IOP program ($r = 0.15$), and accounted for less than 1% of the variance in days spent in the IOP, after controlling for family accommodation, $F_{change}(1, 24) = 0.097$, $p = 0.76$, $R^2_{Adjusted} = 0.09$.

In the final model, with both predictors entered, the mean predicted number of days spent in the IOP for participants with average family accommodation of OCD and average self-reported depression at baseline was estimated to be $b = 43.99$, ($SE = 2.63$) $t(24) = 16.73$, $p < 0.001$. Family accommodation's relationship with days spent in the IOP was estimated to be $b = 5.26$, ($SE = 2.64$) $t(24) = 1.99$ $p = 0.058$, $sr^2 = 0.14$; in this model for every standard deviation increase in family accommodation of OCD, a 5.26 day increase in time spent in IOP is expected, holding all else constant. Self-reported depression's relationship with days spent in the IOP was estimated to be $b = 0.85$, ($SE = 2.72$) $t(24) = 0.31$, $p = 0.758$, $sr^2 = 0.003$; for every standard deviation increase in self-reported depression at baseline, a 0.85 day increase in time spent in IOP is expected, holding all else constant. With both family accommodation and self-reported depression entered into the model, neither was uniquely predictive of days spent in the IOP.

Results for Question 4: Longitudinal Growth Models

Longitudinal growth models were employed to examine the relationships between family accommodation of OCD, depression, and presence of sexual obsessions at baseline on OCD severity scores over the course of treatment (see Tables 5 and 6). In addition, unconditional growth models for family accommodation (Table 7) and depression (Tables 8 and 9) and were conducted to examine their trajectories over the course of treatment as well. Again, both self-reported and parent-reported depression were examined due to the significant differences between reporters. Assumptions of normality, linearity, multicollinearity, and homogeneity of

variance were tested (Tabachnick & Fidell, 2007). Box plots were examined for extreme outliers, and none were identified. Skew and kurtosis values were also examined, and all fell within the acceptable limit (no more than two times the standard error), which indicates normally distributed data. As seen in Table 3 (and discussed in research question two), bivariate correlation analyses were conducted to examine multicollinearity. Significant, moderate sized relationships were found between parent reported depression and family accommodation of anxiety, as well as sexual obsessions at baseline and self-reported depression at baseline. Due to the theoretical predictive value of both variables on OCD outcomes, all were retained in the analysis, however this does potentially limit statistical outcomes due to overlapping variance, reducing the likelihood that each variable will be uniquely predictive of the outcome.

Unconditional and functional form model for OCD severity. Models were run for OCD severity scores to determine the intraclass correlation (ICC) and functional form of the growth process over time. Results from the intercept-only model show that across all four timepoints over 12 weeks of the program, participants average OCD severity score was 22.69 points, all else held constant (see Table 5). The unconditional model for OCD severity outcome indicated little to no variation was explainable by differences between participants. In other words, the variation of OCD severity scores within participants was quite large, however the variation between participants was relatively small, leading to an ICC close to zero.

Based on previous studies and with a total of four timepoints, functional form was limited to linear and quadratic models, both of which were considered as a potential fit for the data. The data revealed that a linear model yielded the best and most parsimonious fit for OCD severity scores change over time based on the BIC value and growth parameter estimate comparisons. Participants were predicted to average 31.03 points on the OCD severity scale at baseline, all

else held constant. On average, participants' OCD severity scores decreased 1.63 points per week, all else held constant (see Table 5).

Linear growth model with time invariant predictor. The first model predicting OCD severity scores included only the time-invariant predictor of presence of sexual obsessions at baseline. Presence of sexual obsessions was effect coded, and the intercept should be interpreted as the average OCD severity score regardless of whether sexual obsessions were present at baseline or not. Results from this partial model are displayed in Tables 5 and 6. These results show that participants had a predicted average OCD severity score of 30.93 points, all else held constant, and their OCD severity scores decreased by 1.63 points per week, on average, all else held constant. The presence of sexual obsessions at baseline was not predictive of OCD severity scores at baseline (β = -0.72, p = 0.382), or their slope (i.e., change over time; β = 0.03, p = 0.842). At baseline, participants with sexual obsessions (+1) were predicted to have 0.723 fewer points on the OCD severity measure compared to average, all else held constant, and were predicted to have .03 more points on the OCD severity measure per week compared to average, all else held constant. In this model, sexual obsessions did not account for a significant portion of the variance in the OCD severity scores.

Linear growth models with time varying predictors. Next, the time-varying predictors (allowing the predictors to vary across all four timepoints, as opposed using one single measurement) of family accommodation and depressive symptomology were examined in the OCD severity scores model. Family accommodation and depression variables were not standardized, as time-varying predictors function as a "Y" variable and are more interpretable when left in their original units. These partial model results are displayed in Table 5—wherein

self-report CDI-2 was used to measure depressive symptoms—and Table in 6—wherein parent-report CDI-2 was used to measure depressive symptoms.

First, this model was run using self-reported depression scores. Results indicated that participants were predicted to average 15.50 points on the OCD severity scale at baseline for participants with zero points on the family accommodation scale and self-report depression measure, all else held constant. Participants' OCD severity scores were predicted to decrease 1.09 points per week, holding family accommodation and self-report depression constant. Self-reported depression ($\beta = 0.20$, $p < 0.001$) and family accommodation ($\beta = 0.16$, $p < 0.032$) at baseline were predictive of OCD severity scores. In other words, for every *T*-score decrease on self-reported depression, there was a predicted decrease of 0.20 points on the OCD severity score scale at baseline (all else held constant), and for every point decrease on the family accommodation scale, there was a predicted decrease of 0.16 points on the OCD severity scale at baseline, all else held constant.

Next the model was run using parent reported depression scores. Results indicated that participants were predicted to average 16.53 points on the OCD severity scale at baseline for participants with zero points on the family accommodation scale and parent-report depression measure, all else held constant, and participants OCD severity scores were predicted to decrease 1.12 points per week, holding family accommodation and parent-report depression constant. Parent-reported depression ($\beta = 0.16$, $p < 0.001$) and family accommodation ($\beta = 0.16$, $p < 0.025$) at baseline were predictive of OCD severity scores. This means that for every T-score decrease on the parent-reported depression scale, there was an expected mean decrease of 0.16 points on the OCD severity scale at baseline, all else held constant, and for every point decrease

on the family accommodation scale, there was an expected mean decrease of 0.16 points on the OCD severity scale at baseline, all else held constant.

Time-varying predictors and interactions. Next, family accommodation and depression's interactions with time were added to the model to better understand whether depressive symptomology and family accommodation moderate OCD severity scores change over time. Model results are again displayed in Tables 5 and 6. In the model using self-reported depression scores, results indicated that participants were predicted to average 21.21 points on the OCD severity scale at baseline for participants with zero points on the family accommodation scale and self-report depression measure, all else held constant, and participants OCD severity scores were predicted to decrease 1.99 points per week, holding family accommodation and self-report depression constant. Family accommodation was predictive of OCD severity scores at baseline ($\beta = 0.20$, $p = 0.003$), and also moderated OCD severity scores slope (i.e. change over time; $\beta = 0.03$, $p = 0.042$). In other words, for every point decrease on the family accommodation scale, there was a predicted decrease of 0.20 points on the OCD severity score scale at baseline, all else held constant. In addition, for every point decrease on the family accommodation scale, the model predicts 0.03 fewer points on the OCD severity scale per week. Self-reported depression scores were not predictive of OCD severity scores nor did they moderate OCD severity scores change over time.

Using parent-reported depression scores in the model, results indicated that participants were predicted to average 23.14 points on the OCD severity scale at baseline for participants with zero points on the family accommodation scale and parent-report depression measure, all else held constant, and participants OCD severity scores were predicted to decrease 2.49 points per week, holding family accommodation and self-report depression constant. Family

accommodation was predictive of OCD severity scores at baseline ($\beta = 0.20$, $p = 0.006$), however, they did not moderate their change over time ($\beta = 0.02$, $p = 0.351$). This means that for every point decrease on the accommodation of anxiety scale, there was a predicted decrease of 0.20 points on the OCD severity scale, and for every point decrease on the family accommodation of anxiety, the model predicts a non-significant 0.02 fewer points on the OCD severity scale per week, all else held constant. Parent-reported depression on the other hand, was not predictive of OCD severity scores at baseline ($\beta = 0.05$, $p = 0.405$), but did moderate OCD severity scores change over time ($\beta = 0.023$, $p = 0.03$). This means that for every T-score decrease on the parent-reported depression scale, there was a predicted decrease of 0.05 points on the OCD severity scale at baseline, which was not significant. However, for every T-score decrease on the parent report depression scale, the model predicts a significant 0.023 fewer points on the OCD severity scale per week.

Full linear growth model. Finally, all predictors and interactions were entered into a final, full model (see Tables 5 and 6). When self-reported depression was used as the measure of depressive symptomology, results indicated that participants were predicted to average 17.85 points on the OCD severity scale at baseline for participants with zero points on the family accommodation scale and self-report depression measure, and regardless of whether or not sexual obsessions were present. Participants OCD severity scores were predicted to decrease 1.68 points per week, holding family accommodation, self-report depression, and presence of sexual obsessions constant. In this model, all three variables were predictive of OCD severity scores at baseline including presence of sexual obsessions at baseline (time-invariant; $\beta = -1.99$, $p = 0.002$), family accommodation ($\beta = 0.22$, $p < 0.001$), and self-reported depression ($\beta = 0.12$, $p = 0.029$). In addition, family accommodation moderated OCD severity scores change over time

($\beta = 0.03$, $p = 0.036$). Self-reported depression did not moderate OCD severity scores change over time ($\beta = 0.01$, $p = 0.342$), and participants with sexual obsessions at baseline were predicted to have a non-significant 0.10 more points on the OCD severity scale per week compared to average ($\beta = 0.10$, $p = 0.390$).

In other words, participants with sexual obsessions at baseline (+1) were predicted to have 1.99 fewer points on the OCD severity scale at baseline compared to average. For every point decrease on the family accommodation scale, there was a predicted decrease of 0.22 points on the OCD severity scale at baseline, and for every T-score decrease in self-reported depression there was a predicted decrease of 0.12 points on the OCD severity scale at baseline. Family accommodation's moderation of OCD severity scores over time means that for every point decrease on the family accommodation scale, the model predicts 0.033 fewer points on the OCD severity scale per week.

With parent reported depression in the model, results differed slightly, indicating that participants were predicted to average 21.97 points on the OCD severity scale at baseline for participants, with zero points on the family accommodation scale and parent-report depression measure, and regardless of whether or not sexual obsessions were present. Participants OCD severity scores were predicted to decrease 1.24 points per week, holding family accommodation, parent-report depression, and presence of sexual obsessions constant. Presence of sexual obsessions at baseline ($\beta = -1.24$, $p = 0.027$) and family accommodation ($\beta = 0.20$ $p < 0.003$) were significantly predictive of OCD severity scores at baseline, however parent reported depression was not ($\beta = 0.06$, $p = 0.284$). Interestingly, parent reported depression moderated OCD severity scores over time ($\beta = 0.02$, $p = 0.033$). However, family accommodation ($\beta = 0.01$,

$p = 0.418$), and the presence of sexual obsessions at baseline did not have a significant relationship with OCD severity scores' slope ($\beta = -0.01$, $p = 0.990$).

In other words, participants with sexual obsessions at baseline (+1) were predicted to have 1.24 fewer points on the OCD severity scale compared to average, and for every point decrease on the family accommodation scale there was a predicted decrease of 0.20 points on the OCD severity scale at baseline. Only parent reported depression moderated of OCD severity scores change over time—for every T-score decrease on the parent-reported depression scale, the model predicts an average of 0.02 fewer points on the OCD severity scale per week.

Unconditional and Functional Form Model for Family Accommodation

The unconditional, intercept-only model for family accommodation indicated that across all timepoints the average family accommodation score was 12.15 points, and that approximately 4% of the variation was explained by difference between participants. The functional form analysis was limited to linear and quadratic models due to previous research as well as number of timepoints available. The data revealed that a quadratic model that allowed participants to randomly vary at baseline and on linear growth (but not acceleration in growth) was the best fit for family accommodation data change over time. This fit was determined based on BIC value as well as the growth parameter estimate (see Table 7). Participants were predicted to average 22.19 points on the family accommodation scale at baseline, all else held constant. On average, participants' family accommodation scores decreased 2.82 points per week, with an acceleration of 0.10 points per week, all else held constant. This model indicated that family accommodation decreased significantly over 12 weeks of treatment.

Unconditional and Functional Form Models for Depression

The unconditional model for self-reported depression showed that across all timepoints, the average self-reported depression T-score was 55.26, and that approximately 30% of the variation was explainable by differences between participants. Functional form analysis was again limited to linear and quadratic models. The data revealed that a linear model was the best fit for self-reported depression change over time. This fit was determined based on BIC value as well as the growth parameter estimate (see Table 8). Participants were predicted to have an average T-score of 63.19 on the self-report depression scale at baseline, all else held constant, and participants' self-reported depression T-score decreased by 1.56 points per week on average.

Finally, the unconditional model for parent-reported depression was examined and was similar to that of self-reported depression. However, a smaller percentage of the variance (13%) was explained by difference between participants. Across all timepoints, the average parent reported depression T-score was 62.71. The data revealed that a linear model was the best fit for parent-reported depression change over time based on BIC and growth parameter estimates (see Table 8). Participants were predicted to have an average T-score of 72.31 on the parent-report depression scale at baseline, all else held constant, and participants' parent-reported depression T-score decreased by 1.91 points per week on average. Both models indicated depressive symptomatology decreased significantly over 12 weeks of treatment

Chapter 5: Discussion

The current investigation aimed to better understand the relationship between participation in this IOP for OCD and important primary and secondary treatment outcomes over time, and possible factors that may predict how participants respond to treatment. OCD is a common, complex, and often chronic disorder in children and adolescents that can cause

significant impairment to normal routines as well as daily functioning (Keely et al., 2007; Lebowitz & Bloch, 2012). Effective and timely treatment is critical to prevent a potential chronic, lifetime course (Mancebo et al., 2014). The path to accurate diagnoses and finding a provider with the training to provide the gold standard treatment of CBT with ERP is often challenging, particularly for youth with symptoms in the severe range (Krebs & Heyman, 2010; Pinto et al., 2005, Walitza et al., 2011). Prompt diagnosis and treatment is important for short and long term social, academic, mental health, and occupational outcomes (Stewart et al., 2004; Storch et al., 2007), making it critical to begin to better understand the effectiveness of IOPs as an expanding OCD treatment option.

While there is an established body of research examining treatment for OCD and establishing CBT with ERP as the gold standard, a large portion of these studies have been conducted with adult participants, and very few research studies have been conducted on the effectiveness of ERP in more intensive treatment settings. Even fewer still have examined the effectiveness of IOP's for children and adolescents (Storch et al., 2007). With IOPs showing promise as a more acceptable and accessible "middle ground" for children and adolescents whose needs fall between those that can be served by weekly outpatient therapy and those who may require residential treatment (Marien et al., 2009), gaining a better understanding of how IOPs may be associated with a decrease in variety of symptomology, including OCD severity, is extremely important. In the past, if traditional weekly outpatient therapy did not lead to reductions in OCD symptomology to an acceptable level, residential treatment was often of the next level of care. However, IOPs offer many potential benefits over residential settings for children and adolescents with severe symptomology, including the opportunity to practice exposures in natural settings and leverage parent presence and participation in treatment (Krebs

& Heyman, 2014; Marien et al., 2009). In order for the IOP treatment option to become more commonplace, more research is needed, and this investigation aimed to add to that body of literature.

In addition to simply understanding whether participation in IOP treatment is related to significant OCD symptom reduction, gathering information regarding individual predictors of treatment outcomes is also critical in beginning to understand for whom treatment might be more (or less) effective, and what factors may be related to OCD severity treatment outcomes. Research is sparse when examining predictors of OCD treatment outcomes, and almost non-existent when examining predictors of treatment outcomes specifically in IOPs for children and adolescents. Previous researchers have organized potential "candidate" predictors of OCD severity outcomes into several categories. Those categories are: demographic predictors, aspects of OCD symptomology, comorbidity, and family factors (Keeley et al., 2008; Torp et al., 2015). The current study sought to provide insight regarding whether we see a reduction in OCD symptomology after participation in IOP treatment, and to to examine three key potential predictors of OCD treatment outcomes—sexual obsessions at baseline, depression, and family accommodation of OCD—using a clinical research sample from one hospital in the Pacific Northwest region of the United States.

Specific Findings

Depressive symptomatology differences. Overall, the descriptive information for each variable was unremarkable, however one variable had a significant impact on data analysis across research questions. As noted in the results section, parent-reported depression and self-reported depression scores were significantly discrepant from one another. There are a variety of possible explanations for the significant differences between reporters, with a sizeable body of

literature examining differences between parent and self-reported internalizing symptoms (e.g., Eg et al., 2018; Renouf & Kovacs, 1994). The literature does not indicate that either parents or children are consistently reliable or unreliable reporters, in fact, it is recommended that multiple reporters are consulted when making a diagnosis and determining a treatment plan (Kim, Chan, McCauley, & Vander Stoep, 2016). In this study's sample, parents consistently rated their child's depression, on average, as higher than children's self-reports of their own depression symptoms. Interestingly, this is opposite from what is often found when comparing parent and self-report of depression, with parents tending to underreport depressive symptomology in the literature (Eg, Bilenberg, Costello, & Wesselhoeft, 2018; Moretti, Fine, Haley, & Marriage, 1985). Here, it appears that parents rated depressive symptomology as more severe, on average, than their children. One possible explanation for this is based on findings from Moretti et al.'s 1985 study, which found that parents' ratings of their own depressive symptoms were significantly correlated with their perceptions of depression in their children. It is possible that parents of children in the IOP were experiencing higher levels of depressive symptomology due to the variety of stressors and challenges associated with parenting a child with severe OCD (Zucker, 2018), which translate to higher parent-reported depressive symptoms. Another possible explanation for this finding could be that OCD's overlap with depression causes more functional impairment that is noticed by parents but is less troublesome to children and adolescents. Regardless, no determination was made on whether parent or self-reported depression was more "accurate" for the purposes of this study. Self and parent-reported depressive symptoms were therefore considered independent, and both measures were used in separate regression and longitudinal growth models to shed light on the questions posed in this investigation.

Program effectiveness. The first research question sought to examine whether this IOP, which utilized ERP as the primary treatment modality, was associated with a significant reduction in OCD symptom severity. Participants' OCD severity scores were measured at baseline, every 4 weeks, and upon discharge from the program (which differed for each individual). Findings showed that treatment in the IOP was linked to reductions in OCD symptom severity after specific amounts of time in treatment (8 weeks and 12 weeks), as well as after discharge from treatment (which was on average 11 weeks from the start of treatment). In addition, findings showed that symptoms continued to decrease significantly between week 8 and week 12. Findings showed that not only did symptoms after 8 weeks, 12 weeks, and discharge decrease significantly compared to baseline, treatment continued to confer benefit (i.e., significant OCD symptom reduction) throughout the entire time spent in treatment.

Findings were expected based on the current body of research, which posits that ERP is the gold standard evidenced based practice in the treatment of OCD symptoms (Garcia et al., 2010; Rowa, Antony, & Swinson, 2007), and for children and adolescents the IOP setting, it is associated with significant reductions in OCD severity (Olino et al., 2011; Rudy et al., 2014; Storch et al., 2007; Whiteside et al., 2006). ERP therapy typically shows robust treatment outcomes, and findings from this sample are no different, indicating that treatment utilizing ERP was highly effective for demonstrating reductions OCD symptom severity in this IOP for children and adolescents with severe symptomology. Overall, results are promising for the continued growth of IOPs as an option for treating severe OCD in children and adolescents.

Zero-order relationships between variables. The second research question explored zero-order relationships between all predictor and outcome variables included in subsequent

regressions and longitudinal growth models. As expected, significant relationships were found between several predictor and outcome variables at each respective timepoint.

OCD severity scores were positively correlated with parent-reported depression, self-reported depression, and family accommodation, however not with the presence of sexual obsessions at baseline. These findings indicate that level of depression (regardless of rater) and how much parents accommodate their child's OCD behaviors are related to OCD severity scores. In other words, children and adolescents with higher levels of depression and whose parents were more accommodating of their OCD behaviors were more likely to have higher OCD severity scores. Presence of sexual obsessions however, did not show a zero-order correlation with OCD severity, indicating that no significant relationship emerged between whether kids were experiencing sexual obsessions at the start of treatment and their OCD severity scores.

Two potential predictor variables showed a significant zero-order relationship with days spent in the IOP: parent-reported depression at baseline and family accommodation at baseline. Children whose parents rated them higher on a measure of depression at baseline were more likely to spend more days as a patient in the IOP. In addition, children of parents who had higher family accommodation scores at baseline were also more likely to spend more days in the IOP. Interestingly, children's self-reported depression scores at baseline were not related to the amount of time spent in the program. This indicates that parents may indirectly play a role in determining how much time children spend in the IOP, based on how much they are accommodating OCD symptoms at the start of treatment, as well as based on their perception of how much depressive symptomology their child is experiencing at baseline.

Several predictor variables were also correlated with each other, including the presence of sexual obsessions at baseline and self-reported depression at baseline. While these findings do

not pertain to a specific research question being posed in this investigation, the relationship between self-report depression symptoms and presence of sexual obsessions at baseline is notable and provides some insight into the inner world of children who experience sexual obsessions as part of their OCD. Sexual obsessions are often taboo and can be difficult for children to share with parents and even mental health providers (Grant et al., 2006). This can lead to a delay in treatment for these particular symptoms, leading them to worsen over time (Grant et al., 2006). It is not surprising that children and adolescents who experience these often disturbing, unwanted thoughts or images, which they may have trouble sharing and seeking help for, may feel distressed, isolated, experience low self-esteem, withdraw from others, and experience more depressive symptoms (March & Benton, 2006).

In addition, statistically significant, positive correlations between parent-reported depression and family accommodation across timepoints was also established. Higher parent-reported depressive symptomology was associated with more family accommodation of OCD. This relationship also brought to light potential multicollinearity issues between family accommodation and parent-reported depression, and results from regression and growth models that utilized both variables should be interpreted with the understanding that there is a higher likelihood for non-significant results due to high covariance. Interestingly, self-reported depression was not correlated with family accommodation, indicating that children and adolescents' perceptions or experiences of their own depressive symptoms were not related how much parents accommodated their OCD symptoms.

Days spent in program. The third research question aimed to inform how family accommodation and depressive symptomology at baseline predicted the number of days participants spend receiving treatment in the IOP. Time spent in program was modeled twice—

once using parent-reported depression as the measure of depressive symptomology, and once using self-reported depression as the measure of depressive symptomology.

Relationship between family accommodation and days spent in the IOP. Baseline family accommodation was entered into the model first and was predictive of the number of days participants spent in treatment at the IOP in both the parent-reported depression and self-reported depression models. Children of parents who indicated higher levels of accommodation of OCD (e.g., changing routines so their children could engage in compulsions, providing reassurance, helping their child with rituals) at beginning of the program were significantly more likely to spend more days in treatment. This is a critical finding in that it may help guide patients' treatment goals and provide information about treatment course from the outset. If parents are high accommodators of their child's OCD symptoms, they can be informed that treatment may take longer than if accommodation was lower and they make plans for school re-entry or work leave as needed. It is also helpful for clinicians to have a more specific idea of how long a child might spend in treatment in order to provide accurate estimates to insurance companies, schools, or even other families on a waitlist.

Parent-reported depression. Baseline parent-reported depression was entered into the regression model next, and it was not predictive of days spent in the program despite there being a significant zero-order correlation. While children and adolescents of parents who reported higher depressive symptomology were more likely to spend more days in the program, it was not significantly predictive. This lack of unique prediction is likely explained by the significant relationship between baseline family accommodation and baseline parent-reported depression. Variance shared between the two predictor variables is already accounted for by family accommodation in the model, and there is little individual variance left for parent-reported

depression to be uniquely predictive of days spent in program. It is possible that if parent-reported depression were entered into the model first (and family accommodation entered next), that depressive symptoms would be predictive and family accommodation would not.

Self-reported depression. Self-reported depressive symptoms at baseline were not predictive of days spent in program. This is not surprising given the lack of a statistically significant zero-order relationship between these two variables. Self-reported depression accounted for less than 1% of the variance in days spent in program after accounting for family accommodation, indicating that self-reported depressive symptomology had very little, if any relationship with the amount of time spent in program. Finally, it is also interesting that it is unclear whether parent perceptions of depressive symptomology are more objectively "accurate" compared to self-report; however, it is parent perception of depressive symptoms that is more likely to be related to the amount of time kids spent receiving intensive outpatient treatment, with parent reported depression contributing 7% of the variance in days spent in program when in the regression model, and self-reported depression contributing 1% of the variance of days spent in program when in the model after accounting for family accommodation.

Summary. No published studies to date have specifically examined time spent in an IOP as an outcome variable. Most existing research examines IOPs with a pre-determined or set number of days or sessions, which is preferable when examining outcomes such as OCD severity scores. However, as noted previously, understanding factors that may be associated with how long participants spend in treatment can have its benefits for parents, patients, and clinicians. Based on present results, it seems clear that the more accommodating a family is of OCD symptoms when they begin treatment, the more likely they are to spend more days in the program. IOP treatment is intrusive and time-consuming for children with OCD, impacting

school attendance and ability to participate in social activities, as well as parents and siblings, parents' ability to attend work or attend to their others children's needs (Marien et al., 2009). Knowing what to expect in terms of treatment length based on specific factors is a potentially important step in demystifying the IOP experience and helping everyone involved feel more prepared.

Trajectory of OCD severity scores. The first aim in the final research question in this investigation was to investigate the trajectory of OCD severity scores across 12 weeks of treatment. Using longitudinal growth modeling, on average, OCD severity scores decreased over 12 weeks of treatment at the OCD-IOP (see Figure 1). A negative linear slope best fit this trajectory, which is consistent with previous studies that show OCD severity symptoms decrease in a linear fashion over time when patients are receiving ERP treatment (Falkenstein et al., 2019; McNamara et al., 2014). While a variety of studies have examined OCD severity trajectories across treatment for children and adults in outpatient and intensive settings, there is a dearth of research on growth trajectories specifically for children and adolescents receiving intensive outpatient treatment. As previously noted, ERP has long been considered the most effective and important part of OCD treatment (NICE, 2005) for adult and pediatric populations in a variety of settings (e.g., outpatient, hospital; Krebs & Heyman, 2010; Mancebo et al., 2014; Rudy et al., 2014). Findings from this investigation add further information regarding the trajectory and rate of change in OCD severity symptoms in a specific, relatively new, and thus far under-researched treatment setting.

Effects of predictors on OCD severity scores trajectories. Next, the aim of the final research question was to examine the relationship between the presence of sexual obsessions at baseline, depressive symptomatology, and family accommodation on OCD symptom severity

and change in OCD symptom severity over time. Because parent and self-reported depression symptoms differed significantly, two final multi-level models were run: one that included self-reported depression as the measure of depressive symptomology, and one that included parent-reported depression.

In the complete multi-level model using self-reported depression symptoms, sexual obsessions at baseline, self-report depression and family accommodation all emerged as predictors of OCD severity scores. Self-reported depression and family accommodation were predictive in the expected direction, such that higher levels of family accommodation and depression were associated with higher OCD severity scores (see Figures 2 and 3). Sexual obsessions at baseline, however, was predictive in an unexpected direction, such that children and adolescents who reported experiencing sexual obsessions on the initial OCD severity measure were predicted to have significantly lower OCD severity scores. When looking at weekly change in OCD severity scores from baseline to week 12 of treatment, only family accommodation affected the trajectory of OCD severity scores. Participants with lower family accommodation demonstrated a steeper decrease in OCD severity scores over time compared to participants with higher family accommodation (see Figure 2). This multi-level model shows that family accommodation was not only linked to initial OCD severity scores, but also how they changed over time, with higher levels of accommodation being associated with poorer outcomes. While causation cannot be inferred from this investigation, the evidence suggests that individuals with lower family accommodation exhibited a faster decline in OCD severity.

These results are consistent with OCD research literature that finds that family accommodation is common, closely related to OCD symptom severity, and may impact children's ability to benefit from OCD treatment (Calvocoressi et al., 1999; Garcia et al., 2010;

Lebowitz & Bloch, 2012; Merlo et al., 2009; Peris et al., 2004). While family accommodation behaviors are typically done with the best of intentions, whether it be to help improve the child's ability to access their education, relieve extreme distress, socialize, or function as a member of the family, it is almost always counterproductive (Lebowitz et al., 2012; Marien et al., 2009; Thompson-Holland et al., 2014). When parents or caregivers accommodate OCD behavior, they are not only allowing the child to further engrain compulsive behaviors, but they are also inadvertently reinforcing the idea that the compulsions they are allowing are necessary (Thompson-Holland et al., 2014). For example, if a child feels the need to clean their backpack after returning from school each day and their parent helps them do it, parents are reinforcing the idea that the backpack is dirty and therefore dangerous. If a parent changes their routine and no longer leaves the house at 9am, because the number 9 is "unlucky," this parent is agreeing with the possibility that something bad could happen if they leave the house at 9am. Even if the child is engaging actively in ERP treatment, if parents continue to behave in ways that reinforce or accommodate OCD worries, treatment will not be as effective as if they do not (Marien et al., 2009; Thompson-Holland et al., 2014). When parents' accommodation behaviors allow OCD behaviors to flourish in this way, it is not surprising that higher levels of accommodation are associated with less change in OCD severity.

Overall, this implies that specifically targeting family accommodation of OCD symptoms as part of a comprehensive treatment could be beneficial in improving treatment outcomes for children and adolescents. Research has started to focus more on the importance of intentionally integrating family accommodation into treatment goals, with family approaches to treatment becoming more common (Choate-Summers et al., 2008; Lebowitz et al., 2019; Maina, Saracco, & Albert, 2006; Steketee & Van Noppen, 2003). Intensive outpatient programs are especially

well positioned to provide interventions that directly target family accommodation, as there may be an expectation that family members are more heavily involved compared to outpatient treatment programs and are therefore expected to attend treatment sessions with their children.

Examining the predicted values for self-reported depression show that while the trajectory for OCD severity scores is not significantly affected by level of depression, children and adolescents with higher self-reported depression are predicted to have, on average, higher OCD severity scores by the end of 12 weeks of treatment by nature of having higher OCD severity scores to begin. The finding that self-reported depression is predictive of OCD severity scores is consistent with the literature that has found that higher levels of depressive symptoms are related to more severe OCD symptoms (Overbeek, Schruers, Vermetten, & Griez, 2001; Rufer, Grothusen, Mab, Peter, & Hand, 2005; Storch et al., 2008). Researchers who have found similar results have posited several explanations. It is possible that higher levels of depression are related to lower motivation or energy to engage in exposures and more feelings of hopelessness, discouragement, or failure if exposures are not immediately effective (Abromowitz, 2004). Children with high levels of depression may be more vulnerable to obsessive thinking due to the ruminative thought patterns that are common with depressive symptomology. Essentially, children with depression and OCD may have a compounded susceptibility to obsessional thoughts making treatment more difficult (Abromowitz et al., 2007). Another possible explanation is that children and adolescents with higher levels of depression are likely to be more withdrawn and socially impaired, which leads to further isolation and lack of activities. In the absence of positive, pro-social and healthy activities, OCD obsessions and compulsions could become more prominent and severe.

Finally, the unexpected finding that presence of sexual obsessions at baseline predicted lower initial OCD severity scores must be addressed. While some research has found no significant relationships between sexual obsessions and OCD severity, and one has found similar results to that of this investigation (e.g., Steketee et al., 2011), the finding that having sexual obsessions at baseline predicted better OCD outcomes was not expected. While this finding is challenging to explain, there are several possibilities. One possible explanation is that the taboo nature of sexual obsessions has led children and adolescents to not only feel uncomfortable talking about their symptom profile, but their symptom severity as well, leading to lower reported CYBOCS scores. It is also possible that for this IOP sample in particular, children and adolescents with sexual obsessions were experiencing fewer symptoms overall, and therefore likely lower overall severity. This is because admission to this IOP required at least once course of "failed" outpatient treatment for OCD. It is possible that many other, less taboo, symptoms were treated successfully in outpatient treatment and the reason for failed treatment was leftover sexual obsessions that went untreated due to worries about disclosing them. This might lead children with sexual obsessions to IOP treatment with a more specific set of symptoms but a less severe OCD symptoms overall. This explanation for this finding may actually be consistent with Alonso et al.'s (2001) investigation, which found a greater frequency of sexual obsessions in patients who were considered non-responders to outpatient treatment. Perhaps the children and adolescents who made their way to IOP treatment were non-responders to outpatient treatment in part due to the presence of sexual obsessions, but they were able to decrease overall OCD severity in the first round of treatment compared to children without sexual obsessions. Finally, it is possible that previous findings of poorer outcomes for individuals with sexual obsessions in

adult populations (e.g. Boschen et al., 2010; Keeley et al., 2008) simply do not hold true for children and adolescents.

In the full multi-level growth model using parent-reported depression, sexual obsessions at baseline and family accommodation emerged as predictors of OCD severity scores. Again, family accommodation was predictive in the expected direction such that higher levels of family accommodation was associated with higher OCD severity scores. Presence of sexual obsessions was predictive in the opposite direction than was expected as well, such that children and adolescents who reported experiencing sexual obsessions on the initial OCD severity measure were predicted to have significantly lower OCD severity scores at baseline. Parent-reported depression did not emerge as a predictor of OCD severity scores at baseline. However, when looking at weekly change in OCD severity scores from baseline to week 12 of treatment, only parent-reported depression affected the trajectory of OCD severity scores. Participants with lower parent-reported depression demonstrated a steeper decrease in OCD severity scores over time compared to participants with higher parent-reported depression.

The most prominent differences between the full multi-level growth model using parent-reported depression and self-reported depression is that in the multi-level growth model using parent-report depression as the measure of depressive symptomatology, depression was no longer predictive of initial OCD severity scores, family accommodation was not related to the trajectory of OCD severity scores over time, and parent-reported depression did affect the trajectory of OCD severity scores over time. What appears to be happening in this multi-level growth model is likely related to the close relationship between parent-reported depression and family accommodation of OCD. Because these two predictors shared a significant amount of variance, the ability to detect the variance they share with OCD severity is significantly lowered.

Nonetheless, it appears that when parent-reported depression was used in the multi-level growth model, OCD severity scores at baseline were not affected by depressive symptomatology, however children whose parents report lower depression scores demonstrated a steeper decrease in OCD severity scores over time compared to participants with higher parent-reported depression scores (see Figure 4). This finding has interesting implications for determining when participants are discharged from the program: when parents report lower depression scores, OCD severity scores are predicted to decrease more quickly, likely leading to a speedier discharge from the program. Parent-reported depression was also closely related to days spent in program, indicating that how parents perceive their child's depression symptoms is associated with the course of treatment. When parents perceive depression to be high, kids' OCD symptoms appear to not improve as quickly, and findings suggest they spend more time in the program.

Trajectories of secondary outcomes: Family accommodation and depression. The final part of research question number four aimed to examine the predictor variables of family accommodation and depression as secondary outcomes to better understand their trajectories over 12 weeks of treatment in the IOP.

While decreasing family accommodation was not a primary aim of the intensive outpatient treatment for OCD, the literature suggests that specifically targeting family accommodation can impact OCD outcomes (Lebowitz & Bloch, 2012). This study adds to the literature in understanding the trajectory of family accommodation and how it changes over time, despite not necessarily being an intended treatment target (i.e., no specific protocol was used to intervene on families' accommodation of their child's OCD behaviors). Although family accommodation was not an intentional treatment target in this study, that does not mean it is not needed as a part of treatment. Using longitudinal growth modeling, on average, family

accommodation scores decreased over 12 weeks of treatment at the OCD-IOP. A negative quadratic slope best fit this trajectory, showing a steep drop in family accommodation symptoms in the first several weeks of treatment with the decrease leveling off as treatment goes on (see Figure 5). This quadratic trajectory of family accommodation is interesting, but not altogether surprising.

Family accommodation is relatively easy to intervene on once the accommodation behaviors are uncovered. Parental instincts are typically to support and protect their children, especially if their children appear to be suffering, and often parents and caregivers are unaware that what they are doing is unhelpful and counterproductive (Marien et al., 2009; Thompson-Holland et. al., 2014). After learning about family accommodation (e.g., what it can look like, how it can impede OCD symptom reduction), parents are often able to identify most ways in which they are accommodating OCD behaviors and stop. Essentially, once parents are educated and are given "permission" to stop doing many of the things they may have believed they should be doing as a warm, sensitive, caring parent (e.g., asking the school to give their child with perfectionism more time on tests, reassuring their crying child repeatedly that the burner is turned off at home), they do not stop accommodating on a linear trajectory. Rather, the accommodation behaviors quickly drop off and then plateau at a low level as treatment goes on.

Lastly, this study aimed to better understand the trajectory of depressive symptomology across 12 weeks of treatment. Again, decreasing depressive symptomology was not a primary aim of treatment and no specific depression treatment protocol was used; however, comorbidity between depression and OCD is high (Walitza et al., 2011), and a better understanding of whether and how depressive symptoms change while in IOP treatment for OCD may be encouraging for individuals with comorbid conditions.

Using longitudinal growth modeling, on average, parent and self-reported depression scores decreased over 12 weeks of treatment at the OCD-IOP. A negative linear slope best fit both trajectories, showing that depressive symptomology followed a similar trajectory to OCD severity scores, decreasing at a steady pace over 12 weeks of treatment (see Figure 6). Participants experienced significant improvement in depression symptoms, with parents reporting an average T-score drop of 7.64 points every 4 weeks and self-report showing a 6.24 T-score drop every 4 weeks. By week 4, predicted average parent-reported depression had fallen from the clinically significant range to the at-risk range. By week 8, parent-reported depression demonstrated a predicted value in the high-average range and by week 12, was predicted to be in the average range. Self-report depression T-scores were, on average, predicted to be in the at-risk range at baseline, high average range at week 4, and in the average range at week 8 and week 12. This finding is not surprising, and the linear trajectory of depressive symptom reduction seems intuitive. Whereas family accommodation, for example, can be more quickly ameliorated by bringing the problem to light, depressive symptoms do not disappear overnight. OCD is chronic and distressing, and most children and adolescents attending an IOP have been struggling with the disorder for many years. It would make sense that as OCD symptoms lift, and this chronic and distressing illness becomes less severe, an improvement in depressive symptoms may quickly follow (Barrett et al., 2004; Storch et al., 2010; Storch et al., 2007). There is some evidence to show that depressive symptoms often set in after OCD in adults (Rasmussen & Eisen, 1992), meaning that targeting OCD symptoms may indirectly work to reduce depressive symptoms. In the treatment protocol used in this investigation, some children were taught and directed to use cognitive strategies that could have been beneficial to fighting against depressive thoughts. Many participants were also directed to engage in behavioral activation activities that

could have contributed to significant depressive symptom reduction. Finally, it is possible that the group nature of this IOP was related to the significant reductions in depressive symptoms over time. Social connection is a known factor in improving depressive symptomology (Cruwys et al., 2013), and by spending three hours per day together, many participants connected socially in group and outside of group.

Implications for Practice

The findings from this study have potentially important implications for the future of treating OCD in children and adolescents. As evidence grows that IOPs are an effective milieu for treating severe OCD, the hope is that they become more common and accessible in a wider range of communities across the country. Gathering evidence for the effectiveness of IOPs is not only important for understanding how to provide high quality and effective intervention, but also for encouraging more hospitals and agencies to provide IOP treatment options and ensuring insurance companies will cover the costs for patients.

As studies continue to investigate and better understand factors that predict OCD-IOP treatment outcomes, programs can begin to tailor treatment and intentionally target individual and family factors such as depressive symptomology and family accommodation to improve outcomes for children and adolescents with higher levels of these variables from the outset. Evidence-based interventions such as behavioral activation for depression could be used in a more structured and systematic way, which could in turn improve patients' hope, motivation, cognitive thinking patterns, and therefore OCD symptomology. Parents with high levels of family accommodation could be frontloaded with psychoeducation on family accommodation. By engaging in these tailored activities, clinicians could potentially decrease the amount of time spent children and adolescents spend in treatment and improve OCD outcomes.

In addition to tailoring treatment in the clinical setting, the finding that higher accommodation is associated with poorer outcomes has implications for the school setting as well. While the majority of research and measures focus on parental accommodation in the home and community, accommodation of OCD is also likely to occur at school. Just as parents and caregivers are driven to engage in accommodation behaviors in order to help their child with OCD function more easily in the world, teachers and school staff also aim to help students and are likely to provide potentially counterproductive accommodations (McKenny, Simpson & Stewart, 2020). In the world of special education, individualized education plans (IEP') and section 504 of the Americans with Disabilities Act, "accommodation" is typically viewed as positive. Unfortunately, just as accommodation of OCD at home is problematic in the long-run for children and adolescents, it is also problematic at school (McKenny, Simpson & Stewart, 2020; Negreiros, 2019).

With the evidence building that more accommodation is linked to poorer OCD outcomes, clinicians, therapists, and other mental health experts can work with teachers and school districts to provide psychoeducation on what accommodation is, why it is often counterproductive for students with OCD, and how to identify accommodations already in place that may be reinforcing obsessions or compulsions. This psychoeducation could take place via large-scale teacher trainings and/or through individual consultations with outside clinicians on an as-needed basis. School psychologists may also be able to act as consultants who are able to be in close contact with mental health clinicians and translate their recommendations for curbing accommodation of OCD at school to teachers and other school staff.

While students with OCD may benefit from temporary accommodations as part of a 504 plan or IEP (e.g., extra time, being allowed to do small group presentations, preferential seating),

those accommodations should always be developed in consultation with the students' therapist and can often be phased out as the student makes progress in treatment (Negreiros, 2019). In addition to paying close attention to the use of these relatively common school accommodations, there are some types of accommodation behaviors that teachers and school staff can be coached to not engage in whatsoever, such as participating in known rituals and providing reassurance (Negreiros, 2019). The ability to more easily identify and decrease accommodation in the school setting as well as the home setting will hopefully be associated with a more thorough elimination of these counterproductive accommodation behaviors and overall better outcomes in treatment. Children and adolescents typically spend a large portion of their day in the school setting and having teachers and staff who are versed in accommodation and the associated pitfalls for students with OCD will hopefully help to significantly reduce accommodation behaviors and improve OCD symptomology.

Finally, the finding that depressive symptoms and accommodation decrease as secondary treatment outcomes in the IOP even without a specific intervention protocol is encouraging. Understanding more about how IOPs may confer extra benefit as a natural part of treatment in addition to the primarily target of decreasing OCD severity is promising for children and families. The fact that we see a reduction in depressive symptoms and family accommodation on top of OCD severity is extremely practical and bodes well for insurance companies' interest in covering this type of treatment. Having a more accurate picture of how depressive symptoms and family accommodation decrease over time can also help clinicians to tailor when to provide the interventions, what to expect in terms of family accommodation and depression symptom reduction over time, and to modify their approach if there is a lack of expected progress. In addition, including a protocol treating for depressive symptomology and family accommodation

in the context of OCD could lead to even greater and faster decreases in these secondary outcomes than are already occurring.

Limitations

There are a number of limitations to consider in the current investigation. First, no causal claims can be made regarding this OCD IOP's overall effectiveness due to the lack of a comparison or control group. It is impossible to say that treatment in the IOP was the cause of lower OCD severity scores, rather, the two are significantly related. Many other factors could theoretically explain treatment outcomes. One extraneous variable in particular that was not accounted for was whether participants were receiving pharmacological treatment while in the OCD-IOP. Because medication was not controlled for it is impossible to know whether it was a contributing factor to OCD severity score declines.

In addition, causal relationships cannot be drawn regarding the relationship between predictor and outcome variables due to the correlational nature of all of the relationships described. The claim cannot be made, for example, that higher levels of family accommodation are the cause of poorer OCD outcomes, rather, a significant relationship exists. To better understand the relationships described in this study, it will be important for future investigations to include additional variables to help better understand the complete picture of OCD severity outcomes or time spent in program, and control for confounding or extraneous variables. This study was highly constrained by the small sample available at the time of this research, which significantly limited number of predictor variables included. In addition to including more predictor variables, a larger sample size would afford the analyses more statistical power and increase the chances of finding significant effects.

Another challenge in this particular investigation was related to the approach by which timepoints were constructed. Because this was a clinical population as opposed to a research sample, timepoints were not always measured on a precise day (e.g., at exactly week 4 or week 8). In addition, the small sample size required the "binning" of data into equally spaced timepoints in order to maximize power, meaning that week 8 data were actually data taken at any point between weeks 5 and 8. While all data were binned according to these rules, this process limits the ability to understand more precisely each measure at an exact point in time.

There are also significant limits to the generalizability of this study based on the characteristics of this particular sample. Ninety percent of participants in this study identified as Caucasian and 76% as female. These demographics do not represent the general population of the Pacific Northwest region of the United States, or the population of children and adolescents who have OCD. In fact, childhood onset OCD tends to effect boys more than girls with a 3:2 ratio, with the prevalence being relatively equal beginning in adolescence (Walitza et al., 2011). A larger, more diverse sample representative of the entire population of children and adolescents with OCD is needed to make more definitive and generalizable claims. It is important to note however, that it is possible that the demographic characteristics of this sample do represent the makeup of individuals who have the resources to seek out and participate in intensive outpatient treatment in this part of the United States.

The way in which depression was measured is also a notable limitation for this study. While challenges reconciling discrepancies between parent and self-report depression are not uncommon in the related research, it may be beneficial for future investigations to develop a more comprehensive and reliable measure of depression that incorporates both parent and child report, as well as a clinician administered interview, which is considered to be the gold standard

in depression diagnosis (Fangyu & Hua, 2018) in order to have a more complete, accurate picture of depressive symptomology.

Future Directions

One primary future direction for this research is investigating long-term follow-up outcomes for children and adolescents who completed the OCD IOP. It will be critical to understand how long treatment gains hold after the completion of the program and if are there any participant characteristics that might predict symptom refraction. Following participations for a length of time after completing the program (i.e., 6 months, 1 year, 5 years) may help better understand the long-term course of OCD after IOP treatment and compare those long-term outcomes with weekly outpatient or residential treatment long-term outcomes. Because OCD often takes a chronic course over the lifetime, it will be important to know more about whether any symptom reduction that occurred in the IOP endured, as well other social, functional or adaptive outcomes, such as whether participants returned to treatment at any point, college admissions, or employment status. Understanding whether IOP treatment is more or less effective in helping participants to maintain gains in the long term can aide clinicians and families in making the most informed decisions regarding treatment.

As previously noted, one limitation of this study was the lack of ability to draw causal conclusions regarding the relationship between IOP treatment and both primary and secondary outcomes. Few randomized control trials (RCTs) have examined OCD treatment for children and adolescents, with the Pediatric Obsessive-Compulsive Treatment Study (POTS) headed by Dr. Garcia being one of the few. More RCTs are needed, specifically using matched samples and matched number of treatment hours comparing IOPs with weekly outpatient and/or residential treatment programs. While these rigorous studies are often challenging to conduct with clinical

populations, they are critical for the advancement of interventions and the provision of the highest-quality evidence-based practices.

It is impossible to escape the reality that children and adolescents are invariably affected by their caregivers—be it due to genetic, environmental, or other factors. A missing piece in the broader research about child and adolescent OCD treatment is understanding how parent and caregiver variables impact the provision of treatment. Another direction for this line of research is to explore parent, family, and/or home environmental variables that may be associated with treatment effectiveness or trajectories. Researchers have started to examine the relationship between variables such as parenting styles (Alonso et al., 2004; Brander et al., 2016; Timpano et al., 2010), parental psychopathology (Calvo et al., 2007; Fard, Shooshtari & Alibaba, 2018; Garcia et al., 2010; Liakopoulou et al., 2010), and family conflict (Ginsburg et al., 2008; Peris et al., 2008, Peris et al., 2012) with OCD treatment outcomes. It is well known, for example, that parental psychopathology is highly impactful on children and adolescents in a variety of ways (e.g., Manning & Gregoire, 2009), but far more work must be done to better understand how that psychopathology may affect how OCD treatment is provided, as well as important treatment outcomes. Much of this research is in its nascence however, and far more is needed—especially in IOP settings—in order to better understand how parental and home factors may be related to symptomology as well as treatment.

Finally, the need to address family accommodation as a part of treatment is emerging as a critical part of successfully treating OCD. Given the potential impact that family accommodation of OCD (i.e., participation in symptoms) can have on children and adolescents working to recover from OCD, future research should continue to focus on the intricacies of this particular variable. One potential line of research could include examining trajectories of accommodation

behaviors based on factors such as parental anxiety, OCD, depression, or parenting styles. While this has not been examined in the literature, it would be interesting to investigate whether, perhaps, parents with their own anxious symptomology have a harder time curbing their accommodating behaviors and therefore have an effect their children's treatment outcomes. OCD can have a pervasive influence on the functioning of an entire family, and a better understanding of how to address all components of treatment will be critical in order to achieve the best possible outcomes.

Conclusions

The current study expanded on previous research in the field and added to the body of evidence demonstrating significant relationships between IOP treatment and an improvement in primary and secondary outcomes associated with pediatric OCD. In addition to participation in this treatment being associated with significant reductions in OCD severity, depressive symptomology, and family accommodation, this investigation also helped to better understand predictors of primary treatment outcomes. As with previous research on the effectiveness of treatment for OCD using ERP, children and adolescents in this study showed significant decreases in OCD severity scores over 12 weeks of treatment. Findings also demonstrated that higher family accommodation and depressive symptoms were associated with poorer OCD outcomes over the course of treatment. Findings also showed promise for secondary outcomes, indicating significant decreases in depressive symptoms and family accommodation over 12 weeks of treatment.

There are many factors to consider when deciding on a treatment setting for children and adolescents with OCD. For many, weekly outpatient may be enough to achieve remission. For others, a residential setting may be appropriate. IOPs offer a potentially viable alternative that

can combine the best of both settings—therapy on an almost daily basis, with the opportunity to involve parents and generalize skills in real-life settings. IOPs also offer a potentially parsimonious avenue for treatment. With the evidence suggesting that treatment is linked to significant decreases in OCD severity as well as depression and family accommodation, IOPs are potentially a time and cost-effective way to see reductions in a variety of problematic symptomology. As predictors of treatment outcomes in IOPs are more clearly defined, intervention can be further individualized, and patients and clinicians can become more empowered and knowledgeable about the best choice for their particular needs. As IOPs gain more traction and evidence grows for their effectiveness, they provide more opportunities for evidence-based treatment for severe OCD and more hope for children and families who may have waited years for appropriate and effective intervention.

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Table 1.
Descriptive Statistics

	N	*% of Sample*
Comorbidities		
1. Depressive Disorder	6	20
2. Eating Disorder	3	10
3. Tourettes	2	7
4. Attention Deficit/Hyperactivity Disorder	2	7
5. Social Anxiety Disorder	1	3
6. Trichotillomania	1	3
7. Gender Dysphoria	1	3
8. Functional Neurological Symptom Disorder	1	3
OCD Obsessions Symptom Categories		
9. Contamination	30	100
10. Aggressive	28	93
11. Sexual	12	40
12. Hoarding/Saving	19	63
13. Magical/Superstitious	14	47
14. Somatic	24	80
15. Religious/Scrupulosity	27	90
16. Miscellaneous	26	87
OCD Compulsions Symtpom Categories		
17. Washing/Cleaning	29	97
18. Checking	27	90
19. Repeating	27	90
20. Counting	8	27
21. Ordering/Arranging	24	80
22. Hoarding/Saving	10	33
23. Superstitious	10	33
24. Rituals Involving Others	19	63
25. Miscellaneous	29	96

Note. $N = 30$

Table 2.
Descriptive Statistics

	N	*Min*	*Max*	*M*	*(SD)*
1. Days in Program	29	19.0	77.0	43.45	(13.93)
OCD Severity Scores					
2. Baseline OCD Severity	30	22.0	39.0	30.38	(3.98)
3. Week 4 OCD Severity	30	10.0	34.0	24.83	(6.41)
4. Week 8 OCD Severity	28	4.0	33.0	18.25	(8.06)
5. Week 12 OCD Severity	23	4.0	32.0	15.26	(7.33)
6. Discharge OCD Severity	29	4.0	31.0	11.72	(6.30)
Parent Reported Depression					
7. Baseline Parent Report Depression	29	52.0	90.0	72.28	(12.11)
8. Week 4 Parent Report Depression	28	50.0	85.0	65.54	(9.82)
9. Week 8 Parent Report Depression	24	40.0	77.0	56.79	(11.24)
10. Week 12 Parent Report Depression	19	39.0	74.0	51.84	(10.20)
11. Discharge Parent Report Depression	23	39.0	71.0	49.43	(8.20)
Depression Self Report					
12. Baseline Self Report Depression	29	46.0	90.0	62.86	(10.58)
13. Week 4 Self Report Depression	27	40.0	90.0	58.19	(14.34)
14. Week 8 Self Report Depression	26	40.0	76.0	50.88	(10.64)
15. Week 12 Self Report Depression	19	40.0	64.0	46.42	(7.27)
16. Discharge Self Report Depression	23	40.0	64.0	44.87	(6.25)
Family Accommodation of OCD					
17. Baseline Family Accommodation	29	5.0	40.0	22.55	(8.80)
18. Week 4 Family Accommodation	29	0.0	26.0	12.14	(8.63)
19. Week 8 Family Accommodation	26	0.0	20.0	6.77	(8.20)
20. Week 12 Family Accommodation	20	0.0	16.0	4.10	(4.22)
21. Discharge Family Accommodation	23	0.0	11.0	2.65	(2.76)
Sexual Obsessions (SO)					
22. Presence of SO Baseline	30	0.0	1.0	0.40	(0.50)

Note. $N = 30$. OCD severity scores from CYBOCS range 0 to 40. Depression T-scores from CDI-2 range 40 to 90. Family accommodation scores from PAS-PR range 0 to 40

Table 3.

Paired Samples t-Test Results Comparing OCD Severity Score Means

	Mean Change	*(SD)*	*t*	*(df)*	*p*
OCD Severity Baseline - Week 8	12.57	(7.51)	8.86	(1, 27)	<0.001
OCD Severity Baseline - Week 12	16.17	(7.36)	10.54	(1, 22)	<0.001
OCD Severity Baseline - Discharge	19.07	(7.24)	14.18	(1,28)	<0.001
OCD Severity Week 8 - Week 12	6.64	(5.28)	5.90	(1,21)	<0.001
OCD Severity Week 12 - Discharge	2.46	(4.24)	2.72	(1,21)	0.013

Note. SD = Standard Deviation. OCD severity scores from CYBOCS and range from 0 to 40.

Table 4.

Correlations Among Mental Health Variables and OCD-IOP Outcomes

Measure	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.
1. Days in Program	--																				
OCD Severity Scores																					
2. Baseline OCD Severity	**.39**	--																			
3. Week 4 OCD Severity	**.69**	**.58**	--																		
4. Week 8 OCD Severity	**.79**	**.38**	**.79**	--																	
5. Week 12 OCD Severity	**.55**	.28	.39	**.67**	--																
6. Discharge OCD Severity	.35	.07	**.38**	**.63**	**.83**	--															
Parent Reported Depression																					
7. Baseline Parent Report Depression	**.44**	.33	.36	.37	.20	.11	--														
8. Week 4 Parent Report Depression	**.53**	**.40**	**.56**	**.40**	.13	.22	**.66**	--													
9. Week 8 Parent Report Depression	**.59**	.20	.36	**.60**	.24	.24	**.57**	**.45**	--												
10. Week 12 Parent Report Depression	.37	-.41	-.44	-.01	.26	.32	.19	.24	**.53**	--											
11. Discharge Parent Report Depressio	.20	**-.47**	-.09	.09	.10	**.48**	.21	.12	.38	**.85**	--										
Self Reported Depression																					
12. Baseline Self Report Depression	.15	.34	.16	.05	.17	-.09	**.46**	.36	.20	.02	-.14	--									
13. Week 4 Self Report Depression	**.40**	.31	**.46**	**.41**	.27	.16	**.52**	**.64**	**.51**	.15	.02	**.75**	--								
14. Week 8 Self Report Depression	.31	.16	**.41**	**.47**	.18	.11	**.48**	**.58**	**.57**	.28	.13	**.63**	**.89**	--							
15. Week 12 Self Report Depression	-.11	-.28	-.23	-.07	.36	.14	.01	.14	.15	.32	.07	.40	**.54**	**.55**	--						
16. Discharge Self Report Depression	-.08	-.40	.01	.10	.12	.29	-.07	.15	.08	.28	.16	.24	**.49**	**.52**	**.90**	--					
Family Acommodation of OCD																					
17. Baseline Family Accommodation	**.39**	**.53**	**.56**	**.40**	.40	.21	**.51**	.23	.35	-.07	-.10	.18	.21	.09	-.04	-.02	--				
18. Week 4 Family Accommodation	**.58**	**.54**	**.60**	**.53**	.38	**.41**	**.51**	**.53**	**.51**	.11	-.04	.11	.32	.18	-.20	-.20	**.65**	--			
19. Week 8 Family Accommodation	**.85**	**.48**	**.56**	**.65**	**.57**	**.54**	**.52**	**.59**	**.68**	.36	.19	.03	.32	.26	-.14	-.19	**.47**	**.81**	--		
20. Week 12 Family Accommodation	.24	-.06	-.18	.17	**.45**	**.55**	.08	-.04	**.51**	**.65**	.46	.08	-.13	.01	.17	-.11	.11	**.45**	**.54**	--	
21. Discharge Family Accommodation	**.48**	-.14	.16	.33	**.54**	**.71**	-.02	-.11	.25	**.52**	**.51**	-.23	-.17	-.12	.02	-.01	.19	.24	.36	**.78**	--
Sexual Obsessions (SO)																					
22. Presence of SO at Baseline	-.08	-.10	-.17	-.13	.19	-.01	.13	-.04	.27	.41	.18	**.43**	.32	.29	.36	.18	.11	-.07	-.17	.06	-.10

Note. $N = 30$. OCD severity scores from CYBOCS range 0 to 40. Depression T-scores from CDI-2 range 40 to 90. Family accommodation scores from PAS-PR range 0 to 40

Table 5.

Multilevel Model Results for OCD Severity Change Over Time Using Self Reported Depression

	M1 (Linear Time)					M2 (Quadratic Time)					M3 (Time-invariant predictor)					M4 (Time-varying predictors only)					M5 (Time-varying predictors & interactions					M6 (Full model)				
Fixed Effects	*Coeff*	*(SE)*	*t*	*(df)*	*p*	*Coeff*	*(SE)*	*t*	*(df)*	*p*	*Coeff*	*(SE)*	*t*	*(df)*	*p*	*Coeff*	*(SE)*	*t*	*(df)*	*p*	*Coeff*	*(SE)*	*t*	*(df)*	*p*	*Coeff*	*(SE)*	*t*	*(df)*	*p*
Intercept (Baseline)	31.03	(0.82)	37.93	(32)	***	30.79	(0.85)	35.99	(38)	***	30.93	(0.81)	37.90	(32)	***	15.50	(3.15)	4.92	(47)	***	21.21	(3.34)	6.34	(41)	***	17.85	(3.33)	5.37	(61)	***
Presence of Sexual Obsessions (Eff)											-0.72	(0.82)	-0.89	(32)												-1.99	(0.61)	-3.27	(55)	**
Self-Report Depression																0.20	(0.05)	3.80	(38)	***	0.08	(0.06)	1.43	(29)		0.12	(0.06)	2.24	(55)	*
Family Accomodation																0.16	(0.07)	2.29	(23)	*	0.20	(0.07)	3.05	(45)	**	0.22	(0.06)	3.70	(60)	***
Linear Growth	-1.63	(0.15)	-10.86	(28)	***	-1.43	(0.27)	-5.23	(81)	***	-1.63	(0.15)	-10.72	(28)	***	-1.09	(0.18)	-5.93	(38)	***	-1.99	(0.52)	-3.86	(67)	***	-1.68	(0.54)	-3.14	(75)	**
Lin*Sexual Obsessions (Eff)											0.03	(0.15)	0.20	(28)												0.10	(0.11)	0.87	(25)	
Lin*Self Report Depression																					0.01	(0.01)	1.36	(63)		0.01	(0.01)	0.96	(73)	
Lin*Family Acommodation																					0.03	(0.01)	2.07	(69)	*	0.03	(0.01)	2.13	(76)	*
Quadratic Growth						-0.02	(0.02)	-0.91	(59)																						
Random Effects	*Variance*					*Variance*					*Variance*					*Variance*					*Variance*					*Variance*				
Intercept (Baseline)	12.37					12.15					11.92					2.85					0.00					0.00				
Linear Growth	0.50					0.53					0.50					0.34					0.13					0.16				
Self Report Depression																0.00					0.00					0.00				
Family Accomodation																0.03					0.00					0.00				
Residual	10.61					10.27					10.58					10.49					11.35					11.28				
Model Information																														
No. Params Est	1					2					2					3					5					7				
Deviance (-2LL)	675					674					674					578					567					558				
BIC	698					702					707					633					632					631				

Note. N=30 participants; Linear Time coded in weeks from baseline (baseline = 0)

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 6.

Multilevel Model Results for OCD Severity Change Over Time Using Parent Reported Depression

	M1 (Linear Time)					M2 (Quadratic Time)					M3 (Time-invariant predictor)					M4 (Time-varying predictors only)					M5 (Time-varying predictors & interactions					M6 (Full model)				
Fixed Effects	*Coeff*	*(SE)*	*t*	*(df)*	*p*	*Coeff*	*(SE)*	*t*	*(df)*	*p*	*Coeff*	*(SE)*	*t*	*(df)*	*p*	*Coeff*	*(SE)*	*t*	*(df)*	*p*	*Coeff*	*(SE)*	*t*	*(df)*	*p*	*Coeff*	*(SE)*	*t*	*(df)*	*p*
Intercept (Baseline)	31.03	(0.82)	37.93	(32)	***	30.79	(0.85)	35.99	(38)	***	30.93	(0.81)	37.90	(32)	***	16.53	(3.14)	5.27	(73)	***	23.14	(3.36)	6.87	(59)	***	21.97	(3.31)	6.64	(62)	***
Presence of Sexual Obsessions (Eff)											-0.72	(0.82)	-0.89	(32)												-1.24	(0.54)	-2.29	(48)	*
Parent Report Depression																0.16	(0.05)	3.34	(70)	**	0.05	(0.05)	0.84	(51)		0.06	(0.05)	1.08	(59)	
Family Accomodation																0.16	(0.07)	2.31	(47)	*	0.20	(0.07)	2.86	(64)	**	0.20	(0.07)	3.09	(60)	**
Linear Growth	-1.63	(0.15)	-10.86	(28)	***	-1.43	(0.27)	-5.23	(81)	***	-1.63	(0.15)	-10.72	(28)	***	-1.12	(0.17)	-6.51	(38)	***	-2.49	(0.52)	-4.79	(64)	***	-2.48	(0.54)	-4.59	(81)	***
Lin*Sexual Obsessions (Eff)											0.03	(0.15)	0.20	(28)												0.00	(0.12)	0.01	(23)	
Lin*Parent Report Depression																					0.02	(0.01)	2.20	(62)	*	0.02	(0.01)	2.17	(78)	*
Lin*Family Acommodation																					0.02	(0.02)	0.94	(83)		0.01	(0.02)	0.81	(86)	
Quadratic Growth						-0.02	(0.02)	-0.91	(59)																					
Random Effects	*Variance*					*Variance*					*Variance*					*Variance*					*Variance*					*Variance*				
Intercept (Baseline)	12.37					12.15					11.92					0.00					0.00					0.00				
Linear Growth	0.50					0.53					0.50					0.28					0.14					0.16				
Parent Report Depression																0.00					0.00					0.00				
Family Accomodation																0.01					0.01					0.00				
Residual	10.61					10.27					10.58					10.10					9.96					9.81				
Model Information																														
No. Params Est	1					2					2					3					5					7				
Deviance (-2LL)	675					674					674					580					567					561				
BIC	698					702					707					636					631					635				

Note. N=30 participants; Linear Time coded in months from baseline (baseline = 0)

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 7.

Multilevel Model Results for Family Acommodation of Anxiety Change Over Time

Fixed Effects	M1 (Linear Time)				
	Coeff	*(SE)*	*t*	*(df)*	*p*
Intercept	22.19	(1.31)	16.94	(57)	***
Linear Time	-2.82	(0.37)	-7.67	(74)	***
Quadratic Time	0.10	(0.03)	3.39	(74)	**
Random Effects	*Var*				
Intercept					
Subject	28.05				
Time	0.00				
Residual	23.42				
Model Information					
No. Params Est	1				
Deviance (-2LL)	672				
BIC	700				

Note. N = 104 timepoints within 30 participants; R lme4 used to estimate models; R lmerTEST used to approximate Sattherthwaite df for coefficient t-tests. Maximum Likelihood estimates shown.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 8.

Multilevel Model Results for Self Report Depression Change Over Time

Fixed Effects	M1 (Linear Time)				
	Coeff	*(SE)*	*t*	*(df)*	*p*
Intercept (Mean C	63.23	(1.88)	33.65	(47)	***
Linear Time	-1.56	(0.16)	-9.59	(74)	***
Random Effects	*Var*				
Intercept (Mean Change)					
Subject	69.31				
Time	0.00				
Residual	47.70				
Model Information					
No. Params Est	1				
Deviance (-2LL)	729				
BIC	752				

Note. $N = 101$ timepoints within 30 participants; R lme4 used to estimate models; R lmerTEST used to approximate Sattherthwaite *df* for coefficient *t*-tests. Maximum Likelihood estimates shown.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 9.

Multilevel Model Results for Parent Reported Depression Change Over Time

Fixed Effects	M1 (Linear Time)				
	Coeff	*(SE)*	*t*	*(df)*	*p*
Intercept	72.31	(1.83)	39.58	(42)	***
Linear Time	-1.91	(0.30)	-9.45	(34)	***
Random Effects	*Var*				
Intercept					
Subject	61.13				
Time	0.30				
Residual	50.77				
Model Information					
No. Params Est	1				
Deviance (-2LL)	735				
BIC	758				

Note. $N = 100$ timepoints within 30 participants; R lme4 used to estimate models; R lmerTEST used to approximate Sattherthwaite *df* for coefficient *t*-tests. Maximum Likelihood estimates shown.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 1

Predicted OCD Severity Scores Over 12 Weeks of Treatment

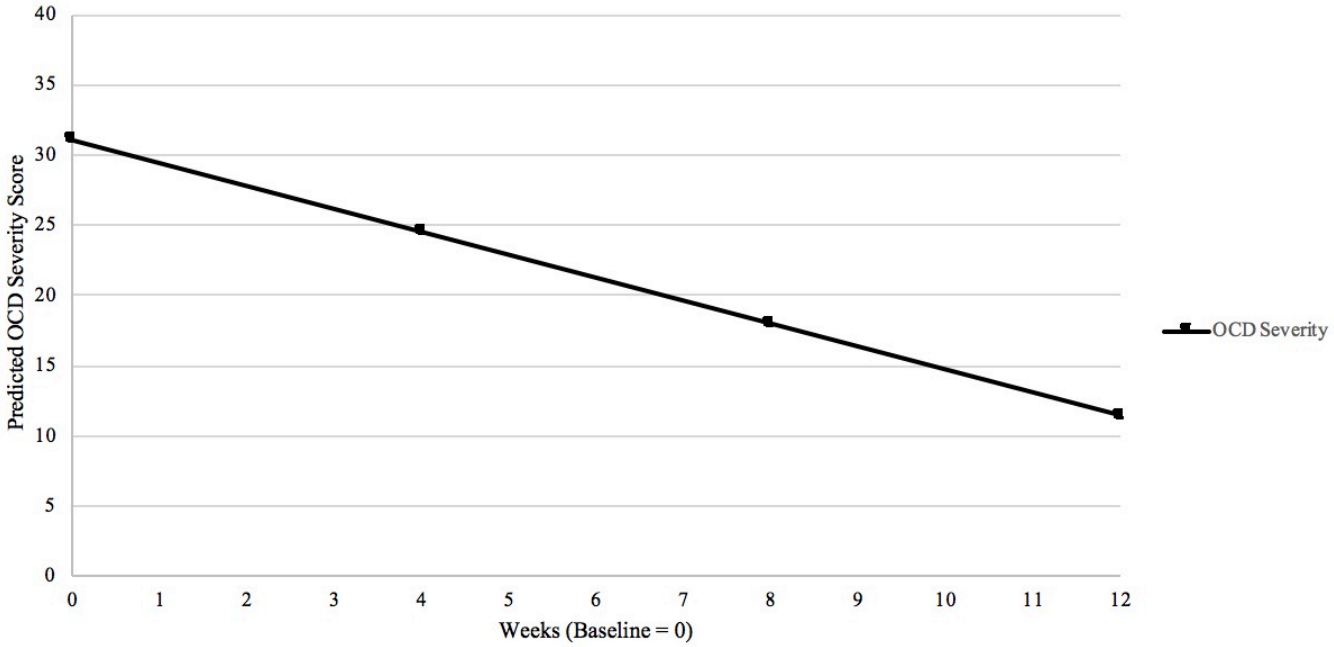


Figure 2.

Predicted OCD Severity Over 12 Weeks of Treatment Based on Levels of Family Accommodation in Self-Report Depression Model

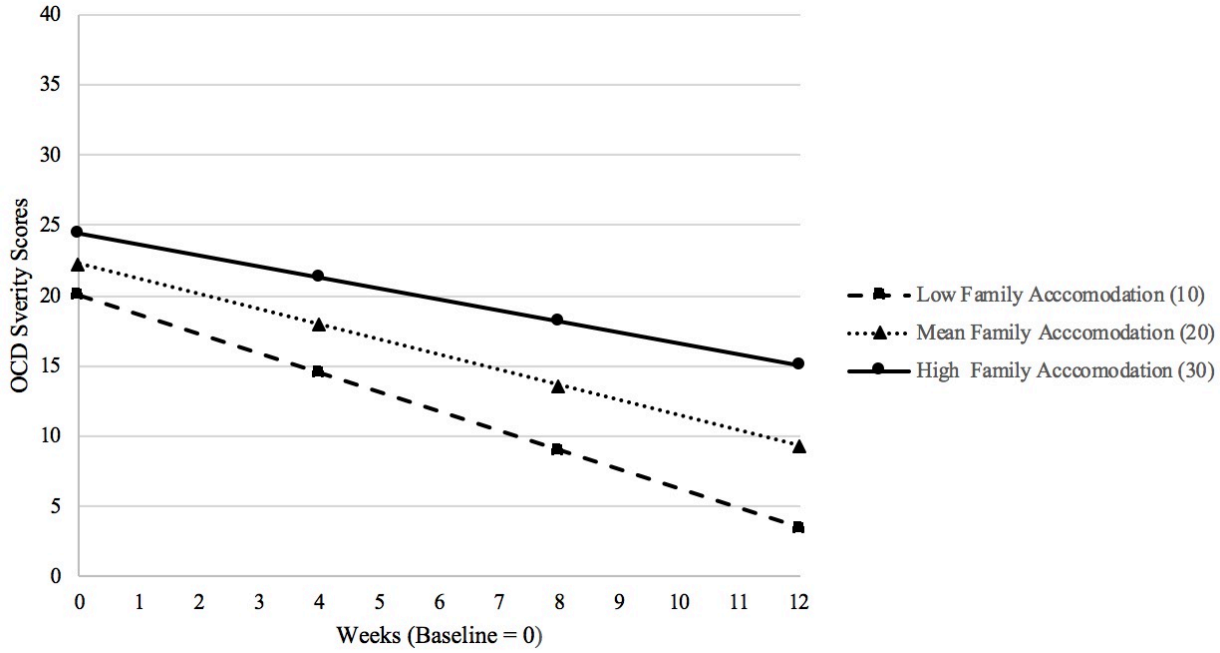


Figure 3.

Predicted OCD Severity Over 12 Weeks of Treatment Based on Levels of Self-Reported Depression

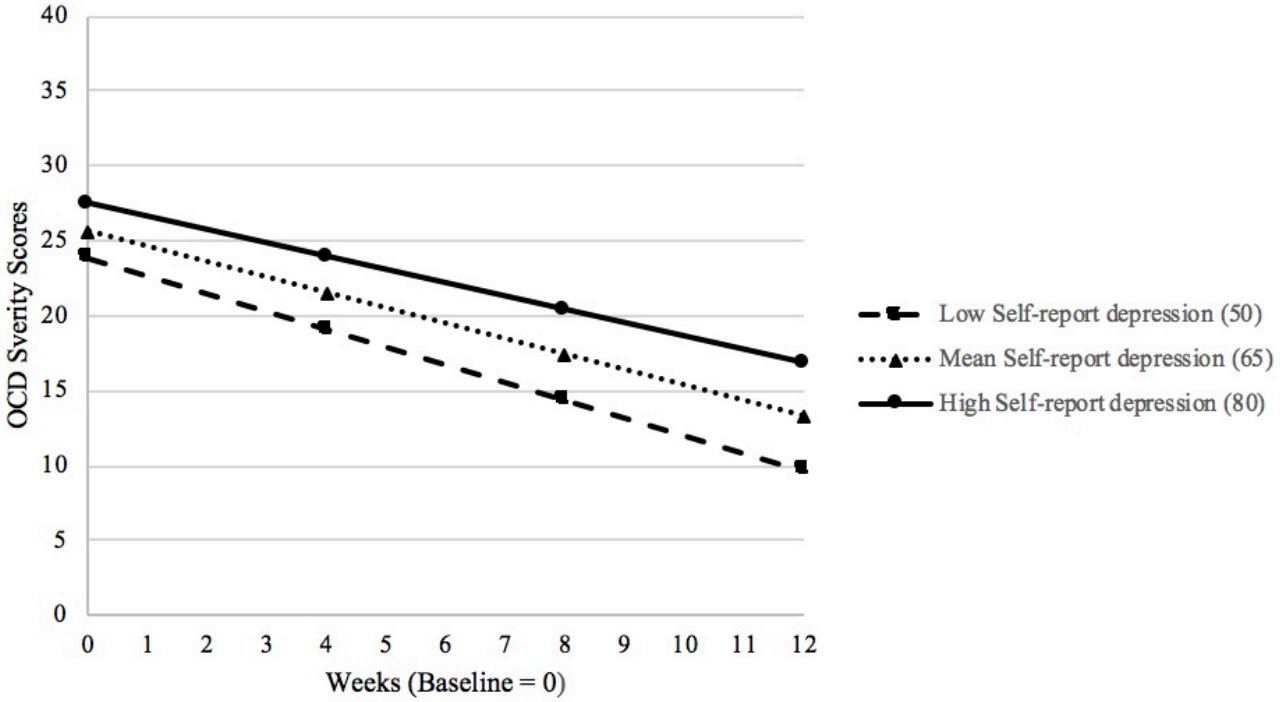


Figure 4.

Predicted OCD Severity Over 12 Weeks of Treatment Based on Levels of Parent-Reported Depression

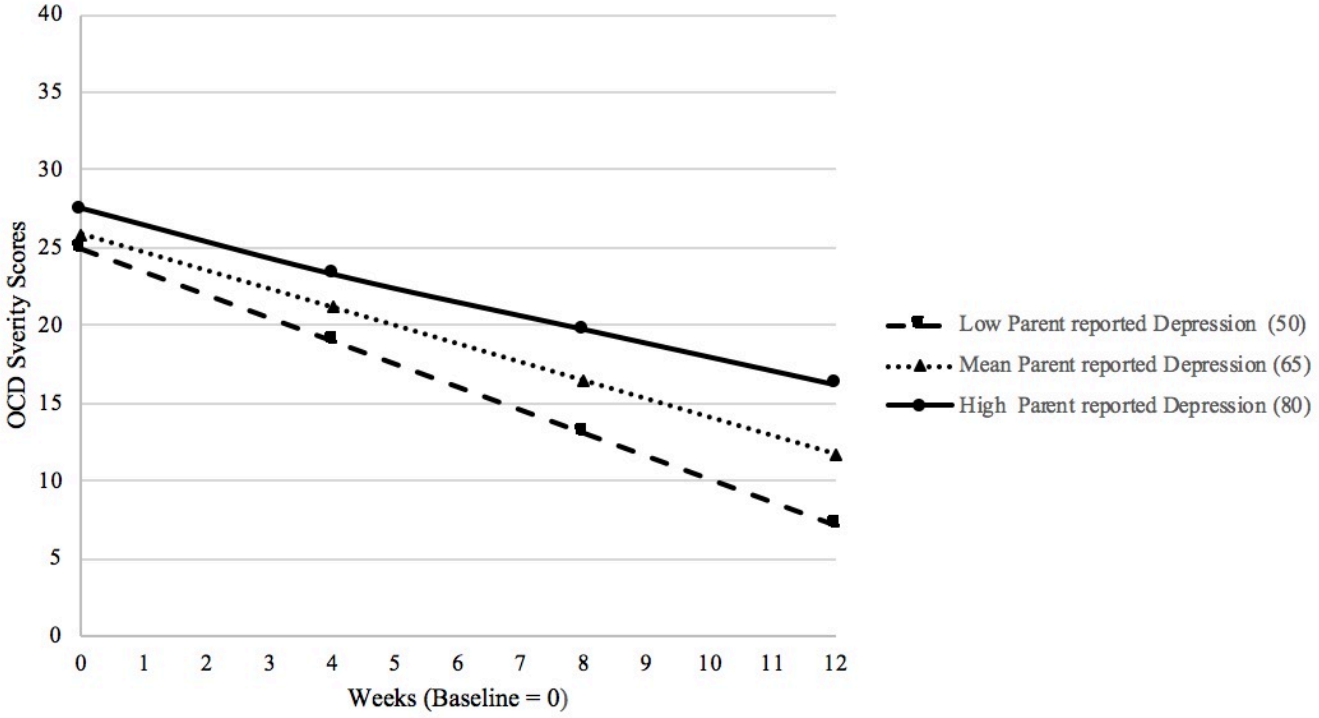


Figure 5.

Predicted Family Accommodation Scores Over 12 Weeks of Treatment

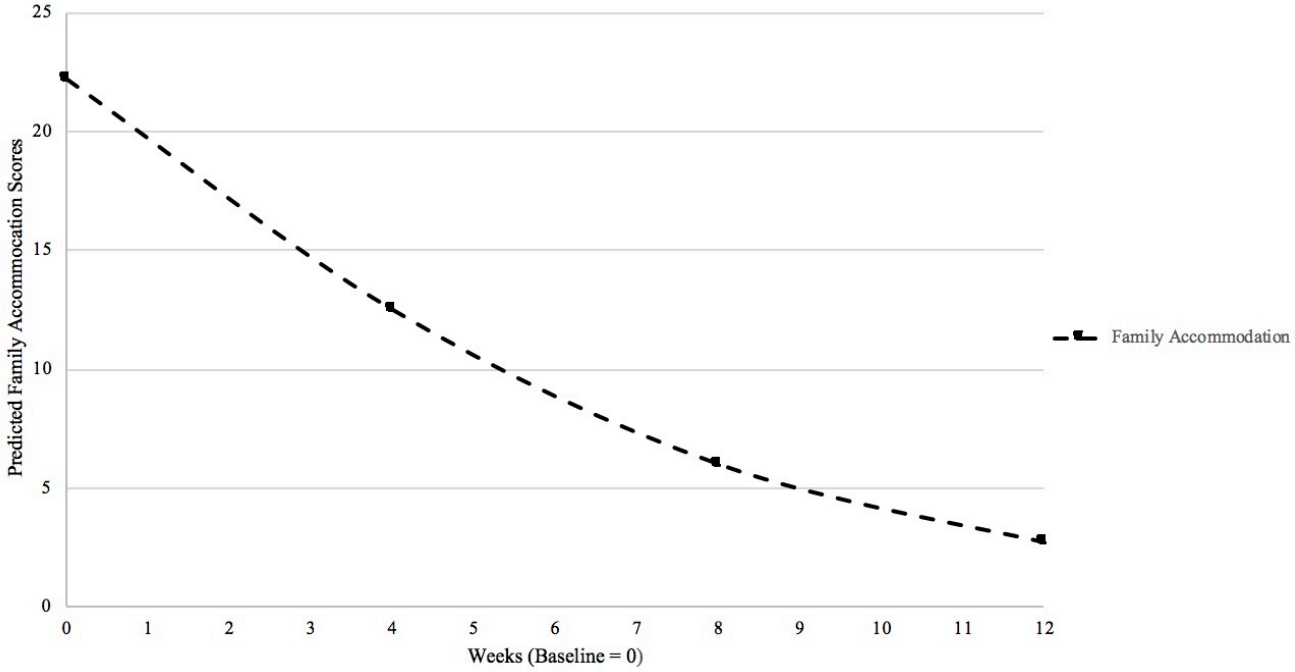
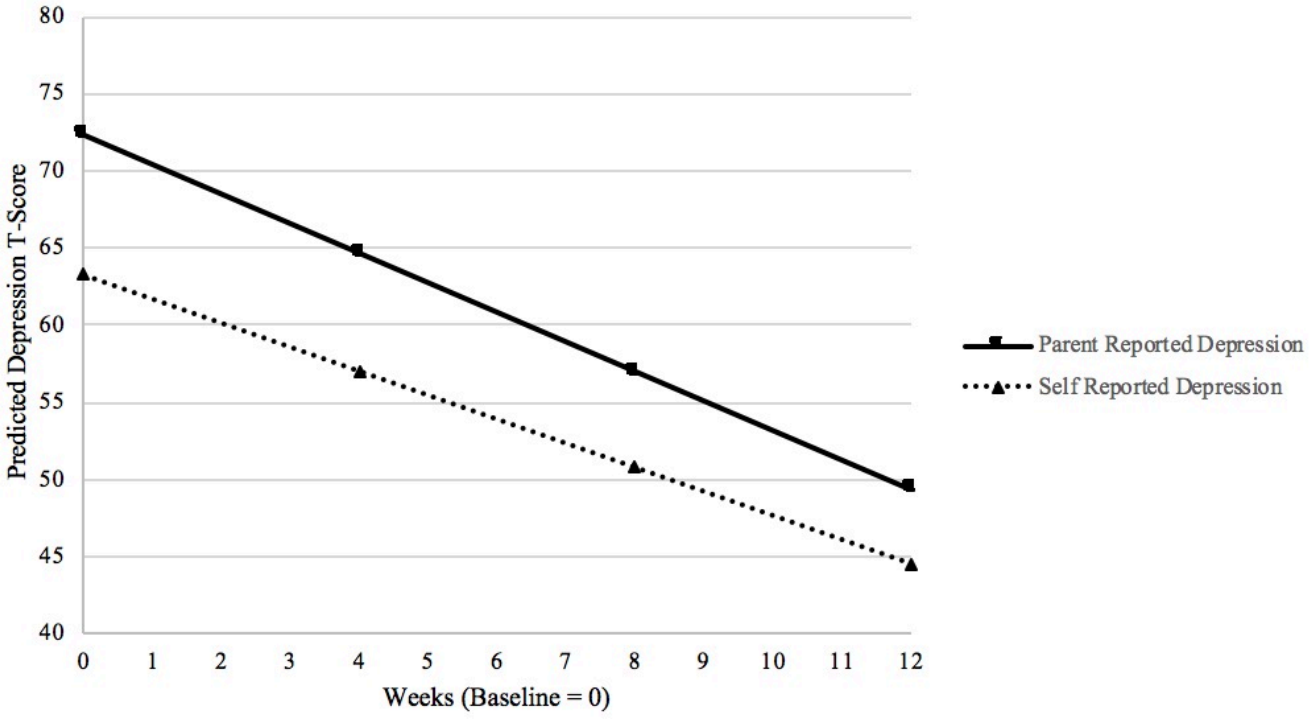


Figure 6.

Predicted Parent and Self-Reported Depression Scores Over 12 Weeks of Treatment



Appendix 1.

R Code Formulas for Longitudinal Growth Models

Model 1: Unconditional Linear Growth Model for OCD Severity

```
> m1_CYBOCSLinearTime <- lmer (CYBOCS ~ TimeLinw1_w12 + (1|subid) + (0+TimeLinw1_w12|subid),  data =
dissertation_HLM, REML = FALSE)
```

Model 2: Unconditional Quadratic Growth Model for OCD Severity

```
> m2_CYBOCSQuadTime <- lmer (CYBOCS ~ TimeLinw1_w12 + TimeQuadw1_w12 + (1|subid) + (0+TimeLinw1_w12|subid)
data = dissertation_HLM, REML = FALSE)
```

Model 3: Time Invariant Predictor Model for OCD Severity

```
> m3_TIPredictor <- lmer (CYBOCS ~ TimeLinw1_w12 + SexObsessEff + (1|subid) + SexObsessEff*TimeLinw1_w12 +
(0+TimeLinw1_w12|subid), data = dissertation_HLM, REML = FALSE)
```

Model 4: Time Varying Predictor Model for OCD severity (Parent Report Depression)

```
> m4_TVPredictordPar <- lmer (CYBOCS ~ TimeLinw1_w12 + ParDepress + FamAcomm + (1|subid) +
(0+TimeLinw1_w12+ParDepress+FamAcomm|subid), data = dissertation_HLM, REML = FALSE)
```

Model 4: Time Varying Predictor Model for OCD severity (Self Report Depression)

```
> m4_TVPredictordSelf <- lmer (CYBOCS ~ TimeLinw1_w12 + SelfDepress + FamAcomm + (1|subid) +
(0+TimeLinw1_w12+SelfDepress+FamAcomm|subid), data = dissertation_HLM, REML = FALSE)
```

Model 5: Time Varying Predictor and Interactions with Time Model for OCD severity (Parent Report Depression)

```
> m5_TVPredicInteractPar <- lmer (CYBOCS ~ TimeLinw1_w12 + ParDepress + FamAcomm + TimeLinw1_w12*ParDepress
+ TimeLinw1_w12*FamAcomm + (1|subid) + (0+TimeLinw1_w12+ParDepress+FamAcomm|subid), data = dissertation_HLM,
REML = FALSE)
```

Model 5: Time Varying Predictor and Interactions with Time Model for OCD severity (Self Report Depression)

```
> m5_TVPredicInteractSelf <- lmer (CYBOCS ~ TimeLinw1_w12 + SelfDepress + FamAcomm +
TimeLinw1_w12*SelfDepress + TimeLinw1_w12*FamAcomm + (1|subid) + (0+TimeLinw1_w12+SelfDepress+FamAcomm|
subid), data = dissertation_HLM, REML = FALSE)
```

Model 6: Full Model with all Predictors and Interactions with Time (Parent Report Depression)

```
> m6_fullmodelParDepress <- lmer (CYBOCS ~ TimeLinw1_w12 + ParDepress + FamAcomm + SexObsessEff +
TimeLinw1_w12*ParDepress + TimeLinw1_w12*FamAcomm + (1|subid) + SexObsessEff*TimeLinw1_w12 +
(0+TimeLinw1_w12+ParDepress+FamAcomm|subid), data = dissertation_HLM, REML = FALSE)
```

Model 6: Full Model with all Predictors and Interactions with Time (Self Report Depression)

```
> m6_fullmodel_SelfDepress <- lmer (CYBOCS ~ TimeLinw1_w12 + SelfDepress + FamAcomm + SexObsessEff +
TimeLinw1_w12*SelfDepress + TimeLinw1_w12*FamAcomm + (1|subid) + SexObsessEff*TimeLinw1_w12 +
(0+TimeLinw1_w12+SelfDepress+FamAcomm|subid), data = dissertation_HLM, REML = FALSE)
```

Unconditional Quadratic Growth Model for Family Accommodation

```
> m1_quad_FamAcomm <- lmer(FamAcomm ~ TimeLinw1_w12 + TimeQuadw1_w12 + (1|subid) +
(0+TimeLinw1_w12|subid), data = dissertation_HLM, REML = FALSE)
```

Unconditional Linear Growth Model for Parent Report Depression

```
> m1_lin_Depress <- lmer(ParDepress ~ TimeLinw1_w12 + (1|subid) + (0+TimeLinw1_w12|
subid), data = dissertation_HLM, REML = FALSE)
```

Unconditional Linear Growth Model for Self Report Depression

```
> m1_lin_SelfDepress <- lmer(SelfDepress ~ TimeLinw1_w12 + (1|subid) +
(0+TimeLinw1_w12|subid), data = dissertation_HLM, REML = FALSE)
```