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2019

Document Version:

Publisher's PDF, also known as Version of record

[Link to publication](#)

Citation for published version (APA):

Cervin, M. (2019). *Beyond fear: Incompleteness and disgust in pediatric obsessive-compulsive disorder*. [Doctoral Thesis (compilation), Department of Clinical Sciences, Lund]. Lund University, Faculty of Medicine.

Total number of authors:

1

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Beyond fear:

Incompleteness and disgust in pediatric obsessive-compulsive disorder

MATTI CERVIN

FACULTY OF MEDICINE | LUND UNIVERSITY





Matti Cervin is a clinical psychologist and a researcher with an interest in emotion and cognition in pediatric mental disorders, particularly obsessive-compulsive disorder and anxiety disorders. The primary aim of his research is to outline factors that are involved in the onset and maintenance of these disorders so that treatment and prevention can be improved.



Beyond fear:

Incompleteness and disgust in pediatric obsessive-compulsive disorder

Beyond fear: Incompleteness and disgust in pediatric obsessive- compulsive disorder

Matti Cervin



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DOCTORAL DISSERTATION

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To be defended at Baravägen 1, Lund, Konferensrum 12
September 27, 9 AM.

Faculty opponent
Tord Ivarsson

Organization LUND UNIVERSITY		Beyond fear: Incompleteness and disgust in pediatric obsessive-compulsive disorder	
		2019-09-27	
Matti Cervin		Lund University	
Beyond fear: Incompleteness and disgust in pediatric obsessive-compulsive disorder			
Abstract			
<p>A comprehensive understanding of the emotional mechanisms that motivate the symptoms of pediatric obsessive-compulsive disorder (OCD) is important for models of the etiology and treatment of the disorder. Existing models have emphasized the central role of fear, but recent research has highlighted that OCD may also be underpinned by incompleteness and disgust. However, whether incompleteness is relevant for the understanding of pediatric OCD has not been examined and no studies have conjointly examined fear, incompleteness, and disgust in clinical samples. The present thesis concerned itself with the degree to which fear, incompleteness, and disgust (a) could be validly assessed in youth with OCD and anxiety disorders; (b) discriminated pediatric OCD from pediatric anxiety disorders; (c) underpinned the main symptom dimensions of pediatric OCD; and (d) predicted treatment outcome for youth with OCD. Youth seeking treatment for pediatric OCD and anxiety disorders (assessed via structured diagnostic interviews) completed self-report and interview-based measures of trait (everyday experiences) and state (direct emotion involvement in symptoms) levels of fear, incompleteness, and disgust. Non-clinical youth were recruited from local schools and completed the same trait-level measures. Results showed that both children and adolescents were able to comprehend the concept of incompleteness and to report on whether this emotion, as well as fear and disgust, was part of their general emotional responses and in their symptoms of OCD and anxiety disorders. Trait-level fear and disgust were elevated in youth with OCD and anxiety disorders when compared to non-clinical youth, while incompleteness was only elevated in youth with OCD. When examining dimensional associations between self-reported trait-level emotion and self-reported symptom severity, fear was positively associated with OCD, anxiety, and depression, while incompleteness was uniquely associated with OCD, and disgust uniquely associated with anxiety. Regarding the direct involvement of these emotions in the symptoms of OCD and social anxiety disorder and generalized anxiety disorder, fear was again shown to be related to both OCD and anxiety disorders, incompleteness specifically related to OCD (particularly symmetry-related OCD), and disgust specifically related to contamination-based OCD. Youth with OCD symptoms characterized by high levels of incompleteness and disgust evidenced a poorer response to OCD treatment. Overall, the present thesis suggests that additional studies are warranted that examine the relationship between incompleteness and disgust in relation to the heterogeneity and treatment of pediatric OCD. Further, to better outline factors specifically related to the development and maintenance of pediatric OCD, theoretical models should more clearly account for emotion-related motivators other than fear.</p>			
Key words: OCD; children; adolescents; fear; harm avoidance; incompleteness; disgust; outcome; emotion			
Classification system and/or index terms (if any)			
Supplementary bibliographical information		Language English	
ISSN 1652-8220 Beyond fear: Incompleteness and disgust in pediatric obsessive-compulsive disorder		ISBN 978-91-7619-810-0	
Recipient's notes	Number of pages 64	Price	
	Security classification		

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Paper 4 © by the Authors (Manuscript unpublished)

Paper 5 © by the Authors (Manuscript unpublished)

Faculty of Medicine
Department of Clinical Sciences, Lund

ISBN 978-91-7619-810-0

ISSN 1652-8220

Printed in Sweden by Media-Tryck, Lund University
Lund 2019



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MADE IN SWEDEN 

For Tova

The only super-human I have met

*We do not hesitate to consider emotions as the primitive and
fundamental element of the obsession.*

Albert Pitres & Emmanuel Régis
Les obsessions et les impulsions, 1902.

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Svensk sammanfattning

Rädsla är centralt för nuvarande modeller av tvångssyndrom, men forskning har visat att känslor av ofullständighet och äckel kan vara lika viktiga för hur tillståndet uppstår och vidmakthålls. Huruvida känsla av ofullständighet är centralt för tvångssyndrom hos barn och ungdomar har dock aldrig undersökts och rädsla, ofullständighet och äckel har aldrig studerats parallellt i kliniska populationer. Syftet med denna avhandling var att studera i vilken utsträckning rädsla, ofullständighet och äckel (a) kunde förstås och rapporteras av barn och ungdomar med tvångssyndrom och ångestsyndrom, (b) kunde användas för att differentiera unga med tvångssyndrom från unga med ångestsyndrom, (c) relaterade till heterogenitet i tvångssyndrom och (d) predicerade behandlingsutfall för unga med tvångssyndrom. Barn och ungdomar med tvångssyndrom och ångestsyndrom rekryterades från en barn- och ungdomspsykiatrisk klinik och genomgick strukturerade diagnostiska intervjuer, fyllde i formulär gällande benägenhet att uppleva rädsla, ofullständighet och äckel i vardagen samt intervjuades om i vilken utsträckning dessa känslor var direkt involverade i deras symptom. Unga utan psykiatrisk problematik rekryterades från lokala skolor och fyllde i samma formulär. Resultaten visade att barn och ungdomar med tvångssyndrom och ångestsyndrom kunde förstå begreppet ofullständighetskänsla samt rapportera i vilken utsträckning denna känsla samt rädsla och äckel var närvarande i vardagen och i deras tvångs- och ångestsymptom. Unga med tvångssyndrom och ångestsyndrom upplevde mer rädsla i vardagen och rapporterade en starkare äckelbenägenhet jämfört med unga utan psykiatrisk problematik. Unga med tvångssyndrom upplevde mer ofullständighetskänslor i vardagen jämfört med unga med ångestsyndrom och unga utan psykiatrisk problematik. Rädslobenägenhet i vardagen var kopplat till självrapporterade symptom på tvång, ångest och depression. Ofullständighet var unikt kopplat till tvång. Äckel var unikt kopplat till ångest. Upplevelsen av rädsla var tydligt närvarande vid samtliga symptomdimensioner av tvång men tydligast kopplat till aggressiva tvång, där det låg i nivå med den grad av rädsla som unga med socialt och generaliserat ångestsyndrom upplevde. Ofullständighet var tydligt närvarande vid samtliga symptomdimensioner av tvång och mer närvarande i dessa dimensioner än vid socialt och generaliserat ångestsyndrom. Äckel var tydligt närvarande enbart vid kontaminationsrelaterade tvång. Att ha tvångssymptom karaktäriserade av höga nivåer av ofullständighet och äckel predicerade sämre behandlingsrespons för barn och ungdomar som fick behandling för tvångssyndrom. Sammantaget visar avhandlingen att ramverket som används för att förstå tvångssyndrom hos barn och ungdomar bör breddas till att förutom rädsla också innefatta känslor av ofullständighet och äckel. Forskning som mer tydligt tar hänsyn till detta bredare ramverk kan ha större möjlighet att avgöra vad som är specifikt för tvångssyndrom i jämförelse med andra psykiatriska syndrom.

List of papers

Paper 1

Matti Cervin*, Sean Perrin, Elin Olsson, Emma Claesdotter-Knutsson, & Magnus Lindvall (2019). Validation of an interview-only version of the Dimensional Yale-Brown Obsessive-Compulsive Scale (DY-BOCS) in treatment-seeking youth with obsessive-compulsive disorder. *Psychiatry Research*, 271, 171-177.

Paper 2

Matti Cervin* & Sean Perrin (2019). Measuring harm avoidance, incompleteness, and disgust in youth with obsessive-compulsive disorder and anxiety disorders. *Journal of Obsessive-Compulsive and Related Disorders*, 22, 100442.

Paper 3

Matti Cervin*, Sean Perrin, Elin Olsson, Emma Claesdotter-Knutsson, & Magnus Lindvall (2019). Incompleteness, harm avoidance, and disgust: A comparison of youth with OCD, anxiety disorders, and no psychiatric disorder. *Submitted*.

Paper 4

Matti Cervin*, Sean Perrin, Elin Olsson, Emma Claesdotter-Knutsson, & Magnus Lindvall (2019). Fear of harm, incompleteness, and disgust in the moment-to-moment experience of pediatric obsessive-compulsive disorder. *Submitted*.

Paper 5

Matti Cervin* & Sean Perrin (2019). Incompleteness and disgust predict treatment outcome in pediatric obsessive-compulsive disorder. *Submitted*.

*Corresponding author

Abbreviations

CBT	Cognitive-Behavioral therapy
CDI-S	Children's Depression Inventory – Short Version
CFA	Confirmatory factor analysis
CGAS	Children's Global Assessment Scale
CGI	Clinical Global Impression Scale
CY-BOCS	Children's Yale-Brown Obsessive Compulsive Scale
CSTC	Cortico-Striato-Thalamo-Cortical
DES-C	Disgust Emotion Scale for Children
DSM	Diagnostic and Statistical Manual of Mental Disorders
DY-BOCS	Dimensional Yale-Brown Obsessive Compulsive Scale
ERP	Exposure and Response Prevention
MINI-KID	Mini-International Neuropsychiatric Interview for Children and Adolescents
OC-CDI	Obsessive Compulsive Core Dimensions Interview
OCD	Obsessive-Compulsive Disorder
OCI-CV	Obsessive Compulsive Inventory – Child Version
OCTCDQ	Obsessive Compulsive Core Dimensions Questionnaire
RCT	Randomized Controlled Trial
SCARED-R	Screen for Child Anxiety Disorders Revised
SRI	Serotonin Reuptake Inhibitor
SSRI	Selective Serotonin Reuptake Inhibitor
Y-BOCS	Yale-Brown Obsessive Compulsive Scale

Introduction

Obsessive-compulsive disorder

Ritualized behaviors and intrusive thoughts

Repetitive and ritualized behaviors are common in the general population and appear early in life. About 80% of 3-year-olds display ritualized bedtime routines; further, ordering rituals, concerns about germs, and hoarding behaviors are frequent in young children, with the first two peaking around three years of age and the latter increasing until age six (Leckman & Bloch, 2008). These ritualistic behaviors are often associated with specific places or contexts and are often highly repetitive in nature (D. Eilam, Zor, Szechtman, & Hermesh, 2006). The presence of ritualized behaviors during normal human development, and their similarity to stereotypic behaviors in other animals (Brune, 2006; David Eilam, Zor, Fineberg, & Hermesh, 2012), has given rise to evolutionary models of human compulsivity, which have in turn been incorporated in some models of obsessive-compulsive disorder (OCD). In these models, human compulsivity is considered a trait shaped by natural selection that has fostered survival and reproduction. For example, ritualized behaviors such as washing, the repetition of actions until it feels ‘just right’, and repetitive checking are thought to have been preserved and selected because they play an important role in avoiding harm (Brune, 2006) and because they free attentional resources (Alonso, Lopez-Sola, Real, Segalas, & Menchon, 2015).

Obsessive-like cognitions, i.e. experiences of unwanted and intrusive thoughts or mental images, are also common in humans. In a seminal study on the presence of such phenomena, Rachman and de Silva (1978) found that obsessive-like cognitions are experienced by more than 80% of individuals. These results have been replicated in numerous studies (Radomsky et al., 2014) and point toward the normality of intrusive thoughts. Hence, as intrusive/obsessional thoughts do not appear to be abnormal *per se*, researchers has directed their attention toward individual differences in how such thoughts are appraised and regulated (Abramowitz, Taylor, & McKay, 2009; Rachman & de Silva, 1978). It has been argued that since intrusive thoughts are similar in form and content in people unaffected by OCD as in those with OCD (Rachman & de Silva, 1978), even though findings have been somewhat mixed (Rassin & Muris, 2007), and since a large proportion of OCD sufferers report

that obsessions usually precede their compulsive behaviors (Taylor, McKay, & Abramowitz, 2005), obsessive-compulsive symptoms may be explained by differences in how obsessions are appraised.

Taken together, obsessive-compulsive phenomena are common in humans and associated with early developmental stages. Similar behaviors are observed in other animals and have possibly been conserved because of their importance for survival and reproduction. In humans, however, compulsive behaviors may be closely linked to intrusive thoughts and as such they may be distinguished from similar behaviors in non-human animals (Abramowitz, Taylor, McKay, & Deacon, 2011).

Diagnostic criteria of obsessive-compulsive disorder

Obsessive-compulsive disorder is a diagnostic class that captures pathological states of obsessions and/or compulsions. In the 5th edition of the Diagnostic and Statistical Manual for Mental Disorders (DSM-5), the diagnostic criteria for OCD are separated into obsessions and compulsions, respectively (American Psychiatric Association, 2013). Obsessions are defined as recurrent and persistent thoughts, urges, or images that are experienced as intrusive and unwanted and cause marked anxiety or distress. Compulsions are defined as repetitive behaviors or mental acts carried out to prevent or reduce anxiety, distress, or the probability of harm in response to an obsession or according to strict rules. To fulfil the DSM-5 criteria for OCD, the individual must have at least one obsession or compulsion which are also time-consuming and cause clinically significant distress and/or functional impairment. It is also important to distinguish compulsive behavior from other repetitive behavioral symptoms commonly seen in psychiatric settings, such as tics, perseverance behaviors in schizophrenia, and stereotypies in autism (Robbins, Vaghi, & Banca, 2019).

In DSM-5, OCD was removed from the anxiety disorders chapter and placed into a new chapter titled ‘Obsessive-Compulsive and Related Disorders’. OCD now appears alongside body dysmorphic disorder, hoarding disorder, trichotillomania, excoriation disorder, substance/medication-induced OCD, and other/unspecified/medically-induced OCD (American Psychiatric Association, 2013). The decision to group these disorders together was based on evidence showing similarities in course, comorbidity patterns, genetics, and treatment response; features that distinguished these disorders from the anxiety disorders (Stein et al., 2010). Further, it was argued that fear and anxiety, although common in OCD and related disorders, is not as important to the phenomenology of these disorders as it is to the anxiety disorders (Van Ameringen, Patterson, & Simpson, 2014). It is however important to note that the empirical grounds for this removal have been questioned (e.g., Abramowitz & Jacoby, 2015).

Epidemiology of obsessive-compulsive disorder

OCD has a bimodal distribution of onset with one peak occurring in childhood/early adolescence and another in late adolescence/early adulthood with the former being more common in males, more heritable, and more comorbid with tics while the latter may be related to poorer neuropsychological functioning (Taylor, 2011a). Prevalence rates vary between studies, but most estimates point toward a prevalence of about 1% to 3% in children and adults alike (Abramowitz et al., 2009; Geller, 2006). However, around half of all adults with OCD report onset before adulthood (Kessler et al., 2005), suggesting that there is a group of youth with OCD that remit spontaneously before or during adulthood (Stewart et al., 2004). Prevalence rates of OCD are similar across nations and cultures (Horwath & Weissman, 2000; Kessler et al., 2005; Williams, Chapman, Simms, & Tellawi, 2017) with evidence suggesting both cross-cultural similarities and differences in symptom expression (Nicolini, Salin-Pascual, Cabrera, & Lanzagorta, 2017; Williams et al., 2017).

Themes of obsessions and compulsions

Much research has been dedicated to make sense of the heterogeneous and idiosyncratic nature of obsessions and compulsions, which spans a broad range of thoughts, urges, behaviors, and mental images. Most of this research has used factor (or principal component) analytic techniques to examine symptom checklists, typically the symptom checklist of the Yale-Brown Obsessive Compulsive Scale (Y-BOCS; Goodman et al., 1989). These studies have consistently found separate factors related to: contamination obsessions and washing compulsions; hoarding obsessions and compulsions; and symmetry obsessions and ordering compulsions (Bloch, Landeros-Weisenberger, Rosario, Pittenger, & Leckman, 2008; Mataix-Cols, Rosario-Campos, & Leckman, 2005). A fourth factor made up of phenomena related to forbidden thoughts, checking behaviors, and mental compulsions also frequently emerges. However, which phenomena to include in this factor are inconsistent across studies with several studies suggesting that this factor is best divided into two separate factors with aggressive obsessions and checking compulsions being one factor and sexual and religious obsessions and related compulsions another factor (Rosario-Campos et al., 2006).

The major symptom dimensions of OCD have been shown to be temporally stable in children and adults (Fernandez de la Cruz et al., 2013; Mataix-Cols, Rauch, et al., 2002), related to different neural substrates in adults (Mataix-Cols et al., 2004; van den Heuvel et al., 2009), and differentially responsive to treatment in children and adults (Mataix-Cols, Marks, Greist, Kobak, & Baer, 2002; McGuire, Tan, & Piacentini, 2019; Williams et al., 2014), but see Storch, Merlo, Larson, Bloss, et al. (2008) for a study in which symptom dimension severity was not related to outcome

in youth. It has also been shown that forbidden thoughts and contamination symptoms are genetically more related to symptoms of anxiety than symmetry symptoms, which are more genetically related to hoarding and body dysmorphic symptoms (Lopez-Sola et al., 2016). Furthermore, for adults, the major symptom dimensions of OCD have been linked to different patterns of comorbidity, with tic symptoms being more prevalent in individuals with symmetry symptoms, eating disorders in individuals with contamination symptoms, and depression and anxiety in individuals with forbidden thoughts (Hasler et al., 2005; Torres et al., 2016). Studies regarding links between OCD symptom dimensions and comorbidity in youth are few, but evidence exist for elevated levels of anxiety and tics in individuals with forbidden thoughts (Hojgaard et al., 2016; Nikolajsen, Nissen, & Thomsen, 2011) and anxiety and depression in individuals with symmetry symptoms (Hojgaard et al., 2016).

Treatment of obsessive-compulsive disorder

Psychological treatment

Psychological treatment in the form of exposure-based cognitive behavioral therapy (CBT) has received strong empirical support as a first-line treatment for OCD in children, adolescents, and adults (Foa et al., 2005; Ost, Riise, Wergeland, Hansen, & Kvale, 2016; Skapinakis, Caldwell, Hollingworth, Bryden, Fineberg, Salkovskis, Welton, Baxter, Kessler, Churchill, et al., 2016; Skapinakis, Caldwell, Hollingworth, Bryden, Fineberg, Salkovskis, Welton, Baxter, Kessler, & Churchill, 2016). The treatment is predicated on a model of OCD in which symptoms are maintained by negatively reinforced behaviors (i.e., compulsions, avoidance) that provide short-term distress relief but long-term negative consequences in the form of more frequent symptoms, greater avoidance, and reinforcement of dysfunctional cognitive beliefs (Ghassemzadeh, Rothbart, & Posner, 2017). Therefore, a key part of CBT for OCD is that the patient engages in exposure and response prevention (ERP). ERP covers a range of techniques that involve asking the patient to confront feared stimuli or situations (in vivo or imaginary) without engaging in neutralization, compulsions, or safety-seeking behaviors (e.g., avoidance). This is thought to lead to habituation of compulsive/avoidance responses, reappraisal of dysfunctional cognitive beliefs, and attenuation or extinction of emotional (primarily fear) reactions to the confronted stimuli or situations (Foa & McLean, 2016).

Approximately 50% of youth with OCD who complete a course of exposure-based CBT reach remission (Ost et al., 2016) with similar outcomes in routine care as in

randomized controlled treatment trials (RCTs) (Farrell, Schlup, & Boschen, 2010; Masi et al., 2010; Valderhaug, Larsson, Göttestam, & Piacentini, 2007). Long-term effects are under examined, but approximately 40% to 60% of youth continue to have OCD symptoms in the clinical range following treatment (Stewart et al., 2004), with some individual studies showing more promising results (Melin, Skarphedinsson, Skarsater, Haugland, & Ivarsson, 2018).

Pharmacological treatment

There is robust evidence that selective serotonin reuptake inhibitors (SSRIs) are an efficacious treatment for OCD in children, adolescents, and adults, with similar effects across different types of SSRIs (Hirschtritt, Bloch, & Mathews, 2017; Skapinakis, Caldwell, Hollingworth, Bryden, Fineberg, Salkovskis, Welton, Baxter, Kessler, Churchill, et al., 2016). In youth, SSRIs as a monotherapy are slightly less effective than combined treatment with CBT and SSRIs (Pediatric OCD Treatment Study Team, 2004). For adults, clomipramine is also recognized as an effective treatment (Hirschtritt et al., 2017). The mechanisms underlying the effectiveness of SSRIs in OCD are unknown but it has been suggested that SSRIs foster reengagement of neural networks important for cognitive control and goal-directed actions, which in turn leads to increased ability to withstand urges to engage in compulsions (Robbins et al., 2019).

Predictors of treatment outcome

Given the modest outcomes for both CBT and SSRIs in pediatric OCD, researchers have attempted to identify illness and patient and family characteristics that predict treatment outcome. Across studies, there is some evidence that baseline symptom severity, functional impairment, family accommodation of the child's OCD symptoms, and psychiatric comorbidity predict poorer OCD outcomes in youth receiving CBT and/or SSRIs (Garcia et al., 2010; Ginsburg, Kingery, Drake, & Grados, 2008; Lavell, Farrell, Waters, & Cadman, 2016; Storch, Merlo, Larson, Geffken, et al., 2008; Torp et al., 2015). For adults with OCD, hoarding symptoms, greater baseline severity of OCD and anxiety, unemployment, and being single have been shown to predict a poorer response to treatment (Knopp, Knowles, Bee, Lovell, & Bower, 2013). However, across both the pediatric and adult OCD literature, there is considerable variability in the coding schemes used to classify treatment response and diagnostic remission, which has led to the development of internationally recognized criteria for defining response and remission in OCD trials (Mataix-Cols et al., 2016).

Models of obsessive-compulsive disorder

Genetic and environmental contributions

There is ample evidence that OCD runs in families (Pauls, Abramovitch, Rauch, & Geller, 2014) with the degree of concordance between relatives increasing with the degree of genetic relatedness (i.e., greater likelihood of OCD in the first versus second or third degree family members of affected probands) (Mataix-Cols et al., 2013). The available twin studies suggest that additive genetic factors account for around 40% of the variation in OCD at the symptom and syndrome level (Taylor, 2011b), and non-shared environmental factors for around 50% of the variation, leaving a small proportion explained by non-additive genetic and shared environmental factors (Pauls et al., 2014; Taylor, 2011b). There is little evidence for gender differences in heritability, but heritability quotients appear to be higher for childhood than adult OCD (Abramowitz et al., 2009). Traumatic life events, events related to the reproductive cycle of women (e.g., menarche, postpartum, menopause), and perinatal complications are associated with a higher risk for OCD, but studies reporting on environmental risk factors are often methodologically constrained by use of retrospective reports and a failure to control for genetic confounding (Brander, Perez-Vigil, Larsson, & Mataix-Cols, 2016).

Neurobiological frameworks

The number of published neuroimaging studies of OCD has been growing steadily since the 1980s, producing results that are arguably among the most consistent across all psychiatric disorders (Pauls et al., 2014). Specifically, individuals with OCD (most often compared to healthy controls) are routinely found to have neural activity suggesting dysfunction in a cortico-striato-thalamo-cortical (CSTC) feedback mechanism in which an imbalance between direct and indirect pathways leads to hyper-activation of pathways between orbitofrontal regions of the cortex and subcortical regions of the brain (Pauls et al., 2014). The direct pathway involves the ventromedial prefrontal cortex, which is linked to emotional processing, and the indirect pathway dorsal anterior cingulate cortex, which is linked to cognitive control and down-regulation of emotion (Liu, Bilek, & Fitzgerald, 2016). Activation in the direct pathway leads to excitation of cortex regions, while activation of the indirect pathway results in decreased cortex activation (van den Heuvel et al., 2016). It has been suggested that hyperactivity in the direct pathway, without activation of the inhibitory processes from the indirect pathway, leads to a feedback loop in which brain activity related to emotional processing gives rise to the intrusive quality of obsessions and the urge to perform compulsions despite recognition that these compulsions are meaningless or exaggerated (Liu et al., 2016; Pauls et al., 2014;

van den Heuvel et al., 2016). Even though the bulk of evidence for CSTC dysfunctions in OCD comes from research with adults, there is a growing body of evidence for the model also in pediatric OCD (Liu et al., 2016).

Cognitive-behavioral models

The most influential psychological models of OCD are cognitive behavioral in nature and are predicated on the notion that OCD is essentially an anxiety disorder and as such characterized by the presence of exaggerated fears and worries, which are appraised in a highly catastrophic manner, with both the emotion and appraisals driving the development of highly ideographic avoidance and escape behaviors (compulsions) (Abramowitz et al., 2009). Proponents of this approach often highlight that unwanted cognitive intrusions, of similar content to patients with OCD, are common in the general population (Rachman, 1997). Hence, the model places a strong emphasis on how these intrusions are appraised and the acts believed necessary to prevent the feared outcome or reduce distress; particularly the need to perform highly ritualized neutralizing or avoidance behaviors (Abramowitz et al., 2009; Rachman, 1997; Rachman & de Silva, 1978). A range of potentially maladaptive appraisals have been found to be elevated in individuals with OCD (compared to controls) and to be associated with OCD severity, including: the likelihood of feared outcomes; causality (e.g. magical thinking, thought-action fusion); exaggerated personal responsibility for preventing harm; a need to control one's own thoughts; perfectionism; and intolerance of uncertainty (Calkins, Berman, & Wilhelm, 2013). However, such beliefs are also elevated in individuals with anxiety disorders and depression (Gentes & Ruscio, 2011; Tolin, Worhunsky, & Maltby, 2006).

Cognitive behavioral models of OCD also place a strong emphasis on the classical conditioning of fear responses, i.e. unreinforced (no real harm occurs) exposures to feared stimuli/situations produces immediate and long-term reductions (extinction) in the fear response, and thus reductions in the urge/need to carry out compulsive behaviors or engage in general avoidance (Foa & McLean, 2016). It is thought that a byproduct of the extinction process, or perhaps the mechanism of change, is changes in maladaptive appraisals about the likelihood of harm, magical thinking, personal responsibility, and the individual's ability to tolerate distress (Foa & McLean, 2016).

RCTs of OCD-focused CBT use interventions that are broadly based on this model of fear extinction/avoidance-reduction and modification of maladaptive appraisals (Abramowitz et al., 2009). Adaptations for pediatric OCD often include interventions aimed at parents to reduce familial accommodation and conflict (Lebowitz, Panza, Su, & Bloch, 2012). Overall, exposure-based CBT produces large reductions in OCD symptoms with small differences between treatments that do and

do not include more formal cognitive interventions (Olatunji, Davis, Powers, & Smits, 2013; Ost et al., 2016; Skapinakis, Caldwell, Hollingworth, Bryden, Fineberg, Salkovskis, Welton, Baxter, Kessler, Churchill, et al., 2016). While family accommodation appears to be an important moderator of pediatric OCD severity (Wu et al., 2016), it remains unclear whether the addition of family interventions targeting such accommodation to standard exposure-based CBT improves outcomes (Iniesta-Sepúlveda, Rosa-Alcázar, Sánchez-Meca, Parada-Navas, & Rosa-Alcázar, 2017)

Newer psychological models

A central feature of OCD is the inability (or great difficulty) to inhibit compulsive behaviors despite the sufferer's awareness that the compulsions are ineffective and/or excessive (American Psychiatric Association, 2013). To explain this phenomenon, a growing body of literature suggests that OCD may be underpinned by an imbalance between goal-directed and habitual behavioral control (Gillan, Robbins, Sahakian, van den Heuvel, & van Wingen, 2016; Robbins et al., 2019). In this model, goal-directed behavioral control refers to intentional behaviors characterized by ongoing evaluations, while habitual behavioral control refers to automatized behaviors carried out without conscious awareness/control (Gillan & Sahakian, 2015). According to the model, control of goal-directed behaviors is time and attention consuming, but enables behavioral flexibility; however, because of the "expensiveness" of such control, certain behaviors can become "habitual", freeing cognitive resources (Gillan et al., 2011). It is argued that adaptive functioning requires a flexible integration of goal-directed and habitual behavioral control (Voon et al., 2015). In OCD, dysfunctions in goal-directed behavioral control may help explain the appearance and persistence of habits (compulsions) despite these being both ineffective and distressing (Gillan et al., 2011). Further, habitual behaviors are often stimulus-driven which may help explain why compulsive behaviors are often closely tied to certain contexts (Kalanthoff, Henik, Simpson, Todder, & Anholt, 2017). Evidence for a probable imbalance between goal-directed and habitual behavioral control has been observed in adult and youth OCD samples (Gillan & Robbins, 2014; Gottwald et al., 2018), but studies are few and generally carried out with small samples.

Pathological levels of doubt have long been recognized as important to OCD, with a number of different psychological models emerging that emphasize the role of doubt in the etiology and maintenance of the disorder (Nestadt et al., 2016). Across models, pathological levels of doubt are thought to arise from deficits in the ability to access internal states (i.e., cognitive, affective, visceral). This deficit leads to dysfunctional decision-making and an over-reliance on external proxies and, hence, the repetitive behavioral routines often seen in OCD (e.g., checking the lock

multiple times, repeated washing). In studies involving non-clinical (Lazarov, Dar, Oded, & Liberman, 2010) and clinical groups (Lazarov, Liberman, Hermesh, & Dar, 2014), participants high on obsessive-compulsive symptomatology or those who had OCD relied more on false external feedback signals and performed worse without the help of such feedback than those who were low on obsessive-compulsive symptomatology, had anxiety disorders but not OCD, and non-clinical controls.

These two models show that aspects of OCD other than fear have been proposed as important to the etiology and maintenance of the disorder. The development and testing of models that incorporate sources of motivation other than fear (alone) is needed and may help improve our understanding of the highly heterogeneous symptom presentation, course, and treatment response found in individuals with OCD (Ouimet, Ashbaugh, & Radomsky, 2019).

Emotion

Emotion is central to human experience and behavior and embedded in day-to-day learning and decision making (Lerner, Li, Valdesolo, & Kassam, 2015). It strongly influences perception and cognition (Damasio & Carvalho, 2013; Wormwood, Siegel, Kopec, Quigley, & Barrett, 2018) and acts as a link between external and internal cues and behavioral responses (Kring, 2008). The strong tie between emotion and behavior has long been recognized (e.g., Darwin, 1872; Hume, 1738; James, 1884) and makes emotion central to understand adaptive and non-adaptive human functioning (Lang, 1995). A predominant view on emotions is that they consist of a set of basic biological ‘entities’ that we share with other mammals and which have been selected and shaped by natural selection because they motivate cognitive and behavioral responses that fosters survival and reproduction (Ekman, 1999). Even though it is intensely debated whether emotions can be considered “basic” (e.g., Lindquist, Wager, Kober, Bliss-Moreau, & Barrett, 2012), the prominent role that emotion plays in relation to human behavior is widely acknowledged (Lerner et al., 2015).

Emotion in obsessive-compulsive disorder

As described above, the dominant psychological model of OCD (and its treatment) has viewed OCD as just another kind of anxiety disorder, characterized by repetitive and ritualized avoidance behaviors that are driven by a high frequency of intrusive thoughts of a fearful nature and maladaptive appraisals about their meaning (Abramowitz et al., 2009). This model is also embedded in the treatment of OCD

that rests heavily on in vivo exposure to feared stimuli while asking the patient to refrain from compulsions and safety-seeking behaviors. In the past decade, the validity of this fear-focused model of OCD has been questioned, and expanded upon by researchers who have highlighted the role of other emotions (Ouimet et al., 2019). This thesis concerns itself with the role played by fear (harm avoidance), incompleteness, and disgust in relation to pediatric OCD.

The Core Dimensions Model

One of the critiques of traditional cognitive behavioral models of OCD is that they do not adequately address the features of OCD that distinguish it from other disorders characterized by high-levels of fear, e.g. anxiety disorders. In particular, the traditional models do not address the occurrence of obsessions and compulsions that appear driven not by fear but a need for things being “complete” or “just right”, or because of intense feelings of disgust or moral abhorrence. In relation to the former, and to better explain the repetitive and ritualized checking, ordering, and symmetry routines often seen in OCD, increasing attention has been directed towards the emotional experience of incompleteness. Incompleteness refers to a feeling of dissatisfaction with things being “not just right” and an emotional urge to act in order to adjust stimuli in the external or internal environment with the goal to reach a sense of completeness (Pallanti, Barnes, Pittenger, & Eisen, 2017). There is evidence that a felt sense of incompleteness at the trait level is partly heritable (Sica, Bottesi, Caudek, Orsucci, & Ghisi, 2016) and associated with neural correlates that differ from those usually observed in individuals during fear challenges and with anxiety problems (Brown et al., 2019).

Building upon ideas from the French neurologist Pierre Janet, who linked the experience of incompleteness to OCD over a century ago (Pitman, 1984), Summerfeldt (2004) proposed a model in which fear (termed “harm avoidance” in the model) and incompleteness should be considered as two core dimensional motivational processes in OCD, each contributing to the severity and heterogeneity of the disorder. In support of the model, studies have found that trait incompleteness is elevated in individuals with OCD compared to individuals with anxiety disorders (Chik, Calamari, Rector, & Riemann, 2010; Ecker, Kupfer, & Gönner, 2014; Ghisi, Chiri, Marchetti, Sanavio, & Sica, 2010) and gambling and eating disorders (Sica et al., 2015), uniquely related to compulsive urges during behavioral tasks in non-clinical samples (Cogle, Fitch, Jacobson, & Lee, 2013; Pietrefesa & Coles, 2009), related to OCD symptoms after controlling for harm avoidance and co-occurring psychiatric symptoms in clinical (Ecker & Gonner, 2008) and non-clinical samples (Belloch et al., 2016), more strongly related to OCD than to general distress (Taylor et al., 2014), and reduced as an effect of OCD treatment (Coles & Ravid, 2016). Further, incompleteness-related experiences have been reported during symptoms

in over 60% of adult patients with OCD (Ferrao et al., 2012). However, to date, all studies on incompleteness have been focused on adults, and usually non-clinical samples. Therefore, little is known about the relationship of this variable to the symptoms of OCD in pediatric samples, and indeed whether incompleteness distinguishes youth with OCD from those with anxiety disorders.

Disgust

Another emotion increasingly linked to OCD (and to other psychiatric disorders) is disgust (Knowles, Jessup, & Olatunji, 2018). The feeling of disgust is globally acknowledged and considered one of the basic emotions linked to the need to avoid infectious and noxious substances (Davey, 2011). However, disgust proneness, which refers to the degree to which an individual reacts with disgust and how these reactions are appraised (Olatunji, Ebesutani, & Kim, 2016), vary between individuals with about half of this variation being attributed to genetic contributions (Sherlock, Zietsch, Tybur, & Jern, 2016). High disgust proneness has been proposed to act as a vulnerability factor for the development of OCD (and anxiety disorders), particularly in relation to contamination-based symptoms (Olatunji, Tart, Ciesielski, McGrath, & Smits, 2011).

A growing body of empirical studies supports the notion that disgust proneness is elevated in psychiatric populations (Knowles et al., 2018; Olatunji, Armstrong, & Elwood, 2017), but whether it shows specificity to OCD is uncertain (Melli, Poli, Chiorri, & Olatunji, 2018). In relation to children and adolescents, positive correlations between disgust proneness and OCD symptoms have been found in non-clinical populations, but equally or stronger correlations were found in relation to anxiety (phobic) symptoms (Muris, van der Heiden, & Rassin, 2008). In clinical samples, an association between disgust and OCD has been found even when controlling for general distress (Olatunji, Ebesutani, Kim, Riemann, & Jacobi, 2017), and disgust proneness has been found to be reduced as an effect of treatment for OCD and anxiety (Knowles et al., 2018; Taboas, Ojserkis, & McKay, 2015)

A broader emotion framework and links to outcome

Even though maladaptive emotional functioning may be considered one of the defining features of OCD and may be of high relevance to the onset and maintenance of its symptoms, emotion involvement in pediatric OCD has received very little research attention. As stated above, no studies exist that examine the potential role of incompleteness in pediatric OCD. In addition, incompleteness and disgust have never been examined conjointly in clinical samples (either children or adults). Also, the degree to which incompleteness or disgust are relevant to outcomes in treatment for OCD has not been examined (either in children or adults). This is a potentially

important gap in the literature given that not all individuals with OCD benefit from the first-line, recommended treatment, exposure-based CBT, which draws upon a fear-centric model of OCD. Hence, it is possible that patients with OCD symptoms that are not driven by fear, may respond more poorly to the traditional fear-focused CBT approaches. Further, a majority of studies have examined emotion involvement using measures that captures general, trait-like proneness for different emotions. While important, this is not the same as the degree to which different emotional experiences are directly involved in symptoms, with the latter having potential stronger implications for etiological models and treatment. Taken together, research is needed that (a) examines whether a fear-based model is adequate in explaining the symptoms of pediatric OCD, (b) conjointly examines fear, incompleteness, and disgust, (c) investigates emotion involvement in symptoms not just at trait-level proneness for these emotions, and (d) examines if emotion involvement in symptoms is associated with treatment outcome.

Aims

The primary aims of the present thesis are to examine to which degree fear, incompleteness, and disgust at the trait and state level: (a) can be validly measured in children and adolescents; (b) are related to the overall severity of OCD and severity of the main OCD symptom dimensions; (c) discriminate youth with OCD from those with anxiety disorders (and no OCD) and from youth with no psychiatric disorder; and (d) predict outcomes for youth undergoing treatment for OCD. These aims were investigated through a series of data-driven studies with the results appearing across five different papers.

Specific aims for Paper 1 and Paper 2 are to examine the validity of measures developed to assess the dimensionality of OCD and the trait- and state-levels of fear, incompleteness, and disgust. The specific aim for Paper 3 is to examine whether self-reported, trait-level fear, incompleteness, and disgust are related to diagnostic status (OCD vs anxiety disorders vs no psychiatric disorder), symptom severity (OCD, anxiety, depression), OCD symptom dimension severity, and change in OCD symptoms following treatment. The specific aim of Paper 4 is to examine whether state-levels of fear, incompleteness, and disgust during OCD symptoms is related to OCD symptom subtype (aggressive, symmetry, contamination) and discriminate youth with OCD from those with generalized anxiety disorder and social anxiety disorder. The specific aim for Paper 5 is to examine whether state-level involvement of fear, incompleteness, and disgust in OCD symptoms at pre-treatment predict post-treatment outcomes for youth undergoing treatment for OCD.

Methods

Participants, procedure, and ethics

Data for this thesis was collected from clinically referred children and adolescents with OCD and anxiety disorders, and non-referred youth with no psychiatric disorder. Participants with OCD and anxiety disorders were recruited from a specialized child and adolescent psychiatric outpatient clinic in Lund, Sweden where the author is employed as a clinical psychologist. Youth with no psychiatric disorder were recruited from Lund-area schools. Clinical psychologists with experience in the assessment and treatment of pediatric OCD and anxiety disorders carried out the interview-based assessments at the first assessment at the clinic (baseline) and again at follow-up. Only youth with OCD were followed up for the purposes of the present studies. Of the 111 follow-up assessments, 57% were carried out at the clinic and 43% by phone. Youth with a mental disorder that required more urgent treatment than OCD or an anxiety disorder and youth with intellectual and language difficulties were excluded. No other exclusion criteria were used. The study was reviewed and approved by the regional ethics committee (Dnr 2015/663; Dnr 2016/394) and all participants and their caregivers provided written informed consent.

Measures at baseline and follow-up

Interview-based measures

Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-KID)

The presence or absence of the most common mental disorders in children were assessed using the MINI-KID (Sheehan et al., 2010). The MINI-KID is based on DSM-IV diagnostic criteria and has shown sound psychometric properties in child and adolescent clinical settings, including in a Swedish clinical context (Högberg et al., 2019). Only slight modifications were needed to the MINI-KID to harmonize this assessment with the DSM-5 criteria for OCD and the anxiety disorders (i.e.,

separation anxiety disorder, social anxiety disorder, generalized anxiety disorder, specific phobia, panic disorder), and these modifications were undertaken prior to any interviews with the scale.

Dimensional Yale-Brown Obsessive Compulsive Scale (DY-BOCS)

To better capture the role played by emotion in the major symptom dimensions of OCD, all participants with OCD were interviewed with the DY-BOCS. This scale measures OCD dimensionality, yielding individual scores (0-15; time, distress, interference) for aggressive, sexual/religious, symmetry, contamination, and miscellaneous symptoms. In its original version, the DY-BOCS consists of a self-report checklist and an interview-based section. It has sound psychometric properties in youths and adults with OCD (Garcia-Delgar et al., 2016; Guler et al., 2016; Rosario-Campos et al., 2006). In the present studies, only the interview portion of the DY-BOCS is used, with its clinical utility and psychometric properties reported upon in Paper 1.

Children's Yale-Brown Obsessive Compulsive Scale (CY-BOCS)

The overall severity of OCD symptoms was measured with the CY-BOCS. This is a 10-item, interview-based scale where time, interference, distress, resistance, and control are scored separately for the most prominent (current) obsessions and compulsions. Each item is scored on a 0-4 scale, yielding an overall score of 0 to 40, with higher scores indicating more severe OCD. The CY-BOCS has sound psychometric properties, including in a Swedish clinical context (Freeman, Flessner, & Garcia, 2011; Scahill et al., 1997; Valderhaug & Ivarsson, 2005).

Obsessive-Compulsive Core Dimensions Interview (OC-CDI)

The OC-CDI is a clinician-led interview developed to assess the state-level involvement of fear and incompleteness in OCD symptoms. For the purposes of the present studies, the interview was modified so that it also included an assessment of disgust. For youth with OCD, emotion involvement (fear, incompleteness, disgust) in symptoms across all dimensions affirmed during the DY-BOCS interview was assessed, resulting in state-level scores for each emotion at the OCD dimension-specific level and at an overall, aggregated, level. For participants with social anxiety disorder and generalized anxiety disorder, the OC-CDI was modified to assess the same three emotions in their anxiety symptoms as defined by DSM-5. Evidence for the clinical utility and validity of the OC-CDI are presented in Paper 2.

Self-report measures

Obsessive Compulsive Core Dimensions Questionnaire (OCTCDQ)

The OCTCDQ is a 20-item self-report measure with 10 items (each) covering everyday (trait) experiences of harm avoidance and incompleteness. Each item is scored on a 0-4 scale with higher ratings corresponding to more frequent experiences of harm avoidance and incompleteness (i.e., higher trait-levels of these emotions). The OCTCDQ was originally developed for use with adults. With the permission and input from the original author (L. Summerfeldt), the scale was translated into Swedish and back-translated into English, following published recommendations on the translation of health-related measures (World Health Organization, 2014). Small adjustments were made to some items to increase interpretability for younger participants and the original author of the scale (L. Summerfeldt) approved the final back-translated version after some further small adjustments. Results for the clinical utility and validity of the OCTCDQ are presented in Paper 2.

Disgust Emotion Scale for Children (DES-C)

The DES-C is a 30-item self-report measure that assesses disgust propensity (trait-level) in youth. Each item asks how much disgust would be evoked by different stimuli on a 0-4 scale with higher ratings indicating a stronger disgust reaction. The DES-C yields both an overall score, and five subscale scores (animals, injection and blood, mutilation and death, rotting foods, and odors). With permission and input from the scale's author (P. Muris), the DES-C was translated into Swedish and back-translated into English following the same procedures as for the OCTCDQ (above). The original author of the scale (P. Muris) approved the final back-translated version. The results for the psychometric properties of the DES-C are presented in Paper 2.

OCI-CV

The OCI-CV is a 21-item self-report measure covering OCD symptoms in youth. Each item is rated on a 0-2 scale with higher ratings indicating more severe symptoms. The scale yields an overall score and six separate symptom dimension scores (doubting/checking, obsessing, hoarding, washing, ordering, neutralizing). The OCI-CV has sound psychometric properties in clinical samples of youth, both in its original and in its Swedish version, including in the present sample (Aspvall et al., 2019; Foa et al., 2010; Jones et al., 2013).

The Screen for Child Anxiety and Related Disorders-Revised (SCARED-R)

The SCARED-R is a 41-item self-report measure of anxiety symptoms. Each item is rated on a 0-2 scale with higher ratings indicating more severe symptoms. The

scale yields an overall score and scores for 5 different subscales (social, generalized, panic, school, and separation anxiety). In the present thesis, only the overall score was used. The original and Swedish version of the scale has sound psychometric properties in clinical samples (Birmaher et al., 1999; Ivarsson, Skarphedinsson, Andersson, & Jarbin, 2017).

Children's Depression Inventory-Short Version (CDI-S)

The CDI-S is a 10-item self-report measure on depressive symptoms in youth. Each item is rated on a 0-2 scale, and all 10 items are summed to yield an overall score. Higher scores indicate more severe symptoms. The original and Swedish version has sound psychometric properties (Ahlen & Ghaderi, 2017; Allgaier et al., 2012).

Statistical analysis

The psychometric properties and validity of the included measures were examined using Cronbach's alpha (internal consistency), confirmatory factor analysis (CFA; factor structure), and zero-order Pearson correlations with relevant clinical measures (construct validity). Between-group comparisons were assessed via chi-squared tests, independent samples t-tests, and analyses of covariance models. To examine unique relationships between sets of variables, standard regression models as well as structural equation models were employed. Predictors of treatment outcome were examined using a hierarchical ordinal regression model. All statistical analyses were carried out in SPSS v. 23 and v. 25 and in R Statistical Software version 3.4.4.

Summary of studies

Paper 1

Background and aim

There is increasing evidence that the symptoms of OCD can be conceptualized into major symptom dimensions related to: (1) aggressive obsessions and checking compulsions; (2) taboo concerns; (3) symmetry obsessions and ordering compulsions; and (4) contamination obsessions and washing compulsions. However, few measures exist that comprehensively assess these dimensions in patients with OCD. Moreover, the most comprehensive of these measures, the DY-BOCS, is time-consuming, not based on the latest DSM-5 diagnostic criteria, and with unknown sensitivity to change in symptoms during treatment. The aim of Paper 1 was to evaluate the psychometric properties and clinical utility of a DSM-5 updated, interview-only version of the DY-BOCS with youth seeking treatment for OCD.

Methods

Participants were 119 treatment-seeking youth with OCD who were assessed with an updated, interview-only version of the DY-BOCS, a subset of whom ($n = 100$) were re-assessed on average 14 months after the initial assessment. The internal consistency of the measure and its subscales, its sensitivity to symptom change, and the time for administration were examined.

Results

Results showed that this updated, briefer version of the DY-BOCS retained its sound psychometric properties when utilized in an interview-only version (i.e., without the clinician having the benefit of the self-report checklist usually completed by the patient prior to the interview). The measure was also shown to be sensitive to treatment change with moderate to strong correlations both at the symptom dimension (self-reported OCI-CV) and at the overall disorder level (clinician-rated

CY-BOCS). More than 90% of all assessments were carried out within a 60-minute session, which is favorable compared to a total administration time of about 90 minutes for the original DY-BOCS.

Discussion

It appears that the major symptom dimensions of OCD can be validly assessed in both children and adolescents using a brief, clinician-rated, interview-only measure. Further validation studies of the DY-BOCS are needed before firm conclusions can be drawn about the validity of the measure. However, due to the importance of OCD symptom dimensions to the study of the etiology and treatment of OCD, such validation studies are warranted.

Paper 2

Background and aim

The view of OCD as a primarily fear-based disorder has come under increasing scrutiny, with increased focus on incompleteness and disgust as other symptom motivators. However, the bulk of research on these emotions has been carried out with adults. An important first step to examine whether incompleteness and disgust play any role in pediatric OCD is to establish the utility and validity of measures aimed at these constructs, both at the trait- and state-level. In the present study, the psychometric properties of a self-report (trait) and interview-based (state) measure of fear, incompleteness, and disgust were evaluated in clinically referred youth with OCD and anxiety disorders.

Methods

One-hundred youth with OCD and 96 youth with anxiety disorders (and no OCD) completed self-report questionnaires of trait-level fear and incompleteness (OCTCDQ) and disgust propensity (DES-C), and the interview-based measure of emotion involvement in OCD symptoms (OC-CDI). Factor analysis was used to explore the theoretical soundness of the factor structure of the self-report measures. Further, the internal consistency and construct validity of the measures were examined. Lastly, in the sample of youth with OCD, it was examined whether self-reported (trait) levels of fear, incompleteness and disgust correlated with scores for the moment-to-moment involvement of these emotions in OCD symptoms obtained from the interview measure (OC-CDI).

Results

The two-factor structure of the OCTCDQ (fear/harm avoidance and incompleteness) established in adults was replicated in this sample of clinically-referred youth. The five-factor structure of the DES-C, previously only examined in a non-clinical sample of youth, was also replicated. Both the OCTCDQ and DES-C exhibited high levels of internal consistency. Scores on the self-report (trait-level) measures of fear and incompleteness (OCTCDQ) correlated in the moderate range with OC-CDI scores for these emotions. Weaker correlations were observed between disgust at the trait level (DES-C) and as it occurred in the moment-to-moment experience of OCD symptoms (OC-CDI). Finally, participants in the study were able to understand the question about, and report upon, the levels of fear, incompleteness, and disgust in their moment-to-moment experience of their OCD

symptoms, suggesting that the OC-CDI is valid for this purpose in children and adolescents.

Discussion

It appears that fear, incompleteness, and disgust proneness can be validly assessed, at the trait- and state-level, in both children and adolescents with OCD and anxiety disorders, using a combination of self-report and interview-based measures. Further validation studies are needed, including the relationship of scores on the OC-CDI to behavioral and cognitive measures of fear, incompleteness, and disgust. Assuming that the measures can be further validated in this way, they represent an efficient and cost-effective tool for use in basic research and clinical settings.

Paper 3

Background and aim

The Core Dimensions Model, in which fear and incompleteness are argued to underlie OCD, has never been evaluated in youth. Further, the involvement of disgust propensity in pediatric OCD and anxiety disorders is understudied, and has not been examined conjointly with fear and incompleteness. To address these gaps in the literature, the present study examined the degree to which self-reported (trait) levels of fear, incompleteness, and disgust discriminated clinically referred youth with OCD from those with anxiety disorders (and no OCD), and from non-referred youth without a psychiatric disorder. Further, within the larger clinical sample (i.e., youth with OCD and anxiety disorders), the association between these emotions and self-reported OCD, anxiety, and depression were investigated using structural equation modelling (SEM). Lastly, within the OCD sample, also using SEM, the relationship between these emotions and scores on a self-report measure of the major OCD symptom dimensions (i.e., doubting/checking, obsessing, washing, hoarding, ordering, neutralizing) was examined.

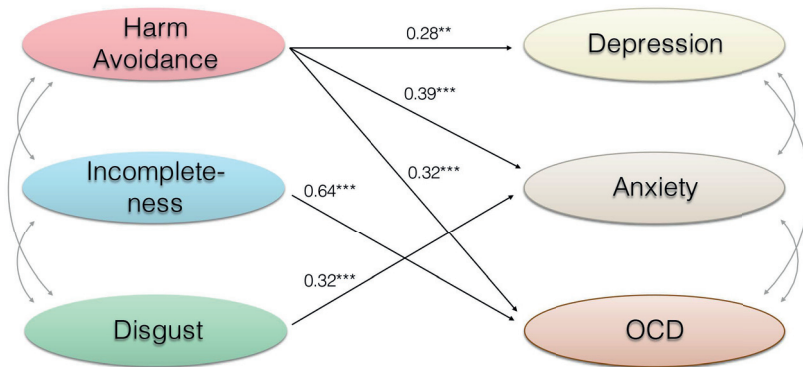
Methods

One-hundred clinically referred youth with OCD, 96 with anxiety disorders, and 25 non-referred youth with no psychiatric disorder completed self-report questionnaires on trait-level fear and incompleteness (OCTCDQ) and disgust propensity (DES-C). Group differences, with adjustments for age and gender, were examined and dimensional relationships between emotion and symptom measures were investigated using two separate SEMs.

Results

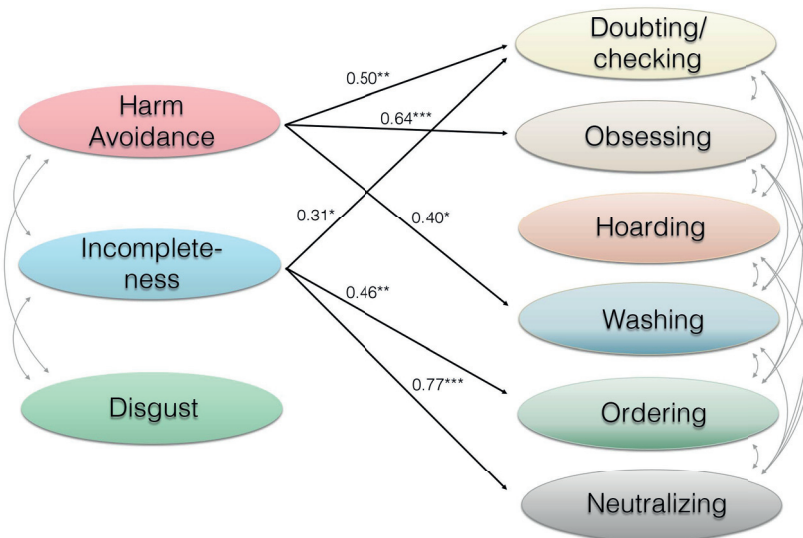
The OCD and anxiety groups scored significantly higher on fear and disgust than the non-clinical group. The OCD group scored higher than the anxiety and non-clinical group on incompleteness, with no statistically significant difference emerging between the two latter groups. Within the clinical group as a whole (OCD and anxiety disorders), fear was uniquely related to OCD, depression, and anxiety, incompleteness was uniquely related to OCD, and disgust uniquely related to anxiety (see Figure 1).

Figure 1. Paths from fear (harm avoidance), incompleteness, and disgust to depression, anxiety, and OCD within the larger clinical sample



Within the OCD group (see Figure 2), fear was uniquely related to doubting/checking, obsessing, and washing. Incompleteness was uniquely related to doubting/checking, ordering, and neutralizing. Disgust was not uniquely related to any symptom dimension.

Figure 2. Paths from fear (harm avoidance), incompleteness, and disgust to OCD symptom dimensions within the OCD sample



Discussion

Similar to findings for adults, incompleteness at the trait level was significantly elevated in youth with OCD when compared to those with anxiety disorders and to youth with no psychiatric disorder. By way of contrast, fear was elevated in both the OCD and anxiety groups, consistent with a view that fear is an important emotion in OCD. Finally, trait levels of disgust were similar in participants with OCD and anxiety disorders, with this emotion differentiating youth with OCD and anxiety disorders from youth with no psychiatric disorder. When looking at these emotions and their relationship to severity of OCD, anxiety, and depression using SEM (in the clinically referred participants), fear appeared to have a trans-diagnostic relationship, making contributions to the severity of all symptoms. By way of contrast, incompleteness showed a unique relationship to OCD, and disgust to anxiety. When the SEM approach was limited to the participants with OCD and the major OCD symptom dimensions, incompleteness showed unique associations with OCD symptom dimensions characterized by doubting/checking, ordering and neutralizing. Fear was uniquely related to OCD symptom dimensions characterized by doubting/checking, obsessing, and contamination/washing. Contrary to expectations, disgust showed no association with any of the OCD symptom dimensions. This is the first study to examine the relationships among these variables in clinically referred and non-referred youth. Further investigations using alternative measures of emotion, including experimental measures, in these same groups are warranted before firm conclusions can be drawn. In the interim, the present results highlight the importance of studying emotions other than fear in relation to both pediatric OCD and pediatric anxiety disorders.

Paper 4

Background and aim

There is evidence, primarily from studies with adults, to suggest that the symptoms of OCD are motivated by emotions other than fear, particularly feelings of incompleteness and disgust. Given the strong influence of emotion on cognition and behavior, this may have important implications for our understanding of OCD and how to best treat the disorder. To date, there have been no studies investigating incompleteness in pediatric OCD samples, with very few investigating the role of disgust, and no studies examining both variables conjointly in clinical samples (either children or adults). In addition, the existing studies rarely include clinical comparison groups and have tended to rely on trait measures of incompleteness and disgust, not measures capable of assessing their moment-to-moment (state-level) involvement in OCD symptoms. The aim of Paper 4 was to address these gaps in the literature by examining state-level involvement of fear, incompleteness, and disgust in OCD symptoms in a large sample of youth with OCD and in anxiety symptoms in youth with social anxiety disorder and generalized anxiety disorder.

Methods

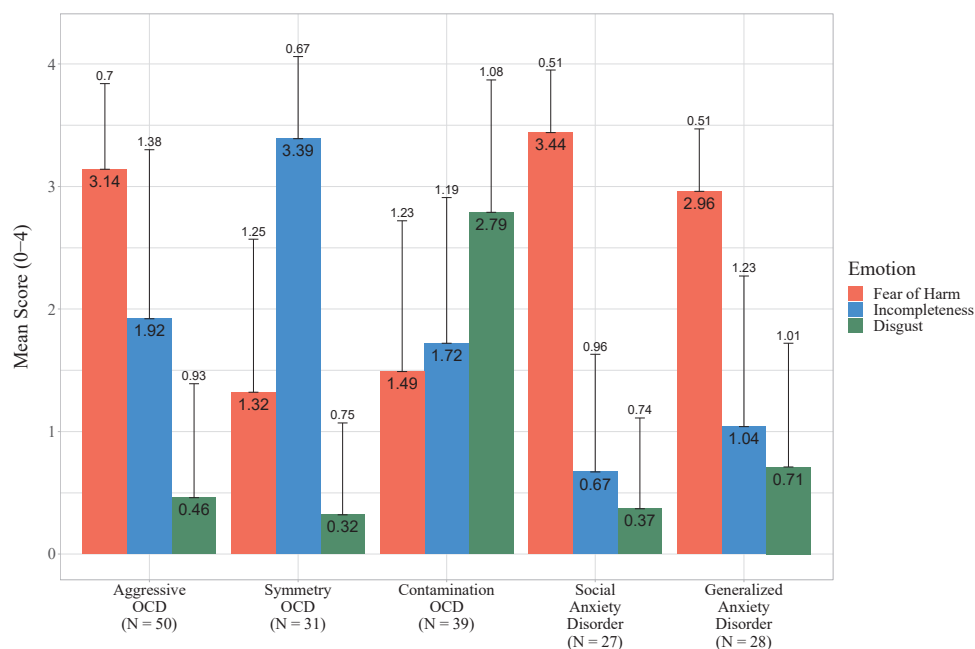
Treatment-seeking youth with a DSM-5 diagnosis of OCD and social anxiety disorder or generalized anxiety disorder (and no OCD), were interviewed about the degree to which fear, incompleteness, and disgust were involved in the moment-to-moment experience of their symptoms. For the OCD group, emotion involvement was assessed for the main symptom dimensions of OCD. The degree to which these emotions were involved in symptoms was compared for the three diagnostic groups. Within the OCD group, the relationship between emotion involvement in OCD symptoms and autistic traits, tic disorder, and hoarding was also examined.

Results

Figure 3 presents the means and standard deviations for emotion involvement in the main symptom dimensions of OCD for youth with this disorder, and in the symptoms of youth with social anxiety disorder and generalized anxiety disorder, respectively. Consistent with expectations, the highest levels of disgust were reported for youth with contamination-based OCD symptoms; levels that were higher when compared to the involvement of disgust in all other OCD symptom dimensions within the OCD group, and in comparison to disgust involvement in symptoms of social anxiety and generalized anxiety disorder. No other OCD

symptom dimensions, or anxiety disorder groups, differed in relation to the level of disgust experienced during symptoms. Incompleteness during symptoms was significantly higher in the OCD groups than in the social anxiety and generalized anxiety disorder groups with the most elevated levels observed in youth with symmetry-related OCD. Fear was heightened in aggressive OCD, social anxiety disorder, and generalized anxiety disorder when compared to contamination and symmetry-based OCD, with no differences between the two latter groups.

Figure 3. Means and standard deviations for the different emotions across symptoms dimensions of OCD and social and generalized anxiety



The following analyses apply only to the OCD group. Both fear and incompleteness were related to the severity of aggressive OCD symptoms, with the overall model including all three emotions (fear, incompleteness, disgust), as well as age and gender, explaining 35% of the total variation in the severity of aggressive OCD symptoms. Incompleteness was the only emotion related to the severity of symmetry-related OCD symptoms, with the overall model explaining 51% of the total variation in the severity of symmetry symptoms. Disgust was the only emotion related to severity of contamination-related OCD symptoms, with the overall model explaining 12% of the variation in symptom severity.

A lifetime history of tic disorder and/or autistic traits was not related to the degree to which the three emotions were involved in OCD symptoms. The degree to which incompleteness (but not fear or disgust) was involved in OCD symptoms was

positively associated with the severity of self-reported hoarding symptoms ($r = .24$, $p < .05$).

Discussion

By subtyping youth with OCD according to their primary symptom dimension and asking them to report on the emotion involvement in symptoms within this dimension, it became evident that emotion involvement in pediatric OCD span at least emotions of fear, incompleteness, and disgust. In this respect, OCD appeared to be broadly distinguishable from social anxiety and generalized anxiety disorder by elevated levels of incompleteness. Disgust was uniquely related to contamination-based OCD, contrasting the results from Paper 3, where trait-level disgust was not uniquely related to any OCD symptom dimension. Fear was elevated in all groups, which is consistent with the transdiagnostic role of trait-level fear in Paper 3. Moreover, the degree to which incompleteness was involved in symptoms was positively associated with self-reported hoarding symptoms.

The present findings provide preliminary support for Summerfeldt's model that there are two emotions central to the experience of OCD symptoms, fear and incompleteness. These findings require replication, and incompleteness and fear should be assessed via methods in addition to retrospective self-reports (e.g., experimentally). The findings for disgust showed that this emotion appears to play an important role in contamination symptoms of OCD. Further studies using additional measures of disgust are warranted. Overall, the present findings add to a growing body of literature suggesting that the heterogeneity of symptoms found in OCD likely reflects diverse etiological and maintaining processes, including but not limited to those associated with the acquisition of exaggerated fear/avoidance responses.

Paper 5

Background and aim

In previous studies (including Papers 3 and 4 in this thesis), preliminary evidence has been provided for a relationship between fear, incompleteness, and disgust and the severity and subtypes of OCD symptoms. To date, no studies have examined whether the moment-to-moment involvement of these three emotions in OCD symptoms are related to outcomes in youth treated for OCD. To fill this gap in the literature, the main objective of the present study was to examine whether the degree of involvement of fear, incompleteness, and disgust in OCD symptoms at pre-treatment predicted outcomes in a large sample of youth treated for OCD.

Methods

Participants were treatment-seeking children and adolescents with OCD ($N = 111$) recruited from a specialist outpatient psychiatry service. All participants underwent structured diagnostic interviews, as well as an interview to assess the degree of emotion involvement in their OCD symptoms at the major symptom dimension level. Clinicians completed measures of overall symptom severity and impairment. This assessment was repeated at post-treatment, an average of 13 months later. Response status for each participant was classified using internationally recognized criteria. The degree to which sociodemographic characteristics, initial OCD symptom severity (overall and symptom dimensions), treatment factors, comorbidity, and emotion involvement in OCD symptoms predicted treatment response was estimated using a hierarchical ordinal regression model.

Results

Having OCD symptoms with a high level of incompleteness and disgust involvement, not engaging in exposure exercises in treatment, and having a neurodevelopmental disorder predicted poorer treatment outcomes (See Tables 1 & 2).

Table 1

Final block of the hierarchical ordinal regression model with outcome as the dependent variable (1= No Response; 2 = Partial Response; 3 = Response; 4 = Remission) and predictors added in blocks.

Model	Model statistics	Variables	OR	<i>p</i>	OR 95% <i>CI</i>
Final block	$X^2 = 43.70$ $df = 17$ p for model < .001 Nagelkerke $R^2 = 35\%$	Age (years)	0.97	.723	0.83, 1.13
		Male vs female	0.79	.582	0.33, 1.85
		Declining ERP	0.28	.045	0.08, 0.97
		SSRIs	0.33	.062	0.11, 1.06
		Sedatives	0.62	.401	0.20, 1.90
		Number of CBT sessions	0.97	.394	0.91, 1.04
		Baseline to follow-up (months)	1.06	.109	0.99, 1.13
		Comorbidity (yes vs no)	0.54	.170	0.22, 1.30
		Baseline severity (CY-BOCS)	1.15	.012	1.03, 1.29
		Aggressive symptoms	0.89	.139	0.77, 1.04
		Taboo symptoms	1.09	.295	0.93, 1.27
		Symmetry symptoms	1.00	.992	0.88, 1.13
		Contamination symptoms	1.01	.936	0.87, 1.16
		Miscellaneous symptoms	0.93	.367	0.81, 1.08
		Fear	1.44	.154	0.87, 2.38
		Incompleteness	0.62	.027	0.41, 0.95
Disgust	0.64	.031	0.43, 0.96		

Notes. ERP = Exposure plus response prevention.

Table 2

Ordinal regression model with outcome (1= No Response; 2 = Partial Response; 3 = Response; 4 = Remission) as the dependent variable and sociodemographic and comorbid variables as predictors.

Predictor	OR	<i>p</i>	OR 95% <i>CI</i>
Age (years)	0.90	.116	0.79, 1.03
Male vs female	0.97	.939	0.45, 2.07
Neurodevelopmental disorder	0.27	.005	0.11, 0.68
Lifetime history of tic disorder	1.11	.810	0.49, 2.52
Major depressive disorder	1.01	.984	0.26, 3.94
Anxiety disorder	0.79	.403	0.38, 1.65

Discussion

Previous studies have found that baseline symptom severity (OCD) is a predictor of treatment outcome in youth receiving CBT and/or SSRIs. This is the first study to show that it is not only higher symptom severity that predicts poorer outcomes, but the degree to which emotions other than fear are involved in the moment-to-moment experience of OCD symptoms. While preliminary, this is an important finding because the participants in this study received the standard, fear-focused, exposure based CBT approach to OCD recommended in the literature and treatment guidelines. Firm conclusions await further studies involving comparison groups and longer follow-ups. However, the present findings suggest that incompleteness and disgust are important targets for investigation in treatment studies, both as targets for change and barriers to improvement.

General discussion

Main findings

OCD is a highly heterogeneous condition, and it has long-been argued that processes other than fear are important to our understanding of the disorder. However, the most dominant evidence-based psychological treatment model (exposure-based CBT) is predicated on the notion that fear, at both the physiological and cognitive levels, is the primary motivator and avoidance/compulsions the primary maintaining factors in OCD. Over the past 15 years, this model has been increasingly challenged. A model put forth by Summerfeldt (2004) argued that both fear and a felt sense of incompleteness were important to our understanding of the highly heterogeneous symptom presentation found in individuals with OCD. Others have argued that disgust, a probable primary emotion, is important to the contamination-related symptoms that are so common in OCD. With few exceptions, studies investigating these models have been carried out with adults, not children and adolescents, and not clinical samples. In addition, the relationship of OCD symptoms to emotions like incompleteness and disgust has been assessed at the trait, not the state level. This thesis sought to address these gaps in the literature.

First, both children and adolescents were able to comprehend the concept of incompleteness and to report on whether this emotion, as well as fear and disgust, was part of their general emotional responses and in their symptoms of OCD and anxiety disorders. Thus, these emotion concepts could be validly assessed in both questionnaire and interview formats. Second, incompleteness (at the trait and state level) was uniquely associated with OCD when compared to anxiety disorders, while fear (trait and state) had greater trans-diagnostic associations. The findings for disgust were mixed with trait-level disgust propensity showing no unique relationship to OCD, while disgust at the state level was clearly elevated in contamination-related OCD symptoms. Third, the degrees to which incompleteness and disgust were involved at the state level in OCD symptoms were significant predictors of a poorer response to OCD-focused treatment including both standard CBT and SSRIs. Below I will discuss these results and link them to the broader fields of OCD and emotion research.

Discussion and future directions

The premise of this thesis was that emotion is an important concept for understanding human behavior and that an understanding of emotion involvement in OCD may elucidate basic mechanisms driving its symptoms. Thus, if the emotions that underpin OCD go beyond fear, this may have implications for the development, maintenance, and treatment of the disorder.

Based on both trait and state-level measures of emotion, the present thesis provided evidence that incompleteness was specific to OCD while fear was related to both OCD and anxiety disorders (and possibly to depression). This may imply that fear in itself is insufficient to give rise to pathological states of compulsivity and that such states instead may be largely driven by incompleteness or a combination of fear and incompleteness. As suggested by the Core Dimensions Model of OCD, this may explain the ritualized and repetitive nature of OCD. However, it is important to note that a subset of participants had OCD symptoms that were not characterized by incompleteness. Furthermore, for a vast majority of the OCD participants, fear was at least moderately involved in their OCD symptoms, and very few participants had symptoms in which neither fear nor incompleteness was involved. Taken together, these results suggest that the core tenet of the Core Dimensions Model, i.e. that fear and incompleteness should be seen as dimensional aspects that together can help explain the seemingly idiosyncratic symptom expressions of OCD, holds promise as valid emotion framework for OCD in children and adolescents.

For the first time in a clinical sample, we conjointly examined disgust alongside fear and incompleteness. While both state and trait-level results for fear and incompleteness were in line with adult research and theoretical notions, results for disgust in the present studies were inconclusive. Trait-level disgust propensity was equally elevated in youth with OCD and anxiety disorders when compared to non-clinical youth. However, when the relationship between disgust propensity and the severity of OCD, anxiety, and depression was examined, after controlling for fear, incompleteness, and covariance between symptom variables, no evidence emerged for a unique link between disgust and OCD at the overall or dimensional level. These results are in line with recent evidence suggesting that disgust proneness/propensity may not be associated with OCD when controlling for other relevant variables (Sica et al., 2019).

Whereas disgust propensity at the trait level failed to show a unique association with OCD, examinations of disgust at the state-level, i.e. the direct experience of disgust in symptoms, provided strong evidence for that disgust is an important emotion in OCD, specifically for contamination-related symptoms. However, it is important to note that contamination-related OCD was the symptom dimension in which emotion involvement explained least of the variance in symptom severity. This may imply

that contamination-related OCD is driven by a broader range of emotions than the other main symptom dimensions of OCD, where incompleteness alone explained a large proportion of the variance in symmetry-related OCD, and fear and incompleteness together a large proportion of the variance in aggressive OCD symptoms. It is important to point out that this is the first time disgust involvement in OCD symptoms at the state level has been undertaken. Further studies are needed that include alternative self-report measures of disgust, and experimental assessment of disgust during symptom provocation. Nevertheless, these results provide preliminary support for the argument that an improved understanding of OCD requires investigations into a wider range of emotions than just fear, or indeed incompleteness.

Our results for disgust merge well with recent evidence for the distinctiveness of contamination-related OCD in the network structure of OCD symptom dimensions (Cervin et al., 2019). Using network analysis with OCI-CV data from a large group of youth diagnosed with OCD, it was shown that contamination-related OCD was the symptom dimension that was least connected to other OCD dimensions within the broader OCD network. There is some evidence that adult patients with contamination symptoms differ from other OCD patients in relation to basic cognitive functioning (Hashimoto et al., 2011) and neural substrates (van den Heuvel et al., 2009) and the present thesis stress the need for more research to better understand how contamination-related OCD is related (and not) to other OCD dimensions and whether there are important differences in relation to etiology and treatment response.

Importantly, evidence emerged that type and level of emotion involvement in OCD symptoms was related to treatment outcome. Given that standard psychological treatment of OCD (offered to all OCD participants in Paper 5) is predicated on a fear model, it may come as no surprise that youth with OCD symptoms characterized by high levels of incompleteness and disgust fared poorer. Furthermore, emotion involvement but not topographical aspects of symptoms (i.e., type of symptom) predicted poorer outcomes, which may suggest that topographic aspects of symptoms are less important to treatment response than emotional (or other) factors that underpin the symptoms. If these results are replicated, studies that attempt to better and more specifically target incompleteness and disgust will be important. For example, it has been suggested that symptoms driven by incompleteness may be targeted more effectively if the treatment uses more habit reversal than exposure-based interventions (Summerfeldt, 2004).

The present findings on treatment outcome should be viewed as preliminary, and in the context of a very small literature examining how different types of emotions (primarily at the trait level) influence outcomes in OCD treatments. It remains an open question whether incompleteness and disgust are genuine predictors of poorer

outcomes, or if these emotions are proxies for another underlying vulnerability or maintenance process. Likewise, it is too soon to speculate whether standard CBT approaches for OCD are suboptimal when patients report high levels of incompleteness and disgust as part of their symptoms. Exposure-based interventions can have effects that are much broader than the specific fears, cognitions, and behaviors evoked during in-treatment or self-guided exposure exercises. It may be that patients with high levels of incompleteness and disgust in their OCD symptoms need more exposure sessions, or for the focus of the exposure to be on tolerance for incompleteness and disgust. For example, there is experimental evidence that evoked disgust habituates slower than fear (Olatunji, Smits, Connolly, Willems, & Lohr, 2007), which may suggest that disgust-driven OCD may be a more treatment-resistant form of the disorder, but studies are few and no such studies have been carried out in relation to habituation and extinction processes of incompleteness. Such research may shed further light on how treatment for pediatric OCD may be improved.

SSRIs are potent in the treatment of OCD, but whether effects differ in relation to emotion involvement has not been examined. An early study showed that adult patients with hoarding symptoms fared poorer to serotonin reuptake inhibitors (SRIs) than patients with other OCD symptoms (Mataix-Cols, Rauch, Manzo, Jenike, & Baer, 1999), but this study examined only topographical aspects of symptoms and relied on factor-derived scores. Hence, more work is needed in which not only overt symptoms but also emotion involvement in these symptoms are examined. If differential effects of SSRIs/SRIs in relation to emotion involvement are present, this may offer clues about the neurobiological basis for fear, incompleteness, and disgust in OCD and may help to build personalized pharmacological treatment of OCD. Such studies are best undertaken under placebo-controlled randomized conditions.

As mentioned in the introduction, there is considerable debate in the literature as to what constitutes an emotion, and the nature of basic versus ‘compounded’ emotions (Lindquist et al., 2012). Specifically, there is debate whether emotions can be divided into basic or primary, inherited emotions and those dependent upon higher cognitive functions that are flexibly and socially constructed. From a basic emotion perspective, each emotion is distinct in form, with its own neural correlates and evolutionary purposes (Ekman, 1999). From this perspective, fear, incompleteness, and disgust would be conceptualized as distinct emotions that have been selected and preserved because they serve important functions for survival and reproduction. Within such a framework, symptom subtypes of OCD may have very different etiologies if they are underpinned by different emotions. Likewise, known differences in neural correlates for the main symptom dimensions of OCD (Mataix-Cols et al., 2004; van den Heuvel et al., 2009) may be explained by the different emotions directly involved in these dimension (as shown in Paper 4).

Within a constructionist approach to emotion, however, where it is argued that emotion is actively constructed and deeply integrated with cognition, behavior, and context, the present results may suggest that fear, incompleteness, and disgust are what you experience when you enter a state where the overarching goal is to prevent harm, create order, or avoid or remove unwanted substances. Interestingly, a constructionist framework merges well with the evidence for the specific role of incompleteness suggested by this thesis and the notion that OCD is underpinned by deficits in goal-directed action control (Gillan & Sahakian, 2015). That is, from a goal-directed perspective, what unites OCD is the inability to resist behaviors despite recognition that these behaviors are excessive or unnecessary, which is thought to be dependent on an imbalance between goal-directed and habitual action control. If we define incompleteness as the emotional product of an inner (habitual) urge to carry out a behavior, paired with efforts to resist this behavior, the specificity of incompleteness to OCD, the goal-directed hypothesis (Gillan, Fineberg, & Robbins, 2017), and the constructionist view of emotion (Barrett, 2017) can be viewed within a single theoretical framework. Future research may benefit from using this framework in the investigation of OCD.

Limitations

The results of the present thesis should be interpreted in the light of certain limitations. First, the majority of analyses were based on cross-sectional data and therefore no conclusions about causality can be drawn. This limitation carries with it that the predefined directionality of effects from emotions to symptoms (as in Paper 3) can also go in the other direction (with equal strength), i.e. from symptoms to emotion. Second, the clinical samples were collected at a single site which may affect generalizability. Third, emotion is a complex phenomenon and as such hard to assess comprehensively, and even though multiple measurements (self-report, interview-based, trait-level, state-level) were employed, there is no universally agreed upon way in which emotional experiences should be assessed. Future studies should include complementary measures such as assessment carried out during symptom-provocation and using psychophysiological and neuroimaging techniques. Fourth, because Paper 5 (treatment outcome) was naturalistic in nature, unmodelled factors may explain the poorer outcome associated with incompleteness and disgust. We controlled for several potential (pragmatic) confounders (i.e., engagement in ERP, medication or not, symptom severity, and time from baseline), but other unmeasured factors may also contribute to the observed results. Fifth, in all variance/covariance-based models, correlations between variables were interpreted as true phenotypic co-occurrence. However, some of this overlap may be explained by ‘evaluation bias’, i.e. the tendency for informants to rate positively

or negatively worded items more similarly. Sixth, as shown in the present thesis, OCD may be underpinned by multiple emotions, including emotions that were not studied in the present thesis. Future studies should therefore include other emotions to better understand what drives OCD, and how such emotions are related to the different symptoms of OCD, commonly co-occurring symptoms, and fear, incompleteness, and disgust. Finally, it is important to note that many participants with OCD in this study also suffered from clinically significant symptoms of anxiety disorders and other conditions. It is possible that the associations observed between incompleteness and disgust and OCD were owing to this comorbidity. It is extremely unlikely that a population of youth with only OCD can be identified, and that such a population would be representative for the broader OCD syndrome. However, future studies involving larger samples of patients with OCD, could attempt to delineate how specific types of comorbidity influence the relationship between fear, incompleteness, disgust (and other emotions) and OCD.

Conclusions

An overriding motivation for this thesis was to better understand what drives symptoms in pediatric OCD and why some fail to fully respond to treatment. My own personal experience from working with children and adolescents with OCD is that many are unable to articulate a specific feeling of fear or feared outcome in relation to their symptoms. Rather they describe a broader emotional experience, perhaps best characterized as “distress” or an “urgency” to perform a particular compulsion. Attempts to talk about this emotional state as if it is fear often feel forced, inaccurate, and inefficient. This led me to search for other emotion frameworks through which OCD could be examined. When I came across Summerfeldt’s Core Dimensions Model, I remember thinking “this is it”. The concept of incompleteness seemed to capture what many children and adolescents struggled to explain. Furthermore, by adding disgust to the framework – an emotion that many young individuals with OCD described as crucial to their symptoms – I felt prepared to more thoroughly examine OCD from an emotion perspective. Hence, the present thesis emanated from a clinical observation and now adds to a growing body of literature that suggests that OCD is not properly reflected when described as a solely fear-related mental disorder. In children and adults alike, other emotions seem to be strongly involved, particularly incompleteness and disgust of which incompleteness differentiates OCD from anxiety disorders at both the trait and state level. Preliminary evidence for the role of emotion in relation to treatment responsiveness further stresses the need to broaden the emotion framework in which OCD is studied and understood. Future studies examining not only overt aspects of symptoms but also emotion involvement in these symptoms and how such

involvement relates to etiology, brain activity, experimental manipulation, and treatment responsiveness hold the promise to move the understanding of OCD, its etiology, and treatment forward.

Acknowledgments

First of all, to all the families who participated – thank you for taking the time to fill in questionnaire after questionnaire, for taking trains, cars, buses, and bicycles to the clinic, where you had to endure long interviews and strange computer tasks. Without you, this thesis would not exist.

Magnus Lindvall, for inviting me to that first lunch, offering me to do a PhD, and consistently making all this possible.

Sean Perrin, for obliging me to think, and think again, and for making me work with my ideas and my writing (Discussion sections are actually growing on me), and for not letting me lose sight of all the patients that my research is about.

Emma Claesdotter-Knutsson, for support when support was needed, pushing when pushing was needed, and for making me open my portfolio (all you PhD students at the Faculty of Medicine in Lund know what I am talking about!), booking my half-time, finishing my portfolio, booking the defense, etc., etc. (i.e., getting me here).

David Mataix-Cols, for early on politely showing me how to step up my game, and since then, continuously and with more and more emphasis, forcing me to think and write as a scientist.

Johannes Björkstrand, for showing up out of the blue with very similar research interests and some wild research skills, and for us taking this the next step.

Elin Olsson, for helping with data collection, of course, but mostly for just being there through these crazy years.

Adrian, Freja, Nore, Edith and Ines, my children who keep me connected to the real world.

Tova Winblad, my partner in life who keeps me connected to the sublime world.

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