

The role of trauma in pediatric obsessive-compulsive disorder

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Thesis Submitted in Partial Fulfillment of the
Requirements for the Degree of
Doctor of Philosophy

in the
Department of Psychology
Faculty of Arts and Social Sciences

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SIMON FRASER UNIVERSITY
Fall 2023

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Abstract

Obsessive-compulsive disorder (OCD) is a debilitating psychiatric disorder whose etiology remains poorly understood. Besides genetic factors, environmental risk factors such as traumatic events seem to play a role in the development and trajectory of OCD. While the role of trauma in OCD development, expression, and treatment has been studied in adults, less attention has been paid to children and adolescents.

The present study aimed to (a) examine the nature of potentially traumatic events (PTEs) in pediatric OCD, including exposure frequency, type, and temporal precedence; (b) investigate the relationship between lifetime PTE exposure and OCD expression; and (c) explore OCD treatment effects based on lifetime PTE exposure.

Data from an OCD-affected youth sample, aged 6 to 19 years ($N = 113$, $M = 13.4$ years), from a specialized OCD clinic were analyzed using descriptive analyses, multiple linear regression, and mixed linear effect models.

First, results indicate that the majority (~82%) of OCD-affected youth have experienced at least one PTE type in their lifetime. One third (~35%) have experienced a PTE within 12 months prior to OCD onset, with the death of someone close being the most frequently endorsed. Second, findings suggest that cumulative lifetime PTE exposure is not associated with OCD severity or OCD-related functional impairment. Third, lifetime PTE exposure did not seem to affect treatment response. However, exposure to certain types of PTEs (physical abuse, emotional abuse, and death of someone close) had differential impacts on the rates of improvement.

Findings highlight the need for adopting a trauma-informed lens when assessing and treating youth with OCD. More research is needed to fully understand the role of trauma in OCD etiology, expression, and treatment in order to improve services and outcomes for families affected with pediatric OCD.

Keywords: obsessive-compulsive disorder; children and adolescents; traumatic life events; environmental risk factors; cognitive-behavioural therapy

Dedication

To my parents, Alice and Klaus.

Acknowledgements

I would like to express my deepest appreciation to my senior supervisor, Dr. Bob McMahon, for his guidance, support, and mentorship throughout the research process. I was lucky to have had an amazing supervisor who encouraged me to pursue my interests and challenged me to do my best work while always supporting me.

I would also like to extend my heartfelt gratitude to the members of my committee, Dr. Evelyn Stewart and Dr. Shannon Zaitsoff. This work owes much to their invaluable feedback, suggestions, and expertise, which they shared so generously.

Furthermore, I am grateful to the examiners, Dr. Peris and Dr. Somers, for their thoughtful questions and insightful comments during the defence, as well as to Dr. John Best for sharing his statistical expertise and advice. Additionally, a very big thank you to the families who participated in this research and made this work possible.

Lastly, I would like to thank my family, friends, and my spouse, Mike, for making it through the ups and downs of this journey with me and always putting a smile on my face at the end of the day.

This dissertation was supported by the Joseph-Armand Bombardier Canada Graduate Scholarship—Doctoral Social Sciences and Humanities Research Council of Canada as well as the BC Children’s Hospital Research Institute (BCCHRI) Brain, Behaviour, & Development Theme Trainee Boost Award.

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Chapter 1. Pediatric obsessive-compulsive disorder

This chapter describes how obsessive-compulsive disorder (OCD) presents in children and adolescents. When appropriate, presentations of OCD between youth¹ and adults are compared. Second, epidemiological findings, comorbidity statistics, and what is known about the etiology of OCD are summarized. Finally, the treatment of pediatric OCD is briefly discussed.

1.1. Description of the disorder

OCD is a mental disorder that affects individuals across the lifespan. OCD is characterized by obsessions and compulsions that are time-consuming (i.e., at least 1 hour per day), distressing, and/or interfere with the individual's life (American Psychiatric Association [APA], 2013).

Obsessions are intrusive, recurring thoughts, images, or urges that lead to uncomfortable feelings (e.g., anxiety, disgust, distress). Even though the specific content of obsessions (and compulsions) varies greatly by individual, commonly identified obsessional themes include excessive fear of contamination by dirt or germs, fear of harm coming to oneself or others, inappropriate or forbidden thoughts (sexual, religious, or aggressive), concerns about symmetry, and not-just-right experiences (a sense that something is not quite right or that something is incomplete) (Mantz & Abbott, 2017).

Compulsions are repetitive behaviours (e.g., foot tapping, handwashing) or mental acts (e.g., repeating words or phrases in one's mind, silently counting) intended to neutralize the discomfort or distress induced by the obsessions. The relief that follows the completion of a compulsion negatively reinforces the behaviour. However, the relief is only temporary, obsessions re-emerge, and as such, the compulsion is subsequently

¹ In this proposal, the term *youth* refers to both children and adolescents. Similarly, the term *pediatric OCD* refers to OCD in children and adolescents. When the term *child* is used, it refers to youth aged 12 years or below. When the term *adolescent* is used, it refers to youth aged 13 to 19 years.

repeated again and again. Additionally, the individual may assume that their compulsion is responsible for the absence of the feared consequence (e.g., “My mom did not get sick at work today because I switched the light switch on and off 15 times”) instead of learning that the feared consequence was avoidable without the compulsion. Similarly, the individual does not learn that they can actually cope with the distress or feared consequence (e.g., that they are going to be okay even if their mother gets sick) (Abramowitz et al., 2018). Themes of compulsions typically involve cleaning and washing rituals, excessive checking, reassurance-seeking, repeating specific actions, ordering, rearranging, and extreme avoidance of triggers. Some compulsions are physical – such as washing hands repeatedly, switching the light switch on/off, or walking in a certain way – and others are mental – such as silently rehearsing certain information over and over, mentally reviewing checklists, or counting in one’s mind.

Based on meta-analytic findings (Bloch et al., 2008), symptom types can be categorized into four symptom dimensions for adult and youth populations: (a) symmetry (i.e., obsessions about having things symmetrical or even, and compulsions involving repeating, ordering, counting, and checking), (b) forbidden thoughts (i.e., aggressive, sexual, and religious obsessions), (c) cleaning (i.e., contamination and somatic obsessions, and cleaning compulsions), and (d) hoarding (i.e., hoarding obsessions and compulsions). Overall, OCD is a heterogeneous condition, with widely different presentations in the content of obsessions and compulsions, known as phenotypic heterogeneity (James et al., 2017). For example, two individuals with OCD can have no overlapping obsessions and compulsions and still share the same diagnosis. Similarly, the obsessional content does not need to logically relate to the performed ritual (Stewart et al., 2008). For example, a child may obsess over potential harm coming to their family (e.g., the family home burning down) and as a response to their obsessions, they may avoid stepping on cracks and say certain phrases over and over (logically unrelated to the risk of fire).

In the current edition of the Diagnostic and Statistical Manual of Mental Disorders (5th ed., DSM-5; APA, 2013), OCD was placed in the newly established Obsessive-Compulsive and Related Disorders (OCRD) category. In addition to OCD, this category includes body dysmorphic disorder (BDD), trichotillomania (hair-pulling disorder), hoarding disorder, excoriation (skin-picking) disorder, and substance/medication-induced obsessive-compulsive and related disorder. This change in nosology recognizes OCD’s

distinction from other anxiety disorders in areas such as genetic makeup, course, and treatment outcome (Greenberg & Geller, 2019). The new categorization also acknowledges that anxiety is only one emotional reaction involved in OCD, in addition to disgust, shame, guilt, and feelings of incompleteness (Greenberg & Geller, 2019).

1.1.1. Differences between adult and childhood presentation

The presentation of OCD is predominantly similar for adults and youth; thus, the same DSM-5 (APA, 2013) criteria apply across the lifespan. However, there are some critical distinctions between adult OCD and pediatric OCD. In comparison with adult cases, children and adolescents with OCD present with (a) different symptom content, (b) rage episodes, (c) greater family accommodation, which are behaviours of family members that enable symptoms (e.g., adjusting family routines to avoid obsessional triggers), (d) a more challenging diagnostic process (i.e., differential diagnosis), (e) different symptom structure, (f) distinct gender/sex distribution, (g) a unique pattern of psychiatric comorbidity, and (h) higher OCD heritability rates. These distinctions are discussed in detail in the following sections.

Content of symptoms. The content of obsessions tends to differ slightly across age groups, reflecting the individual's developmental stage. For example, relative to adults, youth report more fears of losing their loved ones (e.g., their parents) and of harm coming to their loved ones or themselves (Geller et al., 2001). In addition, adolescents report more sexual and religious obsessions than adults (Geller et al., 2001). In their study on 64 youth and 193 adults with OCD, Mancebo and colleagues (2008) found that adolescents and adults more commonly report mental compulsions (i.e., ritualizing in one's head instead of showing behaviours that can be observed) than children. A review of 10 studies on the phenotypic characteristics of pediatric OCD (Geller et al., 1998) concluded that the most common obsessions among children and adolescents center around contamination, sexual, somatic, and scrupulosity themes, whereas washing, repeating, checking, and ordering are the most frequently reported compulsions.

Rage episodes. In addition to these core symptoms of obsessions and compulsions, children and adolescents often show rage behaviours associated with their disorder (Storch et al., 2012). Rage attacks or behaviours are explosive anger outbursts

that are triggered by relatively minor irritations, such as parental limit setting or the youth's inability to complete an OCD-related ritual. As such, these anger outbursts are excessive or inappropriate to the situation. The majority of youth with OCD in Storch and colleagues' (2012) study had a rage attack in the prior week.

Family accommodation. Typically, when a youth is affected by OCD, the entire family unit's life is impaired on an emotional and practical level (Calvocoressi et al., 1995; Lebowitz, 2017; Stewart et al., 2017). A key predictor of family impairment is family accommodation (Stewart et al., 2017), which describes family members' behaviours that facilitate the youth's rituals and OCD demands. For example, family members may accommodate their child's symptoms by participating in daily OCD rituals, providing reassurance, assuming the youth's responsibilities, enabling the avoidance of obsessional triggers, or adjusting family routines (Lebowitz et al., 2012). Meta-analytic findings suggest that, while well intended, family accommodation inadvertently worsens OCD symptoms (Wu et al., 2016) because accommodation reinforces and perpetuates the cycle of obsessions and compulsions (Lebowitz et al., 2012).

Differential diagnosis. Another distinction between OCD in youth versus adults lies in the diagnostic process. It can be more challenging to diagnose OCD in younger children than in adults because rituals, routines, and magical thinking can be developmentally appropriate (e.g., adhering to meal and bedtime rituals for familiarity and structure, believing in superstitions) or reflect other childhood disorders (e.g., autism) (De Caluwé et al., 2020; D. Geller & March, 2012; Greenberg & Geller, 2019). For example, children with autism spectrum disorder (ASD) are often preoccupied with a particular topic, leading them to engage in repetitive actions (Krebs & Heyman, 2015). Even though both disorders frequently co-occur, certain clues can differentiate stereotypical behaviours in ASD from OCD symptoms. In contrast to ASD, compulsions in OCD typically (a) follow an obsession/anxious thought, (b) provide relief from an uncomfortable feeling, and (c) are ego-dystonic (i.e., unpleasant and incongruent with own values) (Krebs & Heyman, 2015).

Insight. Earlier research suggested that youth with OCD present more frequently with lower levels of insight into their disorder than adults do (Geller et al., 2001; Lewin et al., 2010; Storch et al., 2008). In other words, these studies suggested that youth, relative to adults, are less able to recognize that their obsessions and compulsions are

unreasonable or excessive. Interestingly, more recent research has not been supportive of this finding and has reported similar percentages of low insight in youth and adult OCD samples (Selles et al., 2018; Shavitt et al., 2014). For example, in a large-scale, international, multicenter study on youth with OCD ($N = 852$), Selles and colleagues (2018) reported that only 11.1% of youth with OCD (5 to 19 years) had low levels of insight into their disorder. Similar numbers were reported by a large sample of adults with OCD ($N = 1,001$), with 14.0% of the sample showing little to no insight into their symptoms (Shavitt et al., 2014).

Symptom structure. While the factor structure of OCD symptoms is mainly similar for youth and adults with OCD (Bloch et al., 2008), there are two minor differences. First, for youth in comparison to adults, checking compulsions are categorized under the symmetry dimension instead of the forbidden thoughts dimension. This is understandable as checking compulsions are not content-specific and, as such can occur as a response to various types of obsessions (Stewart et al., 2007). Second, for youth in comparison to adults, somatic obsessions are categorized under the cleaning dimension instead of the forbidden thoughts dimension (Bloch et al., 2008). Additionally, most youth with OCD – like adults – report multiple obsessions and compulsions that fall on more than one symptom dimension (Bloch et al., 2008). Overall, the dimensional structure in OCD seems relatively stable across the lifespan (Stewart et al., 2007).

1.2. Epidemiology

Prevalence. A recent meta-analysis of 34 *adult* studies found that the aggregate (a) current, (b) period, and (c) lifetime worldwide prevalence estimates for OCD were 1.1%, 0.8%, and 1.3%, respectively (Fawcett et al., 2020). Focusing on OCD in *youth*, prevalence rates ranged from 2% to 4% across six epidemiological studies with pediatric samples (Geller et al., 1998).

Age of onset and assessment. The age of OCD onset is often described as bimodal, with the first peak occurring at the end of childhood/beginning of adolescence (i.e., childhood-onset OCD, mean onset = 11 years) and the second peak occurring in young adulthood (i.e., adult-onset OCD, mean onset = 23 years) (Taylor, 2011a). Most OCD cases begin in childhood. For example, among nine studies with a total sample

size of 1,812 OCD cases, ~75% of cases were classified as early-onset OCD (cut-off of 21 years) (Taylor, 2011a). On average, it takes 3 years after disorder onset for children and adolescents to be assessed and diagnosed (Stewart et al., 2004).

Gender/sex differences. In a meta-analysis of sex² differences, males are over-represented in early-onset/childhood-onset samples compared to late-onset/adult OCD samples (Taylor, 2011a). In a review of epidemiological and clinical studies, Geller and colleagues (1998) found that 10 out of 11 studies, which focused on the clinical characteristics of children and adolescents with OCD, reported a male preponderance of the disorder, with an average ratio of 3:2 for males to females (60% male, range = 43%–70%). By adolescence, this male preponderance of OCD seems to disappear and move to a slight female preponderance (Geller et al., 1998) This is consistent with the findings of a study of an 18-year-old cohort, in which the male-female ratio was 0.7:1 (Douglass et al., 1995).

A recent epidemiological survey in Denmark ($N = 99,926$) reported equal incidence rates for males and females before 10 years of age and a slight tendency for more female than male OCD cases in late adolescence (Dalsgaard et al., 2020). A slight female preponderance is also seen in adult populations (Geller et al., 1998). There does not appear to be data regarding OCD rates in non-binary or transgender individuals.

1.2.1. OCD impact and long-term outcomes

In most cases, OCD severely impairs the individual's functioning, with the highest impairment in the domains of relationships and social functioning (Ruscio et al., 2010).

² Conventions for defining and measuring gender and sex have evolved over time, and in the past, gender and sex have been used interchangeably and their measurement was conflated. Current best research practices recommend measuring both gender and sex separately (Cameron & Stinson, 2019), acknowledging that they are different, yet interrelated, constructs. Specifically, sex refers to biological attributes including physical features, chromosomes, gene expression, hormones and anatomy; gender refers to the socially constructed roles, behaviors, expressions, and identities (Canadian Institutes of Health Research [CIHR], 2018). It was elected to employ the terminology used by the study authors to describe their samples, recognizing that this may not accurately capture current definitions of these constructs. As recommended by Hyde et al. (2019), the term gender/sex is used at times to indicate the inseparable nature of gender and sex and its conflated measurement in past research.

Sleep has also been shown to be impaired in adults and youth with OCD (Nordahl et al., 2018; Segalàs et al., 2021). For example, a case-control study showed that a much greater proportion of youth with OCD reports sleep disturbances than their healthy counterparts (72% vs. 15%), which was corroborated by objective sleep measure data (Jaspers-Fayer et al., 2018). Weaknesses in executive function/planning and lower school performance are additional functional domains that may be affected in pediatric OCD (Negreiros et al., 2018, 2020; Westwell-Roper & Stewart, 2019).

OCD is often persistent, and the DSM-5 states that without treatment, the course of OCD is typically chronic, with symptoms fluctuating in severity (APA, 2013). However, by early adulthood, more than one-third of youth with OCD may experience remission (i.e., not meeting criteria for full or subthreshold OCD) (APA, 2013). A meta-analysis of 16 study samples on the long-term outcomes of pediatric OCD ($N = 521$) found an overall remission rate of 40% (Stewart et al., 2004). The rates for persistence are 41% for the full OCD syndrome and 19% for subthreshold OCD (Stewart et al., 2004).

1.2.2. PANDAS and PANS

While the disorder onset is usually gradual for children and adolescents (Storch et al., 2007), there is a small subgroup of children with OCD who experience a sudden onset of symptoms. If acute-onset pediatric OCD cases are associated with a preceding bacterial infection and a number of other concurrent non-OCD symptoms, they may be labelled as PANDAS (i.e., pediatric autoimmune neuropsychiatric disorders associated with streptococcal infections) or subsumed under the broader category of PANS (i.e., pediatric acute-onset neuropsychiatric syndrome) (Chang et al., 2015; Macerollo & Martino, 2013; Swedo et al., 1998). In both PANDAS and PANS cases, there is a putative connection between inflammatory and immune responses and occurrence of OCD symptoms. A diagnosis of PANDAS requires a preceding streptococcal infection, while PANS does not specify the trigger but presumes an inflammatory response to either infectious or non-infectious causes (Chang et al., 2015; Gilbert, 2019).

In a recent study, 5% of youth with a lifetime diagnosis of OCD ($N = 136$) met the criteria for PANS and/or PANDAS (Jaspers-Fayer et al., 2017). Assuming that the average prevalence rate of pediatric OCD is 2%, the prevalence rate of PANDAS/PANS would be 0.1%. Despite over 20 years of research in this area, the diagnostic labels of

PANS and PANDAS remain controversial because clear evidence for an inflammatory basis of OCD symptoms is lacking (Gilbert, 2019; Wilbur et al., 2019).

1.3. OCD and comorbidity

Children and adolescents with OCD frequently struggle with other neurodevelopmental or mental disorders, including anxiety disorders, attention-deficit/hyperactivity disorder (ADHD), ASD, and disruptive behaviour disorders (i.e., oppositional defiant disorder and conduct disorder) (Højgaard et al., 2018; Peris et al., 2017; Skriner et al., 2016; Westwell-Roper & Stewart, 2019). In fact, a recent systematic review and meta-analysis (Sharma et al., 2021) found that the majority of youth with OCD (~64%) experience at least one co-occurring condition in their lifetime. Beyond psychiatric comorbidity, immune disorders also present more frequently than expected in childhood-onset OCD (Westwell-Roper et al., 2019). There are several possibilities regarding the temporal relationship between OCD and co-occurring mental disorders: OCD might precede other mental disorders, begin simultaneously, or follow the onset of the other disorder.

In youth with OCD, anxiety disorders are the most frequently co-occurring disorders, with a pooled rate of ~31%, 95%CI [21.1, 42.4] (Sharma et al., 2021). The pooled prevalence rates of comorbidities for OCD-affected youth included the following (in descending order): ~27% generalized anxiety disorder (GAD), ~17% major depressive disorder (MDD), ~16% ADHD, ~14% social anxiety disorder, 13% specific phobia, ~13% oppositional defiant disorder, ~12% tic disorder, ~6% panic disorder, and ~6% ASD (Sharma et al., 2021). Sharma et al. (2021) did not provide childhood OCD-specific pooled prevalence rates for post-traumatic stress disorder (PTSD), eating disorders, BDD, substance use disorder, or any other disorder.

The lifetime comorbidity pattern of youth with OCD differs from the pattern in adults. First, in adults, mood disorders are the most frequently co-occurring disorder (~54%), whereas youth present more commonly with anxiety disorders as previously mentioned. Specifically, children and adolescents present with higher rates of GAD than adults (27% vs. 15%), whereas adults present with higher rates of MDD than youth (41% vs. 17%) (Sharma et al., 2021). Children with OCD, relative to adolescents and adults, are less likely to have co-occurring mood, substance, and eating disorders (Farrell et al.,

2012; Geller et al., 2001; Mancebo et al., 2008). While single studies suggest that prevalence rates for neurodevelopmental disorders, such as ADHD and tic disorders, are higher in youth than in adults with OCD (Farrell et al., 2012; Mancebo et al., 2008), pooled prevalence rates suggest equivalent rates of tic disorders and ADHD among adults and youth (Sharma et al., 2021).

In terms of OCD expression, comorbidity rates have been shown to be positively correlated with symptom severity, suggesting that comorbidity may contribute to the severity of OCD symptoms (Ivarsson et al., 2008; Peris et al., 2017). Similarly, several studies suggest that comorbidity is negatively associated with treatment outcomes for pediatric OCD (Farrell et al., 2012; Ginsburg et al., 2008; Storch et al., 2008).

1.4. Etiology of pediatric OCD

This section summarizes what is known about the etiology of pediatric OCD. Surprisingly, the etiology of pediatric OCD remains poorly understood (Brander et al., 2016). Although strong evidence supports a genetic component in OCD etiology, recent studies suggest that genes may act as predisposing rather than triggering factors in OCD, and more attention should be given to gene-environment interactions (GxE) (Bellia et al., 2021; Liu et al., 2008). For example, concordance rates of OCD in monozygotic twins, who share a very similar genome, range from 45% to 65% (van Grootheest et al., 2005), implying that non-genetic and epigenetic factors play an equally or potentially even more important role in the development and trajectory of the disorder. Epigenetics refer to the mechanisms by which environmental factors interact with the genome and modify genes without altering the DNA sequence, typically involving DNA methylation and histone modifications (Bellia et al., 2021; Liu et al., 2008). One environmental risk factor that is often cited is childhood trauma exposure, which was been found to be significantly associated with risk for OCD across three different variations of genes (McGregor et al., 2016).

In sum, complex interactions among multiple factors across the lifespan are assumed to be involved in the development of OCD, typically involving gene x environment interactions (Greenberg & Geller, 2019; Pauls et al., 2014; Taylor, 2011b). For simplicity, the literature can be split into genetic, environmental, neurobiological, and

psychological factors that contribute to the development of OCD. Research evidence for these factors is described below.

1.4.1. Genetic factors

Findings from twin and family studies indicate that OCD aggregates in families (Mataix-Cols et al., 2013; Stewart & Pauls, 2010). In a review of family studies (Pauls, 2010), all seven studies involving relatives of children with OCD suggested that OCD and subclinical OCD are familial (i.e., the condition is transmitted within families), with rates of OCD among relatives of OCD-affected youth being much higher than OCD rates among relatives of youth without OCD or among the general population. For example, one study demonstrated that first-degree relatives of children and adolescents with OCD had a 22.7% rate of OCD, compared to a 0.9% rate in first-degree relatives of youth without OCD (do Rosario-Campos et al., 2005). Across all studies evaluated in Paul's (2010) review, compared to controls, the risk of OCD among relatives of *youth* with OCD was 10-fold, whereas only 2-fold among relatives of *adults* with OCD.

However, familial occurrence does not signify that the condition is genetic; the increased rates of OCD could be due to genetic or shared environmental factors, or due to a combination of both factors. Segregation analyses of twin and family studies, as well as the more recent genome-wide association studies (GWAS) provide information on the relative importance of genetic versus environmental factors. A meta-analysis of 14 studies with 37 samples ($N = 24,161$ twin pairs) provided two key insights (Taylor, 2011b). First, genetic factors and non-shared environmental factors (e.g., individual life stressors) explain a high percentage of variance in obsessive–compulsive symptoms (approximately 39% and 52%, respectively). Second, it seems that shared environmental factors (e.g., elements in the family environment such as parental rearing style or emotional atmosphere) minimally contribute to obsessive-compulsive symptoms in the twin pairs, explaining only 5% of the variance (Taylor, 2011b). This was confirmed by a recent population study conducted in Sweden, which demonstrated that parental rearing alone did not make a significant contribution to the risk of developing OCD. However, the study did reveal a more than three-fold increased risk of OCD among biological offspring of adults affected by the disorder (Kendler et al., 2023).

Genetics seem to play a larger role in childhood-onset OCD than in adult-onset OCD, with consistently higher rates of heritability in childhood-onset than in adult-onset OCD cases (van Grootheest et al., 2005). For example, heritability estimates calculated based upon common genetic variants identified in the first OCD GWAS (Stewart et al., 2013) were 43% for childhood-onset OCD and 26% for adult-onset OCD, while the combined rate was 37% (Davis et al., 2013).

Using contemporary genomic techniques, it has been established that the genetic component of OCD is predominantly polygenic in nature, indicating that hundreds or thousands of genetic variations each play unique minor roles in determining the overall genetic susceptibility to OCD (Davis et al., 2013; Strom et al., 2021). Specifically, the combined impact of genetic variants explained 16% of the heritability of OCD in a case-control study ($N = 14,140$ OCD cases and $N = 562,117$ controls) by Strom, Yu, et al. (2021). The same study identified a genetic variant with genome-wide significance for the first time.

1.4.2. Environmental factors

In a systematic review of 126 studies, Brander and colleagues (2016) explored a broad range of environmental risk factors, including parenting style, brain injury, and socioeconomic status, that could be potentially associated with OCD. Based on current evidence, the authors concluded that no environmental risk factor has convincingly been associated with OCD (Brander et al., 2016). However, Brander et al. identified three *potential* risk factors: (a) complications at the birth of the individual later developing OCD, (b) reproductive cycle events, and (c) stressful or traumatic life events (Brander et al., 2016).

Perinatal/Birth complications. Six publications in the systematic review (Brander et al., 2016) studied the association between OCD and birth complications (e.g., low birth weight, the use of forceps, and protracted labour). Five out of six studies indicated that birth complications are linked to OCD onset (Cath et al., 2008; Geller et al., 2008; Lensi et al., 1996; Sampaio et al., 2009; Vasconcelos et al., 2007). Specifically, children who had a lower birth weight (Cath et al., 2008), were born using forceps (Sampaio et al., 2009), or had undergone protracted labour (Vasconcelos et al., 2007) showed an increased risk of developing OCD later in life .

Reproductive cycle events. Twenty-three publications in the systematic review (Brander et al., 2016) focused on the association between OCD (onset and expression) and reproductive cycle events (e.g., first menarche, pregnancy, postpartum period, menopause) in women. Four studies (Alpak & Karamustafalioglu, 2009; Guglielmi et al., 2014; Labad et al., 2005, 2010) indicated that menarche (i.e., the first occurrence of menstruation) is associated with OCD onset. Specifically, between 13% and 22% of women reported that their OCD developed at menarche (Alpak & Karamustafalioglu, 2009; Guglielmi et al., 2014; Labad et al., 2005, 2010).

Multiple studies have established a connection between OCD and pregnancy (e.g., Uguz, Gezginc, et al., 2007; Williams & Koran, 1997) as well as the postpartum period (e.g., Miller et al., 2013; Uguz, Akman, et al., 2007; Vulink et al., 2006; Zambaldi et al., 2009). For example, Vulink et al. (2006) reported that 33% of women with OCD experienced a worsening of symptoms during pregnancy, and 48% experienced a worsening of symptoms after childbirth (postpartum). In a prospective study involving 461 postpartum women recruited from a hospital, approximately 11% screened positive for OCD symptoms at 2 weeks and 6 months postpartum, with around 10% and 9% of symptoms considered mild according to the Y-BOCS (Miller et al., 2013). Similarly, Zambaldi et al. (2009) examined 400 postpartum women and found that 9% of the sample met diagnostic criteria for OCD, with 2.3% reporting postpartum onset OCD. These findings indicate an elevated risk of OCD or obsessive-compulsive symptoms during the postpartum period. Finally, several studies indicated that menopause (i.e., the cessation of menstruation) was associated with the onset of OCD (Alpak & Karamustafalioglu, 2009; Guglielmi et al., 2014; Labad et al., 2005; Uguz et al., 2010; Vulink et al., 2006). Specifically, between 0.7% (Uguz et al., 2010), ~2% (Alpak & Karamustafalioglu, 2009; Labad et al., 2005), and 3.7% (Guglielmi et al., 2014) of women with OCD reported that their OCD onset was related to menopause (Guglielmi et al., 2014; Labad et al., 2005; Uguz et al., 2010).

In a study conducted by Guglielmi et al. (2014) with 658 women with OCD, the association between OCD onset and all four reproductive events was investigated, revealing that over 25% of participants reported the onset of OCD to be linked to a reproductive cycle event. Specifically, the onset of OCD was found to occur within 12 months after menarche in 13.0% of cases, during pregnancy in 5.1% of cases, during the postpartum period in 4.7% of cases, and at menopause in 3.7% of cases.

Stressful/traumatic life events. Thirty-four publications in the systematic review (Brander et al., 2016) studied the association between OCD and trauma. Based on the analysed studies, stressful or traumatic life events (e.g., loss of a loved one, serious illness) seem to be associated with increased risk for OCD (Brander et al., 2016). Specifically, in three cross-sectional studies that retrospectively asked adults with OCD about their illness onset, between ~37% and 64% of adults with OCD reported that their illness onset was associated with a stressful life event (Lensi et al., 1996; Real et al., 2011; Rosso et al., 2012).

Notably, of the 34 studies in Brander and colleagues' (2016) systematic review, only four studies (Gothelf et al., 2004; Ivarsson et al., 2016; Lafleur et al., 2011; Valleni-Basile et al., 1996) included children or adolescents as participants. These four studies indicated that youth with OCD report more traumatic life events than healthy controls (Gothelf et al., 2004; Ivarsson et al., 2016; Lafleur et al., 2011) and that youth with more undesirable life events have an increased risk of developing OCD (Valleni-Basile et al., 1996). The low number of pediatric studies is surprising as approximately 75% of OCD cases begin in childhood (Taylor, 2011a). Indeed, a very recent systematic review on the relationship between trauma exposure and OCD in youth (Wislocki et al., 2022) highlighted that there is gap in the literature investigating the role of trauma in *pediatric* OCD and that further research is required to advance the knowledge and treatment of OCD in youth who have also experienced trauma. Chapters 2–4 discuss the current state of the literature on the association between OCD and trauma in more detail.

1.4.3. Neurobiological factors

Based on a growing body of imaging research, OCD has been associated with functional and structural abnormalities in the brain; namely, within the cortical–striatal–thalamic–cortical (CSTC) circuitry that regulates, among other things, response inhibition and planning (Pauls et al., 2014; Piacentini et al., 2014). This circuitry, also known as cortico-striatal circuitry, comprises areas of the orbitofrontal cortex, striatum, cingulate, and thalamus (Pauls et al., 2014; Piacentini et al., 2014).

The OCD workgroup of the ENIGMA (Enhancing Neuroimaging and Genetics through Meta-analysis) consortium used worldwide neuroimaging data across five continents and employed meta- and mega-analyses of regional brain volumetric

abnormalities (van den Heuvel et al., 2022). Findings from these analyses suggest that pediatric OCD is associated with differences in (a) subcortical volume, (b) cortical thickness, and (c) surface area (van den Heuvel et al., 2022). Specifically, in comparison to healthy controls, pediatric OCD cases show (a) greater thalamus volume (Cohen's $d = 0.38$) for unmedicated OCD cases, (b) thinner left and right inferior parietal, left superior parietal and lateral occipital cortices (Cohen's d values between -0.24 and -0.31), and (c) altered asymmetry of the thalamus (more leftward; Cohen's $d = 0.19$) and the pallidum (less leftward, Cohen's $d = -0.21$) (van den Heuvel et al., 2022).

Inconclusive evidence exists regarding factors related to neurochemistry. Preliminary findings indicate that adults and youth with OCD may display some dysregulation of four principal neurotransmitter systems; namely glutamate, serotonin, dopamine, and γ -aminobutyric acid (GABA) (Dougherty et al., 2018; Piacentini et al., 2014). Specifically, OCD is associated with lower synaptic serotonin within the CSTC circuit, striatal dopaminergic and glutamatergic hyperactivity, and potentially deficient GABAergic activity (Dougherty et al., 2018).

Similar mixed results have been reported from neuropsychological studies, with overall findings suggesting that individuals with OCD underperform on executive functioning tasks that directly depend on CSTC circuits (Dougherty et al., 2018; Negreiros et al., 2020; Pauls et al., 2014).

1.4.4. Psychological factors

Dysfunctional beliefs. Within cognitive-behaviour models, dysfunctional beliefs are seen as a leading factor in the etiology of pediatric and adult OCD (Abramowitz, Taylor, et al., 2007; Hezel & McNally, 2016; Piacentini et al., 2014). For example, a longitudinal study (Abramowitz, Nelson, et al., 2007) showed that pre-morbid dysfunctional obsessional beliefs are a risk factor for OCD and are associated with greater symptom severity.

According to Beck (1976), who developed the cognitive theory of emotional disorders, individuals develop various beliefs and assumptions about the world based on their individual life experiences. Specific beliefs can influence how one interprets various external and internal stimuli, including thoughts and feelings. Dysfunctional beliefs are

exaggerated or irrational assumptions, such as an inflated sense of responsibility (i.e., belief that one has more control than actually possible over negative outcomes), that facilitate a person's tendency to negatively interpret and assign meaning to unwanted intrusive thoughts (Abramowitz et al., 2007). At the foundation of the cognitive-behavioural model is the well-supported finding that almost everyone has intrusive thoughts from time to time. For example, roughly 80%-90% of the general population indicated that they experience intrusive thoughts (Briggs & Price, 2009; Dykshoorn, 2014) and that these typical experiences only become pathological (increase in frequency, intensity, and duration) if the individual evaluates them as meaningful and important, sees them as posing an actual threat, or takes on responsibility for these thoughts (Briggs & Price, 2009; Dykshoorn, 2014; Hezel & McNally, 2016).

The different types of dysfunctional beliefs associated with OCD include: (a) inflated responsibility, (b) thought-action fusion (TAF) (i.e., giving thoughts too much importance), (c) need to control thoughts, (d) overestimation of threat, (e) perfectionism, and (f) intolerance of uncertainty (Abramowitz, Taylor, et al., 2007). For the TAF belief, there are two underlying assumptions: moral TAF (thinking about a disturbing event is as bad as actually committing such an event) and likelihood TAF (thinking about a disturbing event increases the likelihood of the event happening).

Inferential confusion. According to the inference-based approach (IBA) of OCD, the development of OCD is primarily influenced by inferential confusion rather than distorted appraisal of normal intrusive thoughts (O'Connor & Aardema, 2012). Inferential confusion refers to an obsessional reasoning process characterized by an overreliance on possibility, a lack of trust in one's senses or self, and irrelevant associations, which lead to a confusion between reality and possibility (O'Connor & Aardema, 2012). This confusion manifests as making *inferences* about possible states of affairs without direct evidence to support them, blurring the line between imagination and reality (Julien et al., 2016).

As such, obsessions are seen as stemming from an internal narrative detached from the present moment, instead of being driven by distorted appraisals of random normal intrusive thoughts (Julien et al., 2016). This obsessional narrative is generated by the individual's imagination, drawing upon personal experiences, second-hand information, abstract facts, ideas, possibilities, and general rules (O'Connor & Robillard

1995). Proponents of this approach note that obsessional narratives often revolve around a vulnerable self-theme (e.g., “I might be the type of person who loses control or is negligent / immoral / bad/ insane/ dangerous), representing the feared possible self that the individual with OCD fears to be or fears to become (Aardema et al., 2018; Aardema & Wong, 2020).

1.5. Course determinants of OCD

This section examines factors influencing the maintenance, course, and expression of OCD (e.g., severity). For adults with OCD, predictors of remission include lower OCD severity and shorter duration of illness (Eisen et al., 2013). Compared to adults, youth generally experience significantly shorter times to remission (Mancebo et al., 2014). However, youth with a chronic course have more severe OCD symptoms than those with a remitting course (i.e., symptoms remitted during the 3-year observation period) (Mancebo et al., 2014), suggesting that higher OCD severity is associated with a chronic course in youth. When treatment is received early in the course of the illness, and before OCD substantially impacted the individual’s functioning, the course of the illness is typically better, highlighting the importance of early intervention (Mancebo et al., 2014). Other research found that earlier age of OCD onset (Stewart et al., 2004; Tibi et al., 2020) and longer duration of illness at baseline (Stewart et al., 2004) are associated with higher rates of illness persistence.

One longitudinal follow-up study found that the symptom content was not significantly different between pediatric OCD cases with a chronic course versus a remitting course (Mancebo et al., 2014). In contrast, another longitudinal follow-up study found that the presence of intrusive magical thinking and repeating compulsions seems to be a poor prognostic factor in pediatric OCD (Becker Nissen et al., 2014). Other poor prognostic factors include a positive family history of OCD, depressive symptoms, co-occurring ADHD, and being referred after age 10 (Becker Nissen et al., 2014). Similar to other psychopathologies, expressed emotion in families (i.e., caregiver expressing high criticism, hostility, and/or emotional over-involvement) is associated with poor long-term outcomes in pediatric OCD (Hibbs et al., 1991; Peris & Miklowitz, 2015). In adults, the presence of childhood trauma led to a less favorable course of OCD, while secure attachment style served to facilitate a better long-term outcome (Tibi et al., 2020).

1.6. Treatment

Given the high burden of OCD on the individual and their family, early evidence-based intervention for OCD is crucial (Fineberg et al., 2019). Research has shown that OCD severely affects the quality of life of the affected individual, with social relationships often suffering the most (Fineberg et al., 2019; Storch et al., 2018). This section examines recommended treatment options and highlights findings on predictors and moderators of treatment outcomes for pediatric OCD.

Currently, the two treatment options for OCD in adults and in youth that have a considerable research evidence base include: (a) exposure-based cognitive-behavioural therapy (CBT) and (b) psychopharmacological treatment with selective serotonin reuptake inhibitor (SSRI) medications (Geller & March, 2012; National Collaborating Centre for Mental Health (UK), 2006). The main ingredient of CBT for OCD is exposure and response prevention (ERP), which teaches individuals to gradually expose themselves to their core obsessions (e.g., facing their fear of “contracting” a terminal illness by touching different surfaces) while refraining from engaging in their usual compulsions (e.g., refraining from excessively using hand sanitizer after touching different surfaces) (Gillihan et al., 2012; Skarphedinsson et al., 2015).

According to the American Academy of Child and Adolescent Psychiatry (AACAP) practice parameters for the treatment of children and adolescents with OCD, CBT alone is recommended as the first-line treatment for mild to moderate cases and a combination of CBT and SSRIs is recommended for more severe cases of pediatric OCD (Geller & March, 2012). Practice guidelines for adults with OCD suggest a similar approach based on severity (American Psychiatric Association, 2007).

Meta-analyses and systematic reviews of randomized controlled trials (RCTs) for pediatric OCD treatment have consistently failed to provide evidence for a preference for combined treatment over CBT monotherapy for more severe OCD cases (Ivarsson et al., 2016; McGuire et al., 2015; Öst et al., 2016; Turner et al., 2018). Meta-analyses overwhelmingly report that (a) CBT alone leads to better treatment outcomes than SSRIs alone and (b) CBT combined with SSRIs shows comparable treatment outcomes to CBT alone (Ivarsson et al., 2015; McGuire et al., 2015; Öst et al., 2016). Hence, in contrast to current practice guidelines (e.g., AACAP’s above-described practice

parameters), the authors of these meta-analytic studies recommend that CBT be offered alone as an initial treatment option for youth with OCD, regardless of symptom severity or comorbidity (Öst et al., 2016; Turner et al., 2018). Generally aligned with these meta-analytic findings is the most recent meta-analysis of RCTs in this area (Uhre et al., 2020); however, the authors criticized existing RCTs for having a high risk of bias and not following rigorous protocols (e.g., not blinding assessors to hypothesized treatment outcomes), making it challenging to form valid conclusions.

Although research has shown that treatment reduces symptom severity, remission rates (i.e., no longer meeting diagnostic criteria after treatment) across the different treatment options are suboptimal (Öst et al., 2016; Uhre et al., 2020). Specifically, more than half of youth with OCD still meet the diagnostic criteria after a trial of CBT or CBT combined with SSRIs (Öst et al., 2016; Uhre et al., 2020) and approximately 75% still meet the diagnostic criteria after a psychopharmacological trial (Öst et al., 2016; Pediatric OCD Treatment Study [POTS] Team, 2004). To improve treatment outcomes and clinical decision-making, researchers have been focusing on identifying potential treatment predictors (i.e., variables that are related to treatment outcome, independent of treatment assignment) and treatment moderators (i.e., variables that determine which context or for which individuals a treatment condition may be more or less effective compared to another treatment option). Some of this research on treatment predictors and moderators is described below.

Besides improving OCD symptom severity, several studies have captured broader outcomes of OCD treatment interventions (Conelea et al., 2017; Selles, Belschner, et al., 2018). For example, secondary outcome analyses of the POTS trial showed that treatment of OCD leads to improvement in other areas of psychopathology and functioning, such as the youth's quality of life, attention, hyperactivity, and anxiety (Conelea et al., 2017). Similarly, Selles, Belschner, et al.'s (2018) open trial of group-based family CBT provided evidence for the wide-ranging benefits of OCD treatment on youth and their family, extending beyond mere symptom reduction to improvements in the youth's psychosocial functioning, family accommodation, coercive/disruptive behaviours, and family functioning.

1.6.1. Treatment predictors

A recent systematic review identified several significant predictors of CBT treatment response across studies of OCD-affected children and adolescents (Turner et al., 2018). Greater OCD symptom severity at baseline, higher levels of OCD-related impairment, and higher levels of depressive symptoms are associated with poorer CBT treatment response (i.e., higher levels of OCD symptoms after a trial of CBT) (Turner et al., 2018). Other meta-analyses and reviews also identified greater OCD symptom severity at baseline as a predictor of poor treatment outcome (Ginsburg et al., 2008; McGuire et al., 2015; Öst et al., 2016). Additionally, poor treatment response was predicted by the presence of any co-occurring mental disorder and greater levels of family accommodation of the youth's symptoms (Turner et al., 2018).

A recent study of an aggregated sample of 573 OCD-affected youth from four international pediatric OCD programs found that the likelihood of CBT response is reduced by greater avoidance, limited recognition of impairment, and older age (Selles et al., 2020). In contrast, treatment response was increased by lower levels of family dysfunction (i.e., lower levels of parental blame and family conflict and higher levels of family cohesion) (Peris et al., 2012), highlighting family cohesion as a positive treatment predictor and potential protective factor.

1.6.2. Treatment moderators

A recent systematic review of RCTs and meta-analyses on treatment moderators for pediatric OCD (Kemp et al., 2020) identified four potential treatment moderators, including: (a) minority status, (b) peer dynamics, (c) co-occurring tics, and (d) family history of OCD (i.e., presence of OCD in a first-degree relative). First, youth with pediatric OCD and ethnic minority status in the United States (U.S.) may benefit more from an enhanced family-based CBT condition (e.g., collaborative family problem solving, tackling disengagement from symptom accommodation together as a team, and practicing distress tolerance skills) than from the standard family-based CBT version (Peris et al., 2020). Second, CBT delivered by telephone may be more effective than in-person CBT for OCD-affected youth with greater peer problems (Nair et al., 2019). Third, OCD-affected youth with a first degree-relative with OCD may benefit less from treatment than youth without such family history (Garcia et al., 2010). This difference

was particularly striking for CBT monotherapy. Specifically, while familial pediatric OCD cases showed a 2.5 times smaller effect size than non-familial OCD cases for CBT and SSRI combined treatment, familial OCD cases showed a 6.5 times smaller effect size for CBT monotherapy (Garcia et al., 2010). Finally, youth with a co-occurring tic disorder may benefit more from CBT monotherapy than from SSRI monotherapy (March et al., 2007).

Despite these preliminary findings, Kemp and colleagues (2020) concluded that the research on pediatric OCD treatment moderators is limited. As such, at this time, no evidence-based decisions about how to augment or individualize CBT based on patient characteristics can be made.

Chapter 2. The nature of trauma in OCD

As previously stated, the etiology of pediatric OCD remains poorly understood and more research on environmental risk factors in OCD is needed (Brander et al., 2016; Wislocki et al., 2022). Among the environmental factors identified as potential contributors to OCD, the following literature review focuses on the role of trauma in OCD. While the link between trauma and OCD has been examined in adults, this relationship has received little attention in the empirical literature with child populations (Wislocki et al., 2022). Understanding the role of trauma in pediatric OCD seems particularly important because of (a) the theoretical connections between traumatic stress and OCD genesis and expression, (b) the high prevalence of childhood trauma among adults with OCD, and (c) the substantial overlap of neurobiological correlates (i.e., structural and functional abnormalities in the same brain regions) between OCD and trauma. These points are further elucidated in this chapter.

2.1. Childhood trauma

Before describing theoretical connection between trauma and OCD, the definition of trauma in the present study is discussed, and information on trauma prevalence rates, treatment of trauma, risk and resilience factors, and trauma measurement are presented.

2.1.1. Definition of trauma

Over the years, the study of trauma has produced various definitions of trauma due to different perspectives and contexts (Brown, 2008). One frequently used definition is based on Criterion A of the PTSD diagnosis in the DSM. According to the current version of the DSM-5 (APA, 2013), a traumatic event is defined as “exposure to actual or threatened death, serious injury, or sexual violence” (p. 271), and includes directly experiencing the event, witnessing the event, learning that the event happened to a close friend/family member, or experiencing repeated/extreme exposure to aversive details of the event. This trauma definition is called a gateway criterion because it is the first criterion that needs to be met for making a diagnosis of post-traumatic stress disorder (PTSD) based on the DSM-5 (APA, 2013).

Researchers in the trauma field (both youth and adult) have criticized the DSM's definition of trauma as too narrow, excluding, for example, diversity-related stressors (e.g., chronic racial aggressions; Brown, 2008), stressors in child development (e.g., extended separation from a caregiver; McDonald et al., 2014), and chronic stressful environments (e.g., witnessing domestic violence; Cook et al., 2005). Specifically, McDonald et al. (2014) cited research showing that many stressful childhood experiences are ignored by DSM-5's definition, such as living with a caregiver with mental illness, frequent separation from a caregiver, repeated verbal abuse, bullying, and minority-related stressors including historical trauma. Furthermore, McDonald et al. (2014) argue that the current DSM-5 definition of traumatic events fails to acknowledge experiences frequently identified as disturbances in attachment relationships, which may result in some of the most complex symptoms related to trauma, such as affect dysregulation and dissociation.

A traumatic experience can be a single event (e.g., an accident, a sexual assault), a series of events (e.g., repeated sexual assault), and/or a chronic condition (e.g., ongoing childhood neglect, domestic violence) (Substance Abuse and Mental Health Services Administration, 2014). Chronic interpersonal trauma that begins early in life is often referred to as complex trauma (Cook et al., 2005; Herman, 1992; Lawson & Quinn, 2013). Dykshoorn (2014) highlights that whether something is experienced as traumatic or not does not depend only on the event itself but on the individual's experience of the event. Two people can be exposed to the same event but experience it differently. How a child perceives an event is influenced by multiple factors such as their developmental stage, the context surrounding the incident, and the support they receive afterwards (Tufnell, 2005). Similarly, numerous other biopsychosocial, contextual, and cultural factors can influence a person's short-term and long-term response to a potentially traumatic event (Harris et al., 2010). Risk and resilience factors are discussed in more detail in the following sections. Brown (2008) adds that the person's choice and sense of control matters whether an event is subjectively experienced as traumatic. Focusing on childhood trauma, Tufnell (2005) stated that stressful experiences that surpass a child's ability to cope can be traumatic even if they do not pose an actual threat to life.

Within the context of this dissertation proposal, trauma is defined as the child's experience of an event or series of events that is perceived as profoundly distressing

and that overwhelms the child's capacity to cope (The National Child Traumatic Stress Network, 2008; van der Kolk & Fislser, 1995). This definition emphasizes that trauma is defined by a child's perception of an event as distressing, rather than the (seemingly) objective severity of the event. It also recognizes that children have varying levels of coping skills and resilience, which can influence their ability to manage the effects of a traumatic event. Based on the previously explained criticism of the DSM-5 definition of traumatic events, this definition seems more appropriate, particularly when researching trauma in children and adolescents as their survival depends on their caregiver. The chosen definition is aligned with the trauma definition by the National Child Traumatic Stress Network (NCTSN), a U.S. organization dedicated to improving the quality of care for children and adolescents who have experienced traumatic events (The National Child Traumatic Stress Network, 2008). The chosen definition of traumatic events includes "adverse life events" and "stressful life events", which are terms that other scholars use in the trauma field (Briggs & Price, 2009; Fontenelle et al., 2012; Real et al., 2011; Rosso et al., 2012).

As such, in the present study, the term trauma is used as the overarching term including traumatic, stressful, and adverse life events. Trauma was assessed via *potentially traumatic events* (PTEs). The term PTE was chosen to more accurately represent the secondary data that were used. In this data, only the parents' endorsement of events was captured, and so no definitive conclusions can be made about whether the child's capacity to cope was overwhelmed. Furthermore, the term PTEs was chosen over Adverse Childhood Experiences, or ACEs, because of the very specific set of events that have been associated with this term since the landmark publication of the ACE Study by Felitti et al. (1998), which highlighted the connections between childhood adversity and several negative adult health and social outcomes (Ports et al., 2020). Specifically, the original ACE Study (Dube et al., 2003; Felitti et al., 1998) assessed 10 ACEs in adults, including three *Child Abuse* exposures (physical, sexual, and emotional abuse), two *Neglect* exposures (physical and emotional neglect) and five *Household Challenges* (mental illness in the household, substance abuse in the household, parental divorce/separation, incarceration of a household member, and mother treated violently). While the trauma screen questionnaire used in this study addresses many of these ACEs, it did not capture mental health in the household, substance use in the household, or parental divorce/ separation. Finally, there is

precedent in describing the output of this questionnaire as PTEs (Roberts et al., 2013). Hence, PTE was deemed the most appropriate term for this study.

2.1.2. Prevalence of trauma exposure

There is a growing body of research that shows that interpersonal trauma exposure often happens very early in life, as early as infancy or toddlerhood (Ford, 2013). By adolescence (age 17), around two-thirds of the general youth population report having experienced at least one lifetime traumatic event (Finkelhor et al., 2015; Hillis et al., 2016; McLaughlin et al., 2013). Based on McLaughlin et al.'s (2013) study, the greatest risk for exposure to PTEs is assumed to be with youth who live with fewer than two biological parents (e.g., single-parent, blended, adoptive, or foster families or out-of-home placements). This is corroborated by other research showing that children are at higher risk for harm when separated from biological parent(s), exposed to conflict between parents, the stresses of single parenting, the absence of a secure attachment bond with caregivers, and out-of-home placements (e.g., foster, adoptive, or institutional) (Ford, 2013).

Cultural and ethnic factors have been shown to influence prevalence rates of specific trauma types (Harris et al., 2011). For example, lower rates of neglect and sexual abuse and higher rates of physical abuse were found among Asian Americans relative to other cultural groups (Zhai & Gao, 2009).

2.1.3. Treatment of youth trauma

Given the ubiquity of trauma, various treatment approaches for trauma in youth exist, including different versions of trauma-focused CBT (e.g., narrative, prolonged exposure therapy), eye movement desensitization and reprocessing (EMDR), and parent training (Mavranouzouli et al., 2020). To understand the relative strength of different psychological and psychosocial therapies for PTSD in youth, Mavranouzouli et al. (2020) compared 32 trials of 17 different interventions in a recent network meta-analysis. Trauma-focused CBT (TF-CBT) seems to be the most effective treatment for PTSD in youth, in particular when individually delivered (Mavranouzouli et al., 2020). This is consistent with other research (e.g., Lucio & Nelson, 2016) and treatment recommendation guidelines published by the American Academy of Child and

Adolescent Psychiatry (Cohen et al., 2010; Dorsey et al., 2017). TF-CBT involves a combination of skill building, trauma-centred exposures, and learning to manage reactions to trauma. Both the youth and the parent/caregiver are usually involved in the treatment process. Regarding the specific TF-CBT forms, Mavranezouli et al.'s network analysis showed that cognitive therapy for PTSD was the most effective intervention in reducing PTSD symptoms. Next in order were the following intervention types (listed in descending order of magnitude of effect versus waitlist): combined somatic/cognitive therapies, child–parent psychotherapy, combined TF-CBT/parent training, meditation, narrative exposure, exposure/prolonged exposure, play therapy, Cohen TF-CBT/cognitive processing therapy (CPT), EMDR, parent training, group TF-CBT, supportive counselling and family therapy (Mavranezouli et al., 2020). Treatment guidelines for trauma in adults (Lewis et al., 2020; Watkins et al., 2018) suggest similar therapy approaches to those described for youth.

In terms of pharmacological treatment for PTSD, there is very little research evidence for the efficacy or safety of medication for PTSD in youth (Ford et al., 2015; Smith et al., 2019). As such, trauma-focused psychotherapies are recommended as the first-line treatment by practice guidelines from the UK (National Institute for Clinical Excellence, 2018), the U.S. (Cohen et al., 2010), and the International Society for Traumatic Stress Studies (Ford et al., 2015). However, despite the lack of scientific evidence, in practice, SSRIs (e.g., sertraline) are often prescribed for treating pediatric PTSD (Ford et al., 2015).

2.1.4. Trauma and other psychopathology

Childhood trauma is associated with increased risk for developing psychopathology other than PTSD across development, including anxiety, mood, substance use, and behaviour problems (Ford, 2013; McLaughlin & Lambert, 2017). Youth exposed to trauma also show increased risk for developing self-harming and suicidal behaviour (Bruffaerts et al., 2010; Dube et al., 2001), as well as psychotic experiences (Janssen et al., 2004; McGrath et al., 2017). The phenomenon that the same environmental experience – exposure to a particular adverse event – leads to different developmental outcomes across individuals is known as *multifinality* in developmental psychopathology (Cicchetti & Rogosch, 1996). Epidemiological research suggests that trauma-exposed youth are twice as likely to develop a mental disorder

relative to youth who have no trauma history (Lewis et al., 2019; McLaughlin et al., 2012). The risk for psychopathology increased when the youth was exposed to interpersonal violence (Alisic et al., 2014; McLaughlin et al., 2012, 2013).

In their transdiagnostic model of childhood trauma, McLaughlin et al. (2020) highlight three potential key mechanisms that seem to underlie the link between childhood trauma and psychopathology: biases in social information processing, altered patterns of emotional processing, and accelerated biological aging. The authors base their model on the well-researched fact that childhood is a period of elevated brain plasticity that allows the child to rapidly adapt to their environment to increase their chance of survival. If the environment that the child is growing up in is unpredictable and has a high potential of violence and harm, children's cognitive, emotional, and neurobiological development will adapt in ways that reduce the risk of future harm (McLaughlin & Lambert, 2017). Although these developmental adaptations may be advantageous in the short-term, they are consistently associated with elevated risk for the emergence of multiple forms of psychopathology across the lifespan and explain the link between childhood trauma and transdiagnostic psychopathology (McLaughlin et al., 2020).

First, research findings indicate that children who have been exposed to trauma exhibit unique patterns in processing social information, including enhanced threat detection and hostile attribution bias (McLaughlin et al., 2020). While the prioritization and overidentification of threat cues in the environment may be beneficial in dangerous environments, developmental adaptations that result in perceptual and attentional biases towards such cues are linked to an increased likelihood of developing psychological disorders (McLaughlin et al., 2020). Second, in terms of altered patterns of emotional processing, McLaughlin and colleagues (2020) provide evidence that trauma-exposed youth show heightened emotional reactivity, low emotional awareness, and poor emotion regulation, which are processes linked to psychopathology. Third, McLaughlin et al. (2020) reference several studies that link childhood trauma with earlier pubertal timing and increased cellular aging (measured by shorter telomere length and advanced DNA methylation age), which in turn are associated with multiple forms of psychopathology.

2.1.5. Resilience to childhood trauma

Not all trauma-exposed youth develop a form of psychopathology, and a high percentage of youth maintain the capacity to flourish despite their adverse life experiences (Cicchetti, 2013). This “capacity of a system to adapt successfully to challenges that threaten the function, survival, or future development of the system” (Masten & Barnes, 2018, p. 2) has been termed *resilience*. Resilience can mitigate trauma impacts and is an important factor for clinicians to consider when evaluating trauma and its risk for negative outcomes.

Common resilience or protective factors across cultures for child development include family cohesion, a feeling of belonging, skilled parenting, and family routines and rituals (Daniels & Bryan, 2021; Masten & Barnes, 2018). McLaughlin and Lambert (2017) identified supportive relationships with caregivers as one of the most important protective factors that buffer children from the onset of psychopathology following traumatic events, in addition to sensitivity to rewarding and positive cues as well as mature amygdala-prefrontal circuitry (as a marker of mature emotion regulation). Social support – with caregiver support as a particularly important form of social support – is an often-cited transdiagnostic protective factor (McLaughlin et al., 2020), meaning that youth who receive high levels of social support are being buffered against the onset or progression of psychopathology following trauma exposure (Bal et al., 2005; Trickey et al., 2012). Another study identified five modifiable resilience factors to improve children’s long- and short-term health outcomes after trauma exposure, including (a) fostering positive appraisal styles and strengthening executive function skills in children, (b) enhancing responsive parenting and strong parent-child relationships, (c) treating maternal mental health problems, (d) teaching parents the importance of selfcare skills and consistent household routines, and (e) enhancing trauma understanding by educating about the nature of traumatic stress and its impact on children (Traub & Boynton-Jarrett, 2017).

2.1.6. Risk factors for trauma-related psychopathology

While certain factors have been shown to promote resilience and aid in maintaining well-being after experiencing trauma, various risk factors have been recognized that can increase the likelihood of developing psychopathology in the

aftermath of trauma. Specifically, a large meta-analysis of 64 studies evaluating 25 risk factors highlighted post-trauma factors such as low social support, social withdrawal, co-occurring psychological problems, the use of distraction and thought suppression, perceived life threat, peri-trauma fear (i.e., the experience of fear during the event), and poor family functioning as risk factors with large effect sizes (Trickey et al., 2012).

2.1.7. Measurement of youth trauma

Given the spectrum of definitions of trauma, there is a wide range of measurement tools for the standardized assessment of trauma in youth. Many of the screening or assessment tools follow the narrower definition of trauma found in the DSM-IV or DSM-5.

In a review of available assessment and screening tools for trauma exposure in youth, Strand and colleagues (2005) evaluated 35 measures specifically designed for children and adolescents on three criteria: (a) psychometric properties, (b) cost, and (c) accessibility. In the category of instruments measuring both a history of trauma exposure and trauma impact (i.e. symptoms), the University of California, Los Angeles (UCLA) PTSD Reaction Index (Steinberg et al., 2004) was deemed to meet all three criteria (Strand et al., 2005). The UCLA PTSD Reaction Index was designed to be used for youth from 7 to 18 years of age and screens both for the history of any traumatic event (e.g., being in a serious accident, having experienced violence) and the frequency of PTSD symptoms.

In the category of instruments that measure a history of exposure to trauma, the Traumatic Events Screening Inventory (TESI, Ford & Rogers, 1997) stands out because it meets all three criteria, focuses on both age groups (children and adolescents), and includes events beyond maltreatment and family violence (e.g., natural disaster, serious injury, death of a loved one). The other measures in this category are more limited because they either focused on only one age group (children or adolescents) or examined only a specific category of trauma (e.g., family violence). In another review of measures of traumatic events for children less than 6 years old (Stover & Berkowitz, 2005), a version of the TESI, the Trauma Exposure Symptom Inventory-Parent Report Revised (TESI-PRR; Ghosh-Ippen et al., 2002), was appraised as the best available option for trauma measures for younger children, given its thorough assessment of

trauma exposure and the inclusion of some of the potentially traumatic events that are specific to younger children (e.g., extended separation from a primary caregiver, witnessing domestic violence).

2.2. Theories connecting trauma and OCD

Several theoretical models have been proposed to examine and explain the relation between trauma and OCD. This section highlights five models: (a) a cognitive theory of obsessions, (b) a cognitive-behavioural model, (c) an inference-based approach, (d) an anatomical and functional model, and (e) a pathoplastic model. These models apply to youth as well as to adults with OCD (Cromer et al., 2007; Williams, 2018). The first four models relate to the overarching *diathesis-stress model*, which postulates that stress interacts with underlying vulnerabilities (e.g., genetic predisposition) to contribute to the development of psychopathology (Ingram & Luxton, 2005). Diathesis is a term used to describe vulnerability or risk factors that make an individual susceptible to psychopathology. Such factors can be genetic, biological, or psychological (e.g., cognitive, interpersonal). For OCD, these factors are mainly aligned with those introduced in the etiology section in Chapter 1. The diathesis-stress model is consistent with research data showing that not everyone develops a disorder in response to significant distress (Ingram & Luxton, 2005), as previously discussed under resilience.

2.2.1. Cognitive theory of obsessions

Rachman's (1997) cognitive theory of obsessions is based on the notion that everyone experiences intrusive, unwanted thoughts and that there is no difference between the content of thoughts of individuals with and without OCD. Obsessions are formed when an individual assigns meaning (i.e., cognitive appraisal), such as personal significance and responsibility to normal intrusive thoughts (e.g., "If I have a violent mental image about harming this person, then this means that I am a bad person") instead of dismissing intrusive thoughts as inconsequential and meaningless (Abramowitz et al., 2007). In other words, obsessions refer to commonplace intrusive thoughts that are inaccurately evaluated as significant, causing adverse emotional reactions and inappropriate efforts to control the thoughts and the accompanying

emotions (Moulding et al., 2014). Further, Rachman suggested that the formation of obsessions (or the transition from typical intrusive thoughts to obsessions) is more likely to occur when the individual is under stress. This is consistent with experimental evidence that shows that stress triggers intrusive thoughts (Horowitz, 1975; Jones & Menzies, 1998). It is also well-known that stress can lead to relapses in OCD (de Silva & Marks, 1999) and that symptom severity waxes and wanes depending on life stress (Lin et al., 2007). Hence, when individuals are exposed to the stress of a traumatic/stressful life event, they may be more likely to appraise an intrusive thought as meaningful or to take on responsibility for the thought, which in turn leads to thought suppression and other maladaptive ways to control thoughts, fuelling the formation of obsessions.

2.2.2. Cognitive-behavioural model

Theories within the cognitive-behavioural framework view trauma as a catalyst for the development (or exacerbation) of obsessive and compulsive symptoms (Miller & Brock, 2017; Salkovskis, 1985). Beliefs and behaviours that begin as adaptive ways of coping with a traumatic experience may become problematic over time (Pauls et al., 2014; Piacentini et al., 2014). Specifically, an individual may initially engage in a specific (safety) behaviour to both prevent the traumatic event from reoccurring and to gain a sense of safety (Lang et al., 2015). For example, as a safety behaviour, an individual who has experienced a violent break-in may add an additional house lock and check if the house is locked to prevent a future break-in. In that example, the individual's behaviour has a clear focus on what happened in the past (i.e., break-in). However, over time, the individual's behaviour may become more rigid and ritualistic, and the focus of the behaviour may shift from "what" needs to be done (e.g., checking that the door is locked) to "how" it needs to be done (e.g., perfectly, "just right") (Fletcher et al., 2020). Similarly, a sense of doubt after completion of the behaviour may emerge and the individual may engage in the behaviour repeatedly (e.g., checking the door several times, taking pictures of the door lock) in order to achieve a sense of certainty (Fletcher et al., 2020).

In addition, rituals unrelated to the trauma content (e.g., counting, praying, excessive cleaning) may develop to avoid experiencing any unpleasant emotions, thoughts, or bodily sensations connected to the trauma memory and to regain a sense of safety that was lost during the traumatic event (Ataria, 2015; Hancock & Bryant, 2018). If

these behaviours drift further away from the trauma trigger in content and become more time-consuming, they can become full-blown compulsions.

In sum, in addition to the cognitive appraisal component of cognitive theories, cognitive-behavioural theory adds that the repeated behaviours of OCD are reinforced by a reduction in discomfort (e.g., unpleasant affect) that accompanies the behaviour (Williams, 2018). Aligning with the diathesis-stress model, Miller and Brock (2017) acknowledged the important role of pre-existing vulnerabilities (e.g., experiential avoidance, dysfunctional beliefs such as an inflated sense of responsibility) that interact with these life stressors and predispose the individual to psychopathology. One of these vulnerabilities – experiential avoidance – and its relation to OCD and psychosocial treatment for OCD is further explained below.

Experiential avoidance. Research indicates that one potential mechanism by which trauma may play a role in the development or expression of obsessive-compulsive symptoms in youth and adults is through a predisposition for experiential avoidance (Briggs & Price, 2009; Kroska et al., 2018). Experiential avoidance is broadly defined as an attempt to alter or escape unwanted internal experiences (e.g., emotions, thoughts, memories, and bodily sensations) or as an unwillingness or instability to remain in contact with these internal experiences (Hayes et al., 1996; Kroska et al., 2018). Avoidance of emotions and thoughts (e.g., thought suppression, emotional numbing) is assumed to be a common coping strategy among individuals with a trauma history (Follette et al., 2006; Orsillo & Batten, 2005). Although avoiding internal experiences might initially provide relief (and as such it is negatively reinforced), persistent experiential avoidance can ultimately have the opposite effect and lead to more distress and dysregulation (Tull et al., 2004). For example, studies have shown that actions to suppress or reduce specific thoughts paradoxically increase the frequency of these thoughts (e.g., Wegner et al., 1990).

In other words, it is believed that most individuals experience similar reactions following the aftermath of a traumatic event, including nightmares and flashbacks, heightened emotional arousal, and avoidance of triggers (Pineles et al., 2011). For many, these “symptoms” reduce naturally over time (Rothbaum et al., 1992). The natural recovery process is believed to involve effective processing of traumatic memories, the gradual decrease of trauma-related negative emotions, and the extinction of fear

responses that are associated with internal or external reminders of the trauma (Pineles et al., 2011).

One risk factor that has been identified as playing an important role in the development and maintenance of psychopathology after trauma exposure as it hinders the natural recovery process is the overreliance on avoidant coping (Pineles et al., 2011; Weiss et al., 2019). Similar associations have been suggested in recent research with respect to OCD symptoms. For example, in a group of at-risk adolescents (i.e., high school students referred for academic, psychosocial, and other difficulties; $N = 51$) and a group of college students ($N = 400$), experiential avoidance significantly mediated the association between childhood trauma and obsessive-compulsive symptoms (Kroska et al., 2018).

Experiential avoidance and OCD treatment. As previously described, the core ingredient of gold-standard psychological treatment for OCD is ERP, which requires the patient to gradually expose themselves to the distressing situation (obsessional trigger) without engaging in their usual coping strategy (compulsion/ritual). Exposures are most effective when patients fully engage in them without any subtle avoidance or safety behaviours, so the patients learn that they can tolerate uncomfortable feelings (e.g., anxiety, guilt) (Ong et al., 2022). Given that research indicates that experiential avoidance is involved in linking a history of trauma with OCD (Kroska et al., 2018), it is possible that exposure treatment may be less effective for OCD-affected individuals with a trauma history in comparison to those without a trauma history because experiential avoidance could interrupt the core ingredient of treatment (e.g., the patient may engage in exposures but not be fully willing to experience the uncomfortable feeling that goes along with it).

2.2.3. Inference-based approach

The inference-based approach (IBA) offers an alternative perspective to the cognitive and cognitive-behavioural models of OCD. In IBA, obsessions are seen to stem from an obsessional narrative within the person, instead of being driven by the misappraisal of random intrusive thoughts that come out of nowhere (O'Connor & Audet, 2019). These narratives are typically based on irrelevant associations, past memories, hearsay, pseudo-scientific facts, and second-hand experiences (O'Connor & Robillard,

1995). As such, life experiences, including stressful and traumatic experiences, are seen as contributing to these obsessional narratives through the formation of a feared possible self by way of developing low self-confidence, identity disruption, and an ambivalent self (Aardema et al., n.d.; Nikodijevic et al., 2015). Similarly, authors proposing IBA suggest that past feelings and associations may not have been processed appropriately and the person confuses the past reality with the present reality (O'Connor & Robillard 1995).

In inference-based CBT for OCD, the focus of therapeutic intervention lies in targeting the obsessional reasoning process and the formation of obsessional doubt ("what if" or "maybe" thoughts) and reorienting the patient to reality (Julien et al., 2016). By addressing and modifying these cognitive processes, the aim is to bring about change and alleviate symptoms associated with OCD.

2.2.4. An anatomical and functional model of trauma and OCD

Adams and colleagues (2018) propose an anatomical and functional model of trauma and OCD by summarizing research findings that show that stress (acute or chronic) can lead to changes in brain regions that have been connected to OCD. Specifically, the authors provide evidence that stress leads to structural and functional changes in the limbic and cortico-striatal circuitry, which is the same circuitry that is believed to be dysregulated in OCD. Furthermore, the authors explain that changes in these brain areas have been associated with increased rigid, habitual patterns of behaviour as well as impaired (or at least reduced) behavioural control and adaptable, goal-directed learning (Adams et al., 2018). In sum, Adams and colleagues (2018) indicate that (trauma-related) stress may activate or aggravate habitual patterns of behaviour that are typical for OCD.

2.2.5. A pathoplastic model of OCD

Cromer and colleagues (2007) suggested the value of examining the relationship between trauma and OCD within a pathoplastic framework in addition to a diathesis-stress model (i.e., predisposition model). Patho means "disease" (Merriam-Webster, n.d.) and plastic means "capable of being molded or modeled" (Merriam-Webster, n.d.). Similar to the diathesis-stress model, the pathoplastic model views trauma as having an

influence on OCD. However, the pathoplastic model postulates that trauma may influence how OCD is expressed after onset instead of influencing the development or onset of OCD (Cromer et al., 2007). As such, the pathoplastic model proposes that traumatic life events modify the manifestation of OCD. The expression of a disorder includes symptom severity, course of the disorder, and treatment response. Cromer and colleagues showed initial support for the pathoplastic model by providing evidence that traumatic life events are associated with the severity of OCD. However, the authors also highlighted that this evidence does not rule out that a diathesis-stress model (i.e., predisposition model) would fit better or can coexist with the pathoplastic model (Cromer et al., 2007).

2.3. Adult literature: Associations between trauma exposure, PTSD, and OCD

Research on the associations between trauma exposure, PTSD, and OCD in youth samples is very limited. As a result, the following section is focused on adult studies. Pediatric studies will be addressed in a separate chapter to allow for a more detailed description of these studies (see Chapter 3). As such, this section summarizes results of previous research reporting on the frequency of trauma and PTSD in samples of *adults* with OCD and the frequency of OCD in traumatized samples, including those with PTSD. Subsequently, rates of trauma in adults with OCD are compared to rates in those who are deemed psychologically healthy.

Summarizing and comparing the literature on trauma and OCD is challenging because studies vary greatly regarding study population (e.g., community versus clinical samples), trauma definition, trauma type (e.g., lifetime history of a diverse list of traumas vs. specific focus on sexual abuse), and trauma measure. Because of these differences, data must be carefully evaluated within the context of the study characteristics.

Figure 1 represents a conceptual map of the potential relationships between trauma exposure, PTSD, and OCD to help contextualize the following statistics and tables in relation to the different populations. For example, OCD patients without any trauma history (segment 1), trauma-affected OCD patients with (segment 3) and without (segment 2) PTSD can be distinguished.

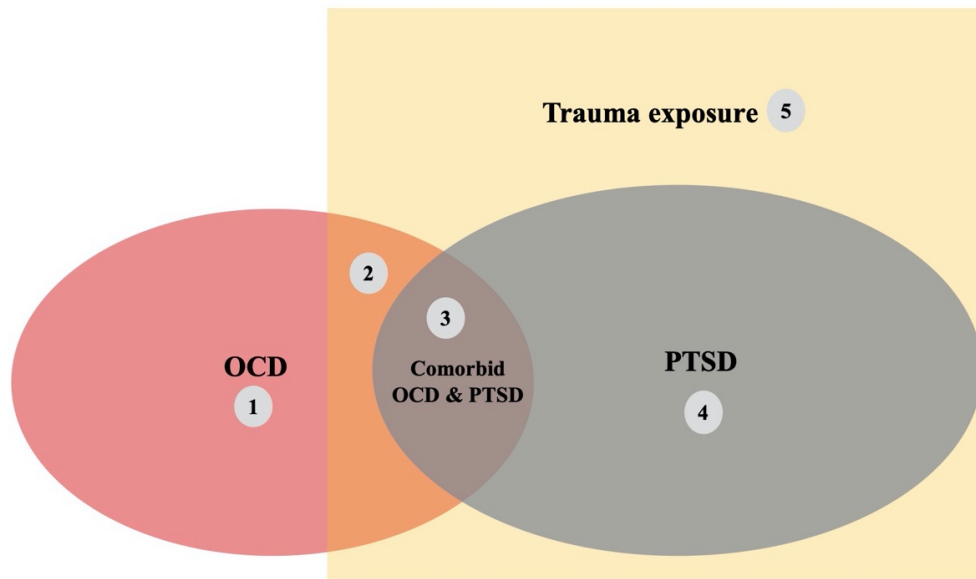


Figure 1. Conceptual map of the relationships of trauma exposure, PTSD, and OCD

Note. Area sizes do not reflect sizes of populations. 1 = OCD without a history of trauma exposure; 2 = OCD with a history of trauma exposure but no PTSD diagnosis; 3 = OCD and co-occurring PTSD; 4 = PTSD and no co-occurring OCD; 5 = Everyone with a history of trauma.

2.3.1. Co-occurrence of OCD and PTSD

OCD and PTSD frequently co-occur at high rates. As with other co-occurring disorders, OCD could precede PTSD, begin at the same time as PTSD, or follow the development of PTSD. In most studies reporting on comorbidity rates, the authors do not provide information on the temporal relationship between the disorders, other than stating which disorder is the principal diagnosis. Hence, if not otherwise stated in this section, the following rates were reported in the studies without indicating the temporal relationship. A separate section addresses the temporal relationship between trauma and OCD.

Similarities and differences in PTSD and OCD. In addition to a high degree of comorbidity between the two conditions, there is a considerable symptom overlap between PTSD and OCD. Specifically, both disorders are characterized by intrusive and distressing thoughts, repetitive behaviours to reduce distress, and avoidance behaviours aimed at escaping thoughts and feelings (Fletcher et al., 2020). However, there are also

several differences in these symptoms that can help practitioners to distinguish the two disorders. First, the content of intrusive thoughts in PTSD is more focused on past trauma-related experiences, whereas in OCD, obsessional content is often focused on future-related fears (Fletcher et al., 2020). Second, the underlying function of seemingly similar overt behaviours (e.g., checking door locks) may be different in PTSD versus OCD. While the function of PTSD symptoms is to avoid re-experiencing the trauma, compulsions in OCD serve to neutralize unwanted feelings or prevent feared consequences (Fletcher et al., 2020). Third, although the behaviour may seem similar between the two disorders, the quality of the behaviour may differ between the disorders. As previously mentioned, in OCD, the core focus may transition from “what” is done to “how” the behaviour is done (e.g., just right, perfectly) (Fletcher et al., 2020). Finally, according to Fletcher et al. (2020), the experience of doubt after completing the behaviour and the need to repeat it in an attempt to achieve certainty is unique to OCD.

OCD rates in adults with PTSD. Depending on the study and its characteristics, the prevalence rate of OCD among adults with a principal PTSD diagnosis is estimated to be between 6% and 41% (e.g., Brown et al., 2001; Huppert et al., 2005; Nacasch et al., 2011). Table 1 presents an overview of studies presenting data on OCD and PTSD rates in adult samples.

Table 1. Overview of OCD and PTSD rates in adults in community and clinical samples

Study	Population	N of sample	OCD (%)	PTSD (%)	OCD among PTSD	OCD among those with trauma	PTSD among OCD
Community samples							
Boudreaux et al. (1998)	Adult women in South Carolina, USA	391	4.1%	6.0%	27.3%	6.3%–62.5%	–
Breslau et al. (1991)	Adults in Michigan, USA	1,007	3.0%	9.2%	15.0%	–	50%
Davidson et al. (1991)	Adults in North Carolina, USA	2,985	2.0%	1.3%	14.5%	1.4%	–
Perkonig et al. (2000)	Adults in Germany	3,021	0.3%	1.0%	20.0%	–	5%
Slade & Andrews (2002)	Adults in Australia	10,641	0.7%	1.3%	34.0%	–	19%
Yoldascan et al. (2009)	University students in Turkey	809	4.2%	–	–	4.2%	–
Trauma-exposed community samples							
Green et al. (1992)	Adult survivors of the Buffalo Creek dam collapse	193	3%	25%	6.0%	3%	60%
Jordan et al. (1991)	Male Vietnam veterans	1,200	2%	–	–	2%	–
McFarlane & Papay (1992)	Australian volunteer fire fighters	398	3%	18%	13.0%	3%	75%
Clinical samples							
Brown et al. (2001)	Adults at anxiety clinic	1,127	13.8%	4.3%	23%	–	7%
Cromer et al. (2007)	Adults with OCD	265	–	–	–	–	10%
Denys et al. (2004)	Adults with OCD	420	100%	–	–	–	1.6%
Fontenelle et al. (2012)	Adults with OCD	1,001	–	–	–	–	19%
Gershuny et al. (2008)	Adults with treatment-resistant OCD	104	–	–	–	–	39%
Nacasch et al. (2011)	Adults referred for PTSD	44	–	100%	41%	–	–
Welkowitz et al. (2000)	Adults attending an anxiety screening program	5,867	15.5%	–	–	–	19%

Note. Percentages are printed here as they were presented in the original articles. OCD = obsessive-compulsive disorder; PTSD = post-traumatic stress disorder; USA = United States of America.

Reviewing the studies, it is noted that most of the lower rates of OCD among adults with PTSD are reported within community-based studies (Boudreaux et al., 1998; Davidson et al., 1991; Essau et al., 2000; Perkonigg et al., 2000; Slade & Andrews, 2002; Yoldascan et al., 2009). Two studies with clinical samples exist, and the reported rates of OCD are higher than those reported in most community-based studies (Brown et al., 2001; Nacasch et al., 2011). One of these clinical studies reported data from a sample of 1,127 patients admitted to an anxiety clinic (Brown et al., 2001). Within a subsample of adults with a principal diagnosis of PTSD ($n = 13$), 23% had a *current* diagnosis of OCD and 31% had a *lifetime* diagnosis of OCD. The second clinical study reported data from a sample of patients with combat- and terror-related PTSD ($n = 44$). Of these, 41% met diagnostic criteria for co-occurring OCD and an additional 6% had sub-threshold obsessive-compulsive symptoms (Nacasch et al., 2011).

Other studies compared adults with PTSD to those without PTSD (Boudreaux et al., 1998; Davidson et al., 1991) and found that the frequency of having OCD was approximately 10 times higher among adults who had developed PTSD than for those who did not have PTSD (~27% to ~3% and ~15% to 1%, respectively). For studies that did not have a control group (Breslau et al., 1991; Perkonigg et al., 2000; Slade & Andrews, 2002) reported rates of OCD among individuals with PTSD can be compared to the general population OCD rate, which is approximately 1%, according to a recent worldwide pooled prevalence estimate (Fawcett et al., 2020). As such, compared to the general population, individuals with PTSD are approximately 14.5 to 41 times more likely to have OCD.

PTSD rates in adults with OCD. Similar to the rates of OCD among adults with a principal diagnosis of PTSD, the prevalence rates for PTSD among individuals with a principal diagnosis of OCD have a large spread, ranging from ~2% to ~75% depending on the study characteristics (e.g., Cromer et al., 2007; Fontenelle et al., 2012; Gershuny et al., 2008; Welkowitz et al., 2000). See Table 1 for an overview of the relevant studies.

Among the 11 identified studies that present data on PTSD among adults with OCD, the lowest rate was reported in a study of 420 adults with OCD ($M = 36$ years); 1.6% of this sample had a current diagnosis of PTSD (Denys et al., 2004). In comparison, the highest rate of PTSD was reported by a study with a clinical sample of treatment-resistant adults with OCD ($N = 104$; $M = 32$ years); 39% of this sample met

criteria for PTSD (Gershuny et al., 2008). This is 10 times higher than the worldwide lifetime prevalence of PTSD in adults, which is estimated to be 3.9% (Koenen et al., 2017).

2.3.2. Trauma rates in adults with OCD

Many individuals with OCD report a history of trauma (Caspi et al., 2008; Cromer et al., 2007; Fricke et al., 2007; Gershuny et al., 2008; Grisham et al., 2011; Hemmings et al., 2013; Huppert et al., 2005; Przeworski et al., 2014; Shavitt et al., 2010), with rates ranging from ~18% to ~89% depending on the population under study (e.g., treatment-resistant OCD group vs. a typical treatment-seeking OCD sample) and focus of trauma type (e.g., general list of traumatic events vs. childhood sexual abuse). See Table 2 for an overview of cross-sectional and case-control studies reporting on these rates.

The lowest trauma exposure rate was reported by Shavitt and colleagues (2010), who studied a sample of first-time treatment-seeking adults with OCD ($N = 215$; $M = 36.3$ years). In their sample, ~18% of OCD-affected adults reported a history of trauma, defined as meeting Criterion A of a PTSD diagnosis outlined in the DSM-IV. In the DSM-IV, the trauma-exposed individual had to show a specific emotional response to meet Criterion A; namely, fear, helplessness, or horror (Shavitt et al., 2010). In the DSM-5, this specific emotional reaction was removed, acknowledging more recent evidence showing that trauma reactions can vary considerably. Cromer and colleagues' (2007) study, which also used the DSM-IV's definition of trauma, reported that the majority of OCD-affected adults (54% of $N = 265$; $M = 41.0$ years) endorsed at least one traumatic event in their lifetime.

Interestingly, the frequency of trauma exposure was much higher in a sample of adults with treatment-resistant OCD (i.e., failure to respond to at least one adequate treatment trial; Gershuny et al., 2008). In this treatment-resistant sample, 82% of OCD-affected adults ($N = 104$, $M = 32.0$ years) reported having experienced a traumatic event. This is similar to the findings of Huppert et al. (2005), who reported that 85% of OCD-affected adults ($N = 151$, $M = 33.9$ years) endorsed a traumatic event on the Posttraumatic Diagnostic Scale (PDS; Foa, 1995).

Table 2. Overview of trauma and PTSD rates among adults with OCD in cross-sectional and case-control studies

Study	N	Adults with OCD		Trauma type; name of measure
		Trauma (%)	PTSD (%)	
Studies assessing a variety of traumatic events				
Cromer et al. (2007)	265	54%	10%	Spectrum of traumatic events ; TEL of the PTSD module of the SCID-I (First et al., 2001), DSM-IV criteria
Gershuny et al. (2008)	104	82%	39.4%	Spectrum of traumatic events ; TES-L (Gershuny, 1999); DSM-IV-TR criteria
Huppert et al. (2005)	151	85%	–	Spectrum of traumatic events ; PDS (Foa, 1995)
Maina et al. (1999)	68	30%	–	Spectrum of traumatic events ; semi-structured interview and Paykel et al.'s (1971) list of traumatic events
Przeworski et al. (2014)	112	89.3%	–	Spectrum of traumatic events ; LEC (Gray et al., 2004)
Shavitt et al. (2010)	215	17.7%	10.2%	Spectrum of traumatic events ; PTSD module of the SCID-I (First et al., 2001)
Studies focusing on childhood abuse				
Caspi et al. (2008)	30	56.6%	–	Childhood sexual abuse (CSA; before age 18); semi-structured interview to detect CSA developed by Finkelhor (1979)
Fricke et al. (2007)	41	34%	7%	Childhood sexual and physical abuse (before age 16); CTQ (E. M. Bernstein & Fink, 1998)
Grisham et al. (2011)	36	24.2%	–	Childhood sexual abuse (before age 11): interview that primarily focused on reproductive health (Grisham et al., 2011)
Hemmings et al. (2013)	134	54.5%	–	Childhood emotional abuse ; CTQ-SF (Bernstein et al., 2003)

Note. OCD = obsessive-compulsive disorder; PTSD = post-traumatic stress disorder; TEL = Traumatic Events List; SCID-I = Structured Clinical Interview for DSM-IV Axis I Disorders; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders, 4th Edition; DSM-IV-TR = Diagnostic and Statistical Manual of Mental Disorders, 4th Edition Text-Revision; TES-L = Traumatic Events Scale-Lifetime; PDS = Posttraumatic Diagnostic Scale; LEC = Life Events Checklist; CTQ = Childhood Trauma Questionnaire; CTQ-SF = Childhood Trauma Questionnaire-Short Form.

Comparison to non-psychiatric controls. To understand the significance of trauma exposure rates among individuals with OCD, trauma rates in OCD need to be compared to those in the general population. The majority of studies that compared adults with OCD to those with no psychiatric diagnoses demonstrated that adults with OCD report more traumatic events than non-psychiatric controls (Carpenter & Chung,

2011; Caspi et al., 2008; Hemmings et al., 2013; Khosravani et al., 2017; Lochner et al., 2002). In other words, a history of trauma is associated with a greater risk of having a diagnosis of OCD. Table 3 presents an overview of case-control studies reporting on the rates of trauma among adults with OCD compared to non-psychiatric controls.

Table 3. Overview of trauma rates among adults with OCD and non-psychiatric controls in case-control studies

Study	OCD		Control group		Ratio	Trauma type; name of measure
	<i>n</i>	Trauma (%)	<i>n</i>	Trauma (%)		
Caspi et al. (2008)	30	56.6%	26	38.4%	1.5	Childhood sexual abuse (before age 18); semi-structured interview (Finkelhor, 1979)
Grisham et al. (2011)	36	24.2%	613	7.6%	3.5	Childhood sexual abuse (before age 11); interview that primarily focused on reproductive health
Hemmings et al. (2013)	134	54.5%	188	28.7%	1.9	Childhood emotional abuse ; CTQ-SF (Bernstein et al., 2003)
Maina et al. (1999)	68	30.0%	68	28.0%	1.1	Variety of traumatic events ; semi-structured interview and Paykel et al.'s (1971) list of traumatic events
	<i>n</i>	Trauma score <i>M (SD)</i>	<i>n</i>	Trauma score <i>M (SD)</i>		
Carpenter & Chung (2011)	82	14.9 (7.2)	92	9.8 (5.3)		Emotional abuse ; CTQ-SF (Bernstein et al., 2003)
Khosravani et al. (2017)	70	77.5 (12.3)	60	43.0 (18.5)		Range of childhood traumas ; CTQ-SF (Bernstein et al., 2003)
Lochner et al. (2002)	74	10.1 (5.1)	31	6.7 (2.5)		Emotional neglect ; CTQ-SF (Bernstein et al., 2003)

Note. OCD = obsessive-compulsive disorder; CTQ-SF = Childhood Trauma Questionnaire-Short Form.

For example, Caspi and colleagues (2008) found a significantly higher rate of childhood sexual abuse among adults with OCD (~57% of $N = 30$) compared to non-psychiatric controls (~38% of $N = 26$). Another example is Grisham and colleagues' (2011) case-control study, which found that individuals who experienced sexual and physical abuse in childhood were 3.5 to 7.7 times more likely to be diagnosed with OCD later in life than non-trauma exposed controls (~24% vs. ~8% for sexual abuse and ~18% vs. ~2% for physical abuse).

Similarly, three other studies that measured childhood trauma on a continuous scale with a short-form version of the Childhood Trauma Questionnaire (CTQ; Bernstein & Fink, 1998) found that adults with OCD report significantly more childhood trauma (1.5 to 1.8 times higher trauma score; see Table 3 for details) than healthy controls (Carpenter & Chung, 2011; Khosravani et al., 2017; Lochner et al., 2002).

Inconsistent findings were reported by one case-control study (Maina et al., 1999), which did not find a significant difference in the *number* of severe life events in the OCD sample and the non-psychiatric controls in the months before OCD onset (~30% for OCD vs. ~28% for controls). However, the authors noted that “birth of a child” was more frequently mentioned in the OCD sample in the months before OCD onset than in the non-psychiatric controls (Maina et al., 1999).

Rates of trauma in other mental disorders. The following is a brief overview of trauma exposure rates in individuals with other mental disorders, including depression, bipolar disorder, schizophrenia, and eating disorders. Overall, trauma exposure rates are higher in samples of adults with mental disorders than adults without mental health disorders (healthy control groups).

A recent study (Xie et al., 2018) examined the prevalence rates of childhood trauma in three patient groups (depression, bipolar disorder, and schizophrenia) and a healthy control group. The authors found that ~62% of patients with bipolar disorder ($n = 102$), ~56% of patients with depression ($n = 229$), ~47% of patients with schizophrenia ($n = 216$), and ~21% of the healthy control group ($n = 132$) reported at least one childhood traumatic event (Xie et al., 2018). Trauma was measured via physical abuse, emotional abuse, sexual abuse, physical neglect, and emotional neglect. Similar rates were found in a large meta-analysis (Molendijk et al., 2017) that compared the rates of trauma (mainly physical, sexual, and emotional abuse) in individuals with eating disorders ($n = 13,059$) to those of healthy ($n = 15,092$) and psychiatric ($n = 7,736$) controls. The authors found that individuals with an eating disorder report more childhood maltreatment than healthy ($OR = 2.47$) and psychiatric controls ($OR = 1.31$).

2.3.3. OCD rates in adults with a history of trauma

Six studies were identified that reported on the rates of OCD among adults with a history of traumatic events but no diagnosis of PTSD (Boudreaux et al., 1998; Davidson et al., 1991; Green et al., 1992; Jordan et al., 1991; McFarlane & Papay, 1992; Yoldascan et al., 2009). The reported rates of these studies ranged from ~1% to ~62.5% (see Table 1, Column titled “OCD among those with trauma,” for a detailed overview of these six studies).

The highest OCD rate among trauma-exposed individuals was 62.5% and was reported by women who had been raped (Boudreaux et al., 1998). Boudreaux et al. (1998) assessed exposure to different forms of sexual assault (e.g., rape, molestation) and crimes (e.g., burglary, robbery) in a sample of community women ($N = 391$). In their study, women with OCD were significantly more likely to have been raped and/or molested.

Comparison to non-trauma exposed samples. Three studies compared the rates of OCD between adults with and without a history of traumatic events (Park et al., 2014; Peles et al., 2012; Saunders et al., 1992). Findings suggest that individuals who have experienced childhood sexual abuse have a higher risk of being diagnosed with OCD over their lifetime than non-trauma exposed controls. Similarly, individuals who experienced multiple types of childhood trauma have a higher chance of developing OCD than their single-trauma or non-traumatized counterparts. See Table 4 for an overview of these three studies.

Saunders et al. (1992) found that, in comparison to non-traumatized women, women who had a history of childhood rape were 4.5 times more likely to meet current diagnostic criteria for OCD (10.3% versus 2.3%) and 6.7 times more likely to have a lifetime history of OCD (15.4% versus 2.3%). Relative to other psychiatric disorders, the risk ratio for a *current* diagnosis of OCD in women with a history of childhood rape compared to those who did not experience this traumatic event was (a) higher than the current risk ratio for social anxiety disorder (4 times), (b) similar to panic disorder (5 times), and (c) lower than agoraphobia (16 times). The lifetime risk ratio for OCD was 6.7 for women who experienced childhood rape, which was the highest among all other

evaluated mental disorders (i.e., depression, agoraphobia, social anxiety disorder, specific phobia, sexual disorders) (Saunders et al., 1992).

Table 4. Studies reporting on the rate of OCD among adults with vs. without a trauma history

Study	Population	N of sample	Rate of OCD among		Ratio	Trauma type; name of measure
			Those with trauma (%)	Those without trauma (%)		
Park et al. (2014)	Community sample (adults)	6,027	0.7%	0.7%	4.6 ^a	Childhood trauma; K-CIDI 2.1 (Cho et al., 2002)
Peles et al. (2012)	Clinical sample of former opiate users (adults)	125	67.5%	33.3%	2.0	Sexual abuse; SAEQ (Rowan et al., 1994)
Saunders et al. (1992)	Community sample of women (adults)	391	10.3%	2.3%	4.5	Childhood rape; ICI (Saunders et al., 1992)

Note. ^a = While rates of OCD among those with trauma vs. those without trauma seem identical, Park et al. (2014) reported an odds ratio adjusted for age and sex of 4.56. OCD = obsessive-compulsive disorder; K-CIDI 2.1 = Korean version of the PTSD section of the Composite International Diagnostic Interview 2.1; SAEQ = Sexual Abuse Exposure Questionnaire; ICI = Incident Classification Interview.

Another study examined a sample of adults who formerly used opiates ($N = 125$, $M = 43.1$ years) and compared the rates of OCD in those who had a history of sexual abuse to those who did not (Peles et al., 2012). The frequency of OCD among individuals who experienced sexual abuse was twice as high as the prevalence rate of OCD among those who had not experienced such trauma (~68% vs. ~33%).

In a large community-based sample ($N = 6,027$), Park et al. (2014) found that adults exposed to multiple types of childhood trauma are 4.6 times more likely to have OCD (Adjusted $OR = 4.6$) after adjusting for age and sex than adults without such a history.

2.3.4. Type of traumatic event

Findings of a recent epidemiological study using the WHO World Mental Health (WMH) survey (Kessler et al., 2017) suggest that the risk of developing PTSD varies significantly by trauma *type* and that traumatic experiences involving interpersonal violence, including intimate partner violence, pose the highest risk for developing PTSD. A similar differential risk based on trauma *type* is suggested for OCD. Specifically, several studies (Boudreaux et al., 1998; Grisham et al., 2011; Lochner et al., 2002; Mathews et al., 2008; Vidal-Ribas et al., 2015) indicate that traumatic life events of an interpersonal or violent nature (e.g., sexual abuse, physical abuse) play a more significant role in the development and expression of OCD in comparison to non-interpersonal or non-violent traumas (e.g., accidents, natural disasters). This relationship holds in both directions: Those with OCD are more likely to have experienced interpersonal trauma, and those with interpersonal trauma are more likely to have OCD.

Comparing different types of interpersonal trauma (e.g., sexual, emotional, or physical), it seems that most research points towards emotional neglect and emotional abuse as the two interpersonal trauma types that are primarily associated with OCD. However, there is also evidence for physical abuse and sexual abuse being differentially associated with OCD. This research is elucidated in the following sections.

Emotional neglect and abuse. According to several studies (Carpenter & Chung, 2011; Hemmings et al., 2013; Lochner et al., 2002), emotional neglect and emotional abuse are the forms of childhood trauma that are more likely to be reported in adults with OCD relative to psychologically healthy adults. For example, in Carpenter and Chung's (2011) case-control study, adults with OCD ($N = 82$) reported more emotional abuse and emotional neglect but not more childhood sexual abuse than healthy controls ($N = 92$).

Other studies only found evidence for either emotional neglect (Lochner et al., 2002) or for emotional abuse (Mathews et al., 2008; Yoldascan et al., 2009). For instance, in Lochner et al.'s (2002) study, OCD cases reported significantly more emotional neglect than healthy controls, while differences for the other four types of childhood traumas (i.e., emotional abuse, physical abuse, sexual abuse, and physical neglect) between groups were not statistically significant. In contrast, in a large

community sample of college students ($N = 938$), childhood emotional abuse is the only trauma that was positively associated with obsessive-compulsive symptoms, while the other types of childhood traumas were not (Mathews et al., 2008).

Physical abuse. One study's findings suggest that exposure to childhood physical abuse (i.e., before age 11) is associated with a higher risk of developing OCD than exposure to childhood sexual abuse (Grisham et al., 2011). Specifically, a history of physical abuse increased the risk of developing OCD by 7.7 times (compared to 3.5 for sexual abuse) relative to healthy controls (Grisham et al., 2011; $N = 613$). It is important to note that this study did not include measurement of emotional abuse or emotional neglect.

Sexual abuse. There is some evidence, although less convincing, that suggests that sexual abuse is associated with a higher risk for OCD above and beyond other trauma types (Boudreaux et al., 1998; Cath et al., 2008). For example, Boudreaux et al.'s (1998) findings indicated that sexual abuse (i.e., rape) is four times more likely to be found in women with OCD than those without OCD. The researchers assessed exposure to different forms of sexual assault (e.g., rape, molestation) and crimes (e.g., burglary, robbery) in a sample of community women ($N = 391$).

A twin study by Cath et al. (2008) examined obsessive-compulsive symptoms in 25 genetically identical twin pairs. The pairs diverged on how many obsessive-compulsive symptoms they displayed, with one twin scoring low and the other twin scoring high on a measure of obsessive-compulsive symptoms. Within-pair analyses showed no significant differences in terms of unique life events (e.g., death of a loved one, accident); however, there was a tendency for the high-scoring twins to have experienced more sexual assault than the low-scoring twins (although the difference did not reach statistical significance) (Cath et al., 2008).

2.3.5. Number of traumatic events

Another important consideration when evaluating the relationship between trauma and OCD is the number of traumas experienced (total number) and the number of different types of traumatic events experienced (e.g., sexual abuse, physical abuse, accidents). With respect to other psychopathologies, existing research indicates that

trauma has a cumulative effect on the severity of symptoms in mental disorders. For example, the number of interpersonal traumatic events seems to be related to the severity of traumatic stress and mood disturbances (Green et al., 2000). Specifically, in a large sample of women ($N = 2,507$), women who were exposed to multiple traumatic events experienced more symptoms of traumatic stress and dysphoric mood than women who were exposed to a single traumatic event (Green et al., 2000).

With respect to OCD, only a few studies reported on the number of traumatic events in relation to OCD. First, as previously described, Park and colleagues (2014) found that adults exposed to multiple types of potentially traumatic events in *childhood* were 4.6 times more likely to have OCD than those without such exposure. Interestingly, the risk of OCD did not significantly differ between those who experienced a single type of trauma and those without any trauma history (Park et al., 2014), indicating that exposure to multiple trauma types, but not exposure to a single trauma type, increases the risk for OCD.

With respect to the frequency of different types of traumatic events, one study found that adults with OCD experienced an average of 2.4 types of traumatic events at study assessment (Shavitt et al., 2010). The authors did not provide any information on the temporal relationship (i.e., whether trauma exposure occurred before or after OCD onset), and as such, it is assumed that the authors reported on lifetime trauma history. A similar frequency was reported by Gershuny and colleagues (2008); adults with OCD reported an average of 2.7 types of traumatic events in their lifetime and an average of 5.9 overall traumatic incidents when the type of trauma was disregarded.

2.3.6. Type of symptom dimension

There is limited research evaluating the relationship between trauma exposure and specific symptom dimensions. Except for one study pointing to the symmetry and checking symptom dimensions (Cromer et al., 2007), most research studies (Fullana et al., 2009; Grisham et al., 2011) demonstrate a prominent association between trauma exposure and the forbidden thoughts dimension (i.e., having inappropriate religious, sexual, or violent obsessions). For example, Grisham et al. (2011) reported that childhood abuse is associated with the forbidden thoughts dimension, whereas the loss

of a parent significantly predicted both the forbidden thoughts and the harm/checking dimensions.

2.4. Trauma and OCD genesis, expression, and treatment

Trauma has been associated with the genesis and expression of OCD. The following sections summarize previous research results on the temporal relationship between trauma and OCD (i.e., the timing of traumatic events relative to symptom onset), as well as on the associations between trauma and OCD expression (e.g., symptom severity and treatment response). The latter association is consistent with a pathoplastic model that views OCD as capable of being moulded by the experience of trauma.

2.5. Temporal relationship between trauma and OCD onset

The findings of several research studies (e.g., Coles et al., 2011; Fontenelle et al., 2012; Rosso et al., 2012), including case series, case-control, and cross-sectional studies, indicate that the *onset* of OCD is associated with the experience of a preceding traumatic event.

For example, in a mixed-methods study, adults with OCD ($N = 199$) were asked to qualitatively describe how they explained their transition to disease status from experiencing occasional intrusive thoughts and rituals (Coles et al., 2011). For both early- and late-onset OCD, the most commonly reported explanations included (a) specific stressors or events (43%; examples include heart attack of a family member, death of family member, house fire), (b) increased general stress (31%; examples include job loss, increased stress and loneliness, sibling diagnosed with mental illness), and (c) changes in daily activities/routine (16%; examples include moving to a new town, starting college or graduate school, leaving home) (Coles et al., 2011). In addition to providing evidence for the relevance of potentially traumatic events triggering the onset of OCD (e.g., house fire, death of someone close), these findings suggest that attention should be paid to increases in general stress and changes in activities or routines (e.g., school transitions, entry into the workforce) (Coles et al., 2011).

In a cross-sectional study of 329 adults with OCD (Rosso et al., 2012), in the 12 months prior to the onset of OCD, approximately 60% reported at least one stressful life event and 25% reported a severe life event (e.g., death of a close family member, hospitalization of a family member, major personal physical illness). Another study assessed a sample of 1,001 adults with OCD (Fontenelle et al., 2012) and found that 19% had a lifetime history of PTSD (i.e., trauma-related OCD), with 72% reporting that OCD onset happened either concurrently with or after PTSD (i.e., post-traumatic) and 28% reporting that OCD symptoms emerged before PTSD (i.e., pre-traumatic). The higher rate of post-traumatic OCD versus pre-traumatic OCD (72% vs. 28%) is taken as an indicator that traumatic events played a role in the development of OCD symptoms.

2.5.1. Differences between OCD cases preceded vs. not preceded by trauma

Gender/sex. Five studies (Bogetto et al., 1999; Goldberg et al., 2015; Lensi et al., 1996; Real et al., 2011; Rosso et al., 2012) were identified that examined the association of gender/sex with the temporal relationship between stressful life events and OCD onset. Four of the five studies found that more females than males reported a stressful life event within the 12 months prior to OCD onset (Bogetto et al., 1999; Goldberg et al., 2015; Real et al., 2011; Rosso et al., 2012). For example, in Bogetto et al.'s (1999) study, ~43% of women, in comparison to ~17% of men, reported that they experienced a severe life event within the 12 months before OCD onset. Similar findings were reported by another study (Rosso et al., 2012), with women showing a greater risk of developing OCD after a stressful life event than men ($OR = 2.15$). The OR increased to 2.91 when women experienced a *severely* stressful event.

Contradictory results were found in one study of 263 adults with OCD, with more males than females (~21% vs. ~11%) reporting adverse life events within the 12 months before symptom onset (Lensi et al., 1996).

Family history of OCD. Based on two studies (Albert et al., 2002; Real et al., 2011), OCD-affected adults with a family history of OCD (defined as having a first-degree relative with OCD) are less likely to have experienced a stressful life event 12 months before OCD onset in comparison to OCD-affected adults without a family history of OCD. Specifically, in Albert et al.'s (2002) study of 74 adults with OCD ($M = 34.3$

years), one of the few significant differences between adult cases with and without a family history of OCD is that stressful life events 12 months prior to OCD onset are more common and more severe in the non-familial OCD group. No other phenomenological, sociodemographic, or clinical difference (e.g., age, onset, sex, course of illness) between the two groups was found. Similar results were found in the second study (Real et al., 2011), in that the presence of a stressful life event before OCD onset was 2.4-times less likely in OCD-affected adults with a family history of OCD than those without a family history.

Comorbidity and course of the disorder. Relative to those without preceding trauma, adults with OCD who experienced a stressful life event within the 12 months prior to OCD onset show higher rates of current (~63% vs. ~47%) and lifetime mood disorders (~72% vs. ~57%) (Rosso et al., 2012). Sudden OCD onset is also more common in OCD cases preceded by trauma than in OCD cases not preceded by trauma (~39% vs. ~23%) (Rosso et al., 2012).

OCD symptom dimensions. Some evidence suggests that trauma exposure may predispose to certain types of OCD symptoms, with contamination fears and cleaning compulsions most frequently mentioned (Fontenelle et al., 2012; Real et al., 2011). For example, one study found that OCD-affected adults who present with contamination/cleaning symptoms report more frequently that they experienced a stressful life event in the year prior to OCD onset (Real et al., 2011). Similar results were reported by Fontenelle et al. (2012); adults with post-traumatic OCD (i.e., OCD developed after trauma) and without prior obsessive-compulsive symptoms show greater rates of contamination-washing symptoms and more severe miscellaneous symptoms (i.e., lucky/unlucky numbers, fear of saying the wrong thing) than adults with post-traumatic OCD and prior obsessive-compulsive symptoms.

In another study (Rosso et al., 2012), patients with OCD with preceding trauma presented almost twice as often with somatic obsessions (i.e., concern with illness or disease; preoccupation with a body part) than those without preceding trauma (~39% vs. ~20%). The study authors hypothesized that the higher rate of somatic obsessions may be sample specific and related to the high rate of exposure to physical illness-related life events; in particular, hospitalization of a family member and major personal physical

illness were the second and third most frequent events in the study sample (Rosso et al., 2012).

2.6. Trauma and OCD severity

Miller and Brock (2017) conducted a meta-analysis of 24 studies ($N = 4,557$) evaluating the effect of trauma on the severity of obsessions and compulsions. Instead of focusing on discrete diagnoses (i.e., OCD, hoarding disorder, body dysmorphic disorder, trichotillomania, and excoriation disorder), the authors focused on obsessive-compulsive spectrum (OCS) symptoms (i.e., obsessions and compulsions), which refer to the symptoms underlying all OCRDs. Of the 24 included studies, 16 focused on OCD samples. Across the total sample ($N = 4,557$), there was a significant, small effect ($r = .20$, $p < .001$) of trauma exposure being associated with higher severity of OCS symptoms. Interestingly, when examining obsessions and compulsions separately, the results suggested that trauma exposure may impact the severity of compulsions but not the severity of obsessions.

More specifically, across five studies ($n = 659$), the severity of obsessions was *not* significantly associated with trauma exposure. In contrast, across four studies ($n = 562$), the severity of compulsions was significantly associated with trauma exposure ($r = .17$). Consistent with previous research in this area (Bogetto et al., 1999; Goldberg et al., 2015; Real et al., 2011; Rosso et al., 2012), meta-analytic findings suggest that females are more likely to experience obsessive-compulsive symptoms in response to trauma than males (Miller & Brock, 2017).

Several drawbacks of Miller and Brock's (2017) meta-analysis were identified. First, the analysis only included adult studies and cannot make any conclusions about children and adolescents with OCD. Second, the authors adopted a narrow definition of trauma and excluded studies measuring stressful or negative life events. In particular, the authors' trauma definition was based on Criterion A of the PTSD diagnosis in the DSM-IV-TR (APA, 2000), stating that the exposure to a traumatic event must involve an actual or perceived threat to the physical integrity of an individual or others (meaning that threats to emotional and mental integrity were excluded).

Several adult studies that were excluded in Miller and Brock's (2017) meta-analysis but that examined the relationship between trauma and OCD severity are presented here. For example, a study of 41 adults with OCD found that those with a history of childhood trauma experienced more severe OCD symptom severity and depressive symptomatology than those without a trauma history (Fricke et al., 2007). In Semiz et al.'s (2014) study of 120 adults with OCD (~48% treatment-resistant), four of five trauma types (emotional neglect, emotional abuse, bodily threat, sexual abuse - but not sexual harassment) were positively associated with OCD severity. Compared to the other types, emotional neglect showed the most significant association with OCD severity (Semiz et al., 2014).

In a large population-based cohort of 22,084 twins (Vidal-Ribas et al., 2015), two of five factors, namely "abuse and family disruption" (e.g., domestic violence, parental divorce/separation) and "sexual abuse", were positively associated with the severity of obsessive-compulsive symptoms. In contrast, "illness/injury" (e.g., accident, physical illness), "loss" (e.g., death of spouse, child, close friend), and "non-sexual assault" (e.g., robbery, been stalked, involved in lawsuit) were not. These associations remained significant after controlling for depressive symptoms, despite depressive symptoms being linked to greater OCD severity in youth (Peris et al., 2010) and adults (Besiroglu et al., 2007). Furthermore, in a large-scale study with 1,001 adults with OCD, Fontenelle et al. (2012) found that individuals with post-traumatic OCD (i.e., OCD developed after a traumatic event) presented with more severe symptoms than the non-trauma and pre-traumatic OCD (i.e., OCD developed prior to a traumatic event) groups.

Other research did not demonstrate a significant association between trauma exposure and OCD severity. For example, Selvi et al. (2012) examined 95 adults with OCD and found that childhood trauma, as measured by the CTQ-28 (Bernstein & Fink, 1998), was not associated with OCD severity. Of note, the study excluded participants with concurrent MDD (Selvi et al., 2012), which may have contributed to this null finding. Similarly, Visser et al. (2014) examined 382 adults with OCD and the relationship between adverse childhood experiences (e.g., physical or sexual abuse, parental dysfunction, early separation from a parent) and found that none of the measured traumatic experiences are related to OCD symptom severity. However, the authors found that trauma exposure is related to greater comorbidity with affective disorders, substance use disorders, and eating disorders (Visser et al., 2014).

2.7. Trauma and OCD treatment response

Based on existing research, it is not clear whether adults with OCD and a trauma history respond more poorly to treatment (de Silva & Marks, 1999; Gershuny et al., 2002, 2003, 2008) than those without such history or if a trauma history is unrelated to treatment response (Fricke et al, 2007; Shavitt et al., 2010). There is even some evidence suggesting that a trauma history may improve treatment outcomes (Lo, 1967; Shavitt et al., 2010). The following section further describes the research in this area.

2.7.1. Equal or better treatment response

In an early study, Lo (1967) examined the course of OCD in 88 adult OCD patients and identified that precipitating events (i.e., triggers occurring within 6 months prior to OCD onset, including psychological, physiological or physical events) were significantly associated with a favourable course of treatment (the type of treatment received was not described in Lo's paper). In other words, Lo's findings suggest that OCD patients exposed to a precipitating event (e.g., puberty, marital problems, physical illness) are more likely to improve over the course of treatment.

Another study examined a sample of first-time treatment-seeking adults with OCD ($N = 219$) and the authors found that the presence of a comorbid PTSD diagnosis or a trauma history without a PTSD diagnosis (authors did not indicate whether trauma was experienced pre- or post OCD) did not negatively affect OCD treatment outcomes (Shavitt et al., 2010). Results differed for trauma history (equal treatment response) versus comorbid PTSD diagnosis (better treatment response). Specifically, the authors found that OCD cases with co-occurring PTSD ($n = 21$) were more frequently rated as treatment responders than OCD cases without PTSD ($n = 184$). Interestingly, when treatment response was not coded as a continuous variable (absolute number of points reductions in baseline OCD severity) and instead as a categorical variable (minimum 35% decrease in baseline Y-BOCS scores plus a score of $1 = \textit{much better}$ or $2 = \textit{better}$ on the Clinical Global Impression Scale-Improvement score), no statistically significant difference in treatment response between these two groups was found for CBT (60% vs. 63%) or SSRI (~47% vs. ~22%) treatment. It is worth mentioning that only a small subset of Shavitt et al.'s sample (~18%) had a positive trauma history.

No significant difference in treatment response between trauma-exposed and non-trauma exposed OCD-affected adults was found by Fricke et al.'s (2007) study. Both the OCD group with a history of sexual and/or physical abuse and the non-trauma group seemed to benefit similarly from a trial of CBT (Fricke et al., 2007). In another analysis of the same study (Fricke et al., 2007), treatment responders were compared to non-responders regarding their trauma load as measured by the CTQ-SF (Bernstein et al., 2003). Both groups did not differ on any CTQ-SF scores, including total trauma score and subscales scores such as emotional neglect or physical abuse.

2.7.2. Poorer treatment response

Contrary to the above findings, Gershuny et al.'s (2002, 2003) findings suggest that patients with treatment-refractory OCD (i.e., previous trials of behaviour therapy and/or medication had failed) have a less favourable response (i.e., no change or a worsening of symptoms) to behavioural treatments of ERP when they have a co-occurring PTSD diagnosis than when they do not. Gershuny et al.'s (2002) unblinded naturalistic treatment study included 15 OCD adult inpatients with treatment-refractory OCD, half of them ($n = 8$) meeting DSM-IV criteria for co-occurring PTSD. Following standard treatment protocols, OCD cases with co-occurring PTSD showed smaller improvements than those without co-occurring PTSD on several measures, including OCD severity, subjective perception of improvement, and depressive symptom severity (Gershuny et al., 2002).

More specifically, as a response to treatment, OCD cases with co-occurring PTSD showed an initial decrease in OCD symptoms while simultaneously showing an increase in PTSD symptoms (e.g., increased trauma-related intrusive thoughts, flashbacks, and nightmares). However, eventually, OCD symptoms intensified again and became more frequent. These results suggest that OCD symptoms may be inversely related with trauma-related symptoms; when one symptomatology decreases (i.e., improves), the other increases (i.e., worsens). McKay et al. (2017) termed this phenomenon the “hydraulic effect.” In terms of treatment recommendations, this observation suggests that, when OCD and PTSD present together, treatment may be more successful when both symptom clusters are targeted at the same time (Gershuny et al., 2003).

Consistent with these findings are those of Semiz and colleagues (2014) who studied 120 adults diagnosed with OCD ($M = 34.7$ years). Based on their response to treatment, OCD patients were either labelled as treatment-resistant (i.e., failed at least one adequate prior treatment trial) or treatment responders (i.e., 35% decrease in initial Y-BOCS score and maintenance of improvement for at least 12 months). The treatment-resistant group had significantly higher trauma scores on the Traumatic Experiences Checklist (TEC; Nijenhuis et al., 2002) than the treatment responder group in all domains except for sexual harassment.

In addition to these three cross-sectional studies, several case studies (de Silva & Marks, 1999; Gershuny et al., 2003; Pitman, 1993; Sasson et al., 2005) indicate that individuals with OCD and co-occurring PTSD may benefit less from treatment than OCD cases without co-occurring PTSD. For example, Sasson et al. (2005) examined the treatment response of 13 military veterans ($M = 34.1$ years) who were diagnosed with both PTSD and OCD. In those cases, the onset of OCD was directly linked to severe combat-related trauma (Sasson et al., 2005). The veterans received either psychotherapy only, psychopharmacology only, or a combination of both. Only one case left treatment with reduced symptoms, and the majority of cases (10 out of 13) showed no reduction in symptoms. The remaining two cases were excluded as they did not comply with treatment.

2.7.3. Summary of association between trauma and OCD treatment response

In sum, findings are mixed in terms of whether a trauma history is positively or negatively associated with treatment outcomes for adults with OCD. Methodological differences between studies may have affected findings as studies differed in their design (cross-sectional vs. case series), population (first-time vs. treatment-resistant OCD patients), and treatment type (psychopharmacological, behavioural, or combined).

Shavitt and colleagues (2010) noted that OCD patients with unsuccessful previous treatment trials might be more likely to do poorly in subsequent treatment trials. As such, for treatment-resistant OCD cases, co-occurrence of PTSD / trauma exposure may be a more important prognostic factor than for non-treatment-resistant OCD cases.

Chapter 3. Pediatric studies related to trauma and OCD

When reviewing the literature on the role of trauma in childhood-onset OCD, it is notable that there is a dearth of studies with pediatric samples in comparison to studies with adult samples. For example, in Brander and colleagues' (2016) systematic review of environmental risk factors for OCD, only 4 of 34 identified studies on the relationship between trauma and OCD included samples of children or adolescents (or both). In addition to the four studies identified by Brander et al. (2016), there are at least six additional youth studies that are related to the role of trauma and pediatric OCD, and that are reviewed in detail below. See Table 5 for an overview of the ten pediatric studies.

3.1. Community-based samples

Four of the ten identified pediatric studies examined community-based samples (Barzilay et al., 2019; Essau et al., 2000; Jaisoorya et al., 2015; Valleni-Basile et al., 1996).

Barzilay and colleagues' (2019) study included a large community sample of 7,054 adolescents ($M = 15.8$ years) recruited at a pediatric, non-psychiatric hospital. The authors specifically investigated the relationship between trauma and obsessive-compulsive symptoms, including subthreshold OCD (i.e., youth experiencing obsessive-compulsive symptoms but not fulfilling threshold OCD criteria). The sample contained 3% of adolescents meeting OCD DSM-5 criteria and 38% endorsing subthreshold OCD. Approximately 70% of OCD-affected adolescents in the community experienced at least one traumatic event, of which more than half experienced more than one event. Barzilay et al. (2019) reported that trauma exposure was associated with obsessive-compulsive symptoms in a dose-response manner, suggesting that youth who have experienced more traumatic events show more obsessive-compulsive symptoms (Barzilay et al., 2019). This association was greater in female compared to male youth, and greater in pre-pubertal than in pubertal youth.

Table 5. Pediatric studies examining the associations between OCD and trauma

Study	Study design and sample type	N	Age group (age range), M (SD), in years	Trauma measure (Measure type; name of measure; trauma type)	Main findings
Cross-sectional studies with non-psychiatric samples					
Barzilay et al. (2019)	Cross-sectional study; non-psychiatric clinical sample	N = 7,054	Youth (11–21 years) M = 15.8 (SD = 2.7)	Self-report; trauma screen of eight traumatic events created for study; lifetime exposure to eight traumatic events	<ul style="list-style-type: none"> Trauma shows a dose-response relationship with OCD severity, which is greater in females and pre-pubertal youth The trauma-OCD association varied by type of trauma (assaultive types) and OCD dimension (forbidden thoughts)
Essau et al. (2000)	Cross-sectional study; community sample	N = 1,035	Youth (12–17 years) M = 14.3 (SD = 1.7)	Structured diagnostic interview; CAPI (Wittchen & Pfister, 1996); only PTSD assessed	<ul style="list-style-type: none"> OCD among youth with PTSD: 17.6% PTSD among youth with OCD: 23.1%
Jaisooriya et al. (2015)	Cross-sectional study; community sample	N = 7,560	Youth (12–18 years) M = 15.2 years (SD not reported)	Self-report; four yes/no questions about lifetime exposure to sexual abuse created for study; lifetime exposure to sexual abuse	<ul style="list-style-type: none"> Youth with OCD reported significantly more sexual abuse than youth without OCD (24.6% vs. 4.2%; $p < .01$)
Valleni-Basile et al. (1996)	Cross-sectional study; community sample	N = 359	7 th to 9 th graders M = 13 (SD not reported); 13 or younger: 66.4%	Self-report; modified version of the CSL-A (Coddington, 1972); life events in the previous 12 months	<ul style="list-style-type: none"> Youth who experienced more undesirable life events in the 12 months prior to baseline testing had 1.21 higher risk of OCD onset
Clinical samples					
Freeman & Leonard (2000)	Case study; clinical sample	OCD (N = 2)	Two cases (7 years and 10 years)	Not applicable	<ul style="list-style-type: none"> Both children developed OCD symptoms after sexual assault
Gothelf et al. (2004)	Case-control study; clinical sample	Total N = 80 OCD (n = 28); AD (n = 28) Control (n = 24)	Youth (age range not reported) M = 13.3 (SD = 3.3)	Self-report; LES (Sarason et al., 1978); general list of traumatic events	<ul style="list-style-type: none"> The OCD group experienced significantly more negative life events in the year before onset than the control group (32% vs. 4%)
Ivarsson et al. (2016)	Case-control study; clinical sample	OCD (n = 25); MDD (n = 25); OCD+MDD (n = 25); Control (n = 25)	Adolescents (13–17 years) mean age not reported	Semi-structured interview; AAI (Main & Kaplan, 1985); attachment-related trauma	<ul style="list-style-type: none"> Attachment-related trauma was less commonly reported in the OCD group than in the control group (12% vs. 28%)
Lafleur et al. (2011)	Case-control study; clinical sample	OCD (n = 263); Control (n = 151)	Youth (age range not reported) M = 11.9 (SD = 3.0)	Self-/parent-report; endorsement of criterion A of PTSD diagnosis of DSM-IV (APA, 1994)	<ul style="list-style-type: none"> Youth with concurrent OCD and PTSD presented with more severe OCD symptoms Trauma exposure rate in the OCD group was significantly higher than in the healthy control group (11% vs. 1%) No difference between symptom dimensions
Thomsen & Mikkelsen (1995)	Longitudinal, matched case-control study; clinical sample	OCD (n = 23); Control (n = 23) matched for sex and age	Youth (age range not reported) M = 16.6 (SD = 3.0) (age at 5-year follow-up)	Self-report; no explicit measure of trauma (report of traumatic events in interview)	<ul style="list-style-type: none"> 52.2% of youth reported that they had experienced an event that preceded the onset of OCD symptoms (most of the events were family-related)
Vazquez et al. (2022)	Cross-sectional study; clinical sample	OCD (N = 142)	Children and adolescents (7–17 years) M = 12.8 (SD = 3.0)	Caregiver-report; ACE checklist created for the study; list of 15 ACEs	<ul style="list-style-type: none"> 73% of OCD-affected youth were exposed to at least one ACE CBT for pediatric OCD was effective irrespective of ACE exposure

Note. OCD = obsessive-compulsive disorder; PTSD = post-traumatic stress disorder; AD = other anxiety disorder; TSE = traumatic stressful event; CAPI = Composite International Diagnostic Interview; CSL-A = Coddington Life Events Scale for Adolescents; LES = Life Events Checklist or Survey; AAI = Adult Attachment Interview; ACE = adverse childhood experience.

The association between trauma exposure and obsessive-compulsive symptoms also varied by trauma type and OCD dimension. Specifically, Barzilay and colleagues (2019) found that assaultive traumatic events showed stronger associations with obsessive-compulsive symptoms than non-assaultive events, with sexual assault showing the most robust association (sexual assault odds ratio [OR] = 4.82 vs. physical assault OR = 2.52 vs. non-assaultive events OR = 2.03). Furthermore, while trauma exposure was related to all four OCD symptom dimensions (forbidden thoughts, repeating/checking, symmetry, and cleaning/contamination), the forbidden thoughts dimension showed the strongest association (Barzilay et al., 2019).

A similar finding regarding a greater role of sexual abuse in OCD was found by an epidemiological study of 7,560 adolescents between the ages 12–18 years ($M = 15.2$ years) (Jaisoorya et al., 2015). In this sample, 0.5% had a diagnosis of OCD and the prevalence of sexual abuse was significantly higher in the sample of OCD-affected youth than in the non-OCD-affected youth (24.6% vs. 4.2%). However, sexual abuse was the only trauma type investigated in this study.

Valleni-Basile and colleagues (1996) followed 359 adolescents over grades 7 to 9 ($M = 13$ years) and reported a 1-year incidence rate of 0.7 % for OCD and 8.4% for subclinical OCD. The authors' longitudinal data suggests that adolescents are at higher risk for developing OCD when they experienced more undesirable (e.g., divorce of parents) and fewer desirable (e.g., graduation from high school) life events in the 12 months prior to baseline testing (Valleni-Basile et al., 1996).

The fourth study examined a community-based sample of 1,035 adolescents aged 12 to 17 years ($M = 14.3$, $SD = 1.7$ years) and reported on prevalence rates of anxiety disorders (Essau et al., 2000). While not directly focusing on the relationship between OCD and trauma, the study provides rates on co-occurring PTSD and OCD in a community youth sample. In their sample, among adolescents with OCD, 23% had a co-occurring diagnosis of PTSD and, among adolescents with a primary diagnosis of PTSD, ~18% had a co-occurring diagnosis of OCD (Essau et al., 2000).

3.2. Clinical samples

The remaining youth studies comprised clinical samples, mainly recruited from psychiatric hospitals. Gothelf and colleagues (2004) compared 28 youth with a primary diagnosis of OCD ($M = 13.8$ years) with 24 typically developing youth ($M = 13.3$ years) and 28 youth ($M = 14.4$ years) with an anxiety disorder (GAD, social anxiety disorder, specific phobia, and panic disorder). The authors found that compared to healthy controls, children and adolescents with OCD report more negative life events, both across lifespan and 12 months prior to disorder onset. Specifically, the life event of “major illness or injury in a relative” was eight times more often reported in the OCD group than in the healthy control group (32% vs. 4%) and almost twice as often than in the anxiety disorder group (32% vs. 18%) (Gothelf et al., 2004). The authors noted that the OCD group reported more negative life events than the anxiety group but that the difference was not statistically significant (Gothelf et al., 2004). Findings suggest that negative life events may be an environmental risk factor for OCD but not one that is specific to OCD. It is noteworthy that the study was limited by small sample sizes.

Lafleur et al. (2011) examined the rates of PTSD (including subthreshold PTSD) and trauma exposure (meeting Criterion A of PTSD diagnosis) in a clinical sample of 263 children and adolescents with OCD ($M = 11.9$ years). Subthreshold PTSD was defined as meeting all criteria for two of the three required sections of the DSM-IV version of the PTSD diagnosis. LaFleur et al. found that the prevalence of trauma exposure and PTSD was higher in youth with OCD than in a control group matched for age, gender³, and socioeconomic status. Specifically, relative to the healthy control group, the OCD group reported an 11-times higher trauma exposure rate (11% versus 1%) and a 6-times higher PTSD rate (including subthreshold) (6% versus 0%).

Additionally, Lafleur et al.’s (2011) study is one of the only pediatric studies with a clinical sample that examined OCD severity in relation to trauma exposure in youth. The authors found that, compared to youth with OCD only, youth with concurrent OCD and PTSD presented with more severe OCD symptoms as measured by the gold-standard

³ Lafleur et al. (2011) used the term “gender” and categorized youth as female or male.

OCD severity scale, the Children's Yale-Brown Obsessive-Compulsive Scale (CY-BOCS; Scahill et al., 1997). While the OCD-PTSD group had an average CY-BOCS score of 25.5, which is in the moderate-severe range, the OCD-only group had a score of 21.3, which is in the moderate range (Lewin et al., 2014). The authors did not find any significant difference between the OCD only and OCD and PTSD groups regarding the four OCD symptom dimensions (aggressive/sexual/religious/somatic/checking; symmetry/ordering/counting/repeating; contamination/cleaning; and hoarding).

A clinical case-control study (Ivarsson et al., 2016) examined four groups of adolescents between 13 and 17 years old ($N = 100$); 25 each with OCD, MDD, OCD plus MDD, and healthy controls. The study was primarily focused on attachment experiences, including traumatic and adverse attachment events. Childhood experiences were categorized into five categories: (a) attachment-related trauma, (b) peer cruelty, (c) other forms of interpersonal violence, (d) loss of a parent, and (e) loss of another important person. Youth with OCD did not experience more negative life events or loss experiences than healthy controls. Attachment-related trauma was less commonly reported in the OCD group than in the control group (12%, $n = 3$ vs. 28%, $n = 7$) (Ivarsson et al., 2016). Consequently, Ivarsson and colleagues (2016) concluded that OCD in adolescence does not appear to be associated with attachment-related negative experiences. Of note, the sample sizes for each group of Ivarsson et al.'s study were small, and the study was likely underpowered to detect true differences.

In a longitudinal study, Thomsen and Mikkelsen (1995) followed 23 OCD-affected youth for several years ($M = 16.6$ years at follow-up). At the baseline interview, the majority of youth (52.2%) reported to have been exposed to a stressful life that they believed had precipitated the onset of OCD symptoms. Most of these events were family-related, such as a parent's divorce, death, move, or financial problems (Thomsen & Mikkelsen, 1995). While being a qualitative report, this study provides insight into youth's beliefs about reasons for symptom onset.

In a recently published study, Vazquez et al. (2022) examined the associations between ACE exposure and OCD expression as well as its effects on treatment outcomes in a sample of 142 children and adolescents with OCD ($M = 12.8$ years). The majority of OCD-affected youth (73%) were exposed to at least one ACE. The authors did not find significant differences between youth who were exposed to ACEs and those

who were not in terms of OCD severity, child-reported OCD-related functional impairment, and negative thinking. However, they found a significant difference in parent-reported OCD-related functional impairment, with the ACE group reporting higher functional impairment than the no ACE group (Vazquez et al., 2022). In terms of treatment, the study's findings suggested that individual CBT with ERP was effective for youth with OCD irrespective of ACE exposure. However, youth who had fewer parent-reported ACEs improved more quickly (Vazquez et al., 2022).

Finally, a clinical case study by Freeman and Leonard (2000) provided information on two children (ages 7 and 10 years old) with OCD (sexual obsessions). The authors described how both children developed OCD symptoms shortly after being sexually abused, suggesting sexual abuse as the trigger for sexual obsessions.

3.3. Summary of findings and research gaps in pediatric studies

To sum up, the findings of most existing pediatric studies suggest that there may be an association between trauma and OCD. Specifically, one clinical study reported significantly higher rates of trauma exposure and PTSD in youth with OCD relative to healthy controls (LaFleur et al., 2011). Another study identified a dose-response relationship between trauma and OCD symptoms, with youth who were exposed to more traumatic events reporting more obsessive-compulsive symptoms (Barzilay et al., 2019). Furthermore, findings suggest (a) a differential risk based on trauma type, (b) differential risk for a specific OCD symptom dimension, and (c) a temporal relationship between trauma and OCD onset. First, three studies (Barzilay et al., 2019; Freeman & Leonard, 2000; Jaisoorya et al., 2015) point to sexual abuse as the trauma type that may be most strongly related to OCD. Second, one study (Barzilay et al., 2019) points to the forbidden thoughts dimension as the symptom dimension that may be most strongly associated with trauma. Third, the findings of one study suggest that youth with OCD experience more negative life events both at lifetime and at 12 months prior to OCD onset than healthy controls (Gothelf et al., 2004).

The existing pediatric studies have several limitations. First, only two studies had a large clinical sample (Lafleur et al., 2011; $N = 263$; Vazquez et al., 2022, $N = 142$); the other clinical studies had sample sizes of fewer than 30 youths. Second, Lafleur and

colleagues (2011) used a narrow definition of trauma (i.e., meeting Criterion A of DSM-IV's PTSD diagnosis) and treated trauma as a dichotomous variable (i.e., trauma yes/no) rather than a dimensional variable (i.e., trauma load with a numerical value). Third, in most studies, youth were asked to self-report on trauma exposure; only one study to date has used caregiver report to evaluate traumatic events, which allows for the assessment of earlier traumatic events that the youth might not be able to remember (e.g., before age 3) but that may still influence the youth.

Fourth, almost all quantitative studies that reported an age range (Barzilay et al., 2019; Essau et al., 2000; Ivarsson et al., 2016; Jaisoorya et al., 2015; Valleni-Basile et al., 1996) included youth older than 12 years. As such, most existing studies cannot make any conclusions about the potential association between trauma and OCD in children as they only included adolescents. Furthermore, only two pediatric studies (Barzilay et al., 2019; Lafleur et al., 2011) examined the relationship between symptom dimensions and trauma, producing contradictory results. Specifically, while Lafleur et al. (2011) found no differences between associations of trauma and symptom dimensions in a clinical sample, Barzilay and colleagues (2019) found that the forbidden thoughts dimension showed the strongest association with trauma in a large community-based sample.

Finally, regarding treatment outcome research, despite one recent study (Vazquez et al., 2022) that explored the potential influence of ACEs on treatment response in pediatric OCD using a non-validated ACE screen, the topic of trauma in relation to treatment outcomes has been completely neglected in pediatric OCD samples. This is surprising as the effects of trauma on treatment response have been extensively examined in other childhood disorders (e.g., D'Andrea et al., 2012). For example, Lewis and colleagues (2010) reported that youth with MDD ($M = 14.6$ years) and a previous history of childhood sexual abuse demonstrated a lower response to CBT compared to youth who did not have a history of abuse (Lewis et al., 2010). According to Lewis et al., this is the fourth study that found a poorer CBT response for trauma-exposed youth with MDD, highlighting not only the fact that trauma seems to have a role in CBT response for this population but also that trauma exposure in relation to treatment response has been studied more extensively in youth with MDD than in youth with OCD.

Closing this gap in the literature is particularly important when considering recent evidence that suggests that mental health clinicians fail to adequately diagnose and treat OCD symptoms when OCD-affected youth present with a trauma history (Becker-Haimes et al., 2021). Specifically, in their study, Becker-Haimes et al. (2021) identified that when clinicians were presented with vignettes about a teenager showing symptoms of OCD, they were less likely to believe that the youth met the diagnostic criteria for OCD and that the first-line treatment for OCD (i.e., ERP) would be effective if the youth had experienced sexual abuse compared to clinicians who read the same scenario without any mention of trauma. As such, advancing the understanding of the role of trauma in pediatric OCD may help improve treatment outcomes and clinical practice.

Chapter 4. Research questions

This section describes the present study's three primary research objectives that aimed to address the demonstrated gaps in the current literature. The first research aim was to describe the nature of exposure to PTEs in pediatric OCD, including PTE exposure frequency, PTE exposure type, and temporal precedence. The second research aim was to assess the relationship between PTE exposure and OCD expression. Specifically, the study examined how lifetime PTE exposure by count or category was related to OCD severity, youth's functional impairment, OCD symptom dimensions, comorbidity, and other relevant clinical factors. The third research aim was to explore whether youth with OCD respond differently to gold-standard psychosocial treatment based on lifetime PTE exposure by count or category/type.

It is important to note that the primary objective of this research study was to explore and examine the relationships and associations that exist within the samples of interest. The study was not designed to establish causality between the variables under investigation. The following specific research questions were examined:

4.1. Research Aim 1: Description of the nature of PTE exposure in pediatric OCD

1.1 PTE exposure frequency

1.1.1 What is the lifetime rate of PTE exposure among youth with OCD, and to how many different types of PTEs, on average, are youth with OCD exposed based on parent report?

1.2 PTE exposure type

1.2.1 What types of PTEs do youth with OCD experience in their lifetime based on parent report?

1.3 Temporal precedence

1.3.1 What percentage of PTE types preceded the onset of OCD, and what percentage was specifically reported within a 12-month period prior to OCD onset?

1.3.2 What types of PTEs preceded the onset of OCD, and which ones occurred within a 12-month period prior to OCD onset?

4.2. Research Aim 2: Description of the relationship between cumulative lifetime PTE exposure and pediatric OCD expression

2.1 Relationship between the *number* of parent-reported PTE types and pediatric OCD expression

2.1.1 What is the relationship between the *number* of PTE types and OCD severity (obsession severity and compulsion severity)?

2.1.1.1 Is the relationship between the *number* of PTE types and OCD severity moderated by youth gender or family cohesion?

2.1.1.2 What is the relationship between the *number* of PTE types and OCD severity when controlling for depressive symptoms?

2.1.2 Similarly, what is the relationship between the *number* of PTE types and OCD-related functional impairment?

2.1.3 What is the relationship between the *number* of PTE types and obsessive–compulsive symptom dimensions?

2.2 Relationship between PTE *categories* (non-interpersonal trauma, physical abuse, sexual abuse, emotional abuse) and OCD expression

2.2.1 What is the relationship between any of the PTE *categories* and OCD severity?

2.2.2 What is the relationship between any of the PTE *categories* and OCD-related functional impairment?

2.2.3 What is the relationship between any of the PTE *categories* and any of the obsessive–compulsive symptom dimensions?

2.3 Based on lifetime PTE exposure, how do OCD-affected youth compare on the following variables: (a) family history of OCD, (b) course of OCD onset, (c) youth’s gender, (d) comorbidity, and (e) parental educational attainment (as an indicator of socioeconomic status)?

4.3. Research Aim 3: Effectiveness of gold-standard psychosocial pediatric OCD treatment for youth with OCD affected by PTEs

3.1 Do youth with OCD differ in their response to gold-standard psychosocial treatment for OCD based on cumulative lifetime PTE exposure, with respect to the following variables: (a) OCD severity, (b)

OCD-related functional impairment, (c) family accommodation, and (d) family functioning?

3.2 Do youth with OCD differ in their response to gold-standard psychosocial treatment based on their exposure to a specific PTE type/category, with respect to the following variables: (a) OCD severity, (b) OCD-related functional impairment, (c) family accommodation, and (d) family functioning?

4.4. Research Aim 4: Caregiver perception of OCD onset or worsening

4.1 What percentage of parents associated their child's OCD onset or worsening with a stressful life event in the youth's life?

Chapter 5. Method

5.1. Participants

The current study used a sample of participants from the database of the British Columbia Children's Hospital Provincial OCD Program (BCCH-POP), which is a hospital-based outpatient specialty program for the assessment and treatment of youth with OCD. The BCCH-POP has a registry of all physician-referred children and adolescents who presented to the clinic and underwent a comprehensive clinical initial assessment by Ph.D.-level psychologists and psychiatrists between September 2011 and May 2020. Typically, to be eligible to be referred to the speciality program, a new patient needs to have tried treatment in their local health authority.

This study's sample included youth (6–19 years of age) and their parents who met the following eligibility criteria: (a) the youth was assigned a primary diagnosis of OCD based on either DSM-IV-TR or DSM-5 criteria and (b) the youth's parent completed a measure that assessed the exposure to potentially traumatic events. At the time of the initial assessment, parents provided informed consent and the youth provided informed assent to have researchers use their de-identified information collected during the standard clinical assessment for research purposes.

Within the existing database, 197 families of OCD-affected youth completed the trauma exposure measure, The Traumatic Events Screening Inventory – Parent Report Revised (TESI-PRR; Ghosh-Ippen et al., 2002). The measure is described in detail in the Measures section. Data collection for the TESI-PRR varied over the years. In 2013 and 2014, every family was presented with the TESI-PRR and asked to complete it (referred from now on as the *unscreened sample*). In other years, to reduce participant burden (e.g., to reduce the overall time of the registry assessment battery), only families who endorsed at least one of six “pre-screening” questions were presented with the TESI-PRR (from now on referred to as the *pre-screened sample*). As such, the total sample of caregivers that completed the TESI-PRR ($N = 197$) can be split into two subsamples, the unscreened sample ($n = 113$) and the pre-screened sample ($n = 84$). “Pre-screener” is a misnomer in this context as the screening questions were less sensitive than the TESI-PRR items, and as such the participants who negatively screened out could not be considered to have been exposed to zero PTEs on the TESI-

PRR. For reference, the six screening questions included: (1) Did [a trauma] occur to your child at the time of OCD onset or worsening?, (2) Did [a trauma] occur in your child's immediate family at the time of OCD onset or worsening?, (3-6) Has your child ever been exposed to actual or threatened death, serious injury, or sexual violence in one or more of the following ways? (3) Directly experiencing the event, (4) Witnessing it in person, (5) Learning of violent or accidental death of close family or friend⁴, or (6) Repeated or extreme exposure to traumatic details.

The sample used for Research Aim 1 consisted of the unscreened subsample ($n = 113$) to allow for unbiased prevalence numbers of PTE exposure. See Figure 2 for a flow chart for trauma exposure questionnaire completion within the registry OCD database.

⁴ It is of note that one of the TESI-PRR items inquires whether the child experienced the death of someone close. In comparison to the pre-screening questions, for the TESI-PRR, the death does not need to be "accidental or violent". Please see Appendix A for a full list of the TESI-PRR items.

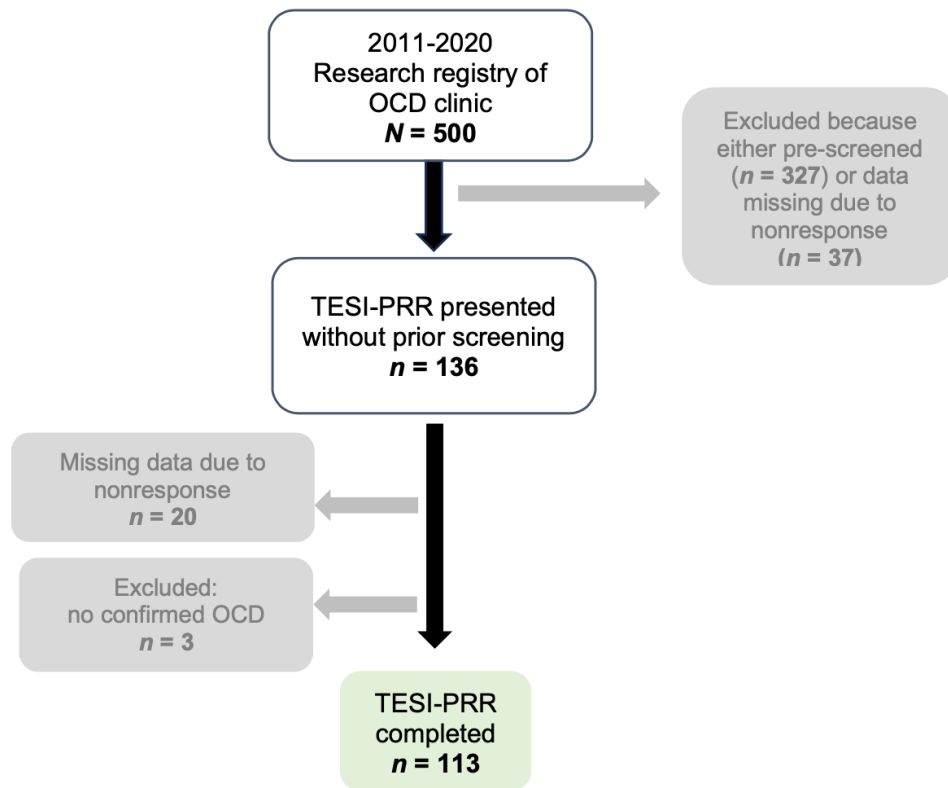


Figure 2. Flow chart of participant flow and TESI-PRR completion for the sample of Research Aim 1

Note. OCD = obsessive-compulsive disorder; TESI-PRR = The Traumatic Events Screening Inventory - Parent Report Revised (TESI-PRR; Ghosh-Ippen et al., 2002).

The sample used for Research Aim 2 ($n = 197$) consisted of the combined unscreened and pre-screened subsamples (see Figure 3 for a flow chart for TESI-PRR questionnaire completion within the registry OCD database) if sensitivity analyses indicated that the total sample could be used. See data analysis section for a detailed description of the sensitivity analyses.

The sample used for Research Aim 3 ($n = 98$) consisted of a subsample of youth (8 to 19 years) from the registry database who participated in a 12-week evidence-based, group-based family CBT program (see treatment description under 5.4 Description of treatment protocol). Youth and their parents were invited to participate in treatment based on the youth's suitability for the group, including their capacity to engage with the group materials (i.e., group was cognitively, developmentally, and behaviourally appropriate for the youth), their current suicide risk (i.e., treatment was not

likely to increase their suicidal behaviour), and parental availability (i.e., at least one parent was willing to attend concurrent parent sessions) (Selles, Belschner, et al., 2018). See Figure 3 for a flow chart for TESI-PRR questionnaire completion and treatment participation. The sample for Research Aim 3 consisted of unscreened and pre-screened subsamples if sensitivity analyses indicated that the total sample could be used.

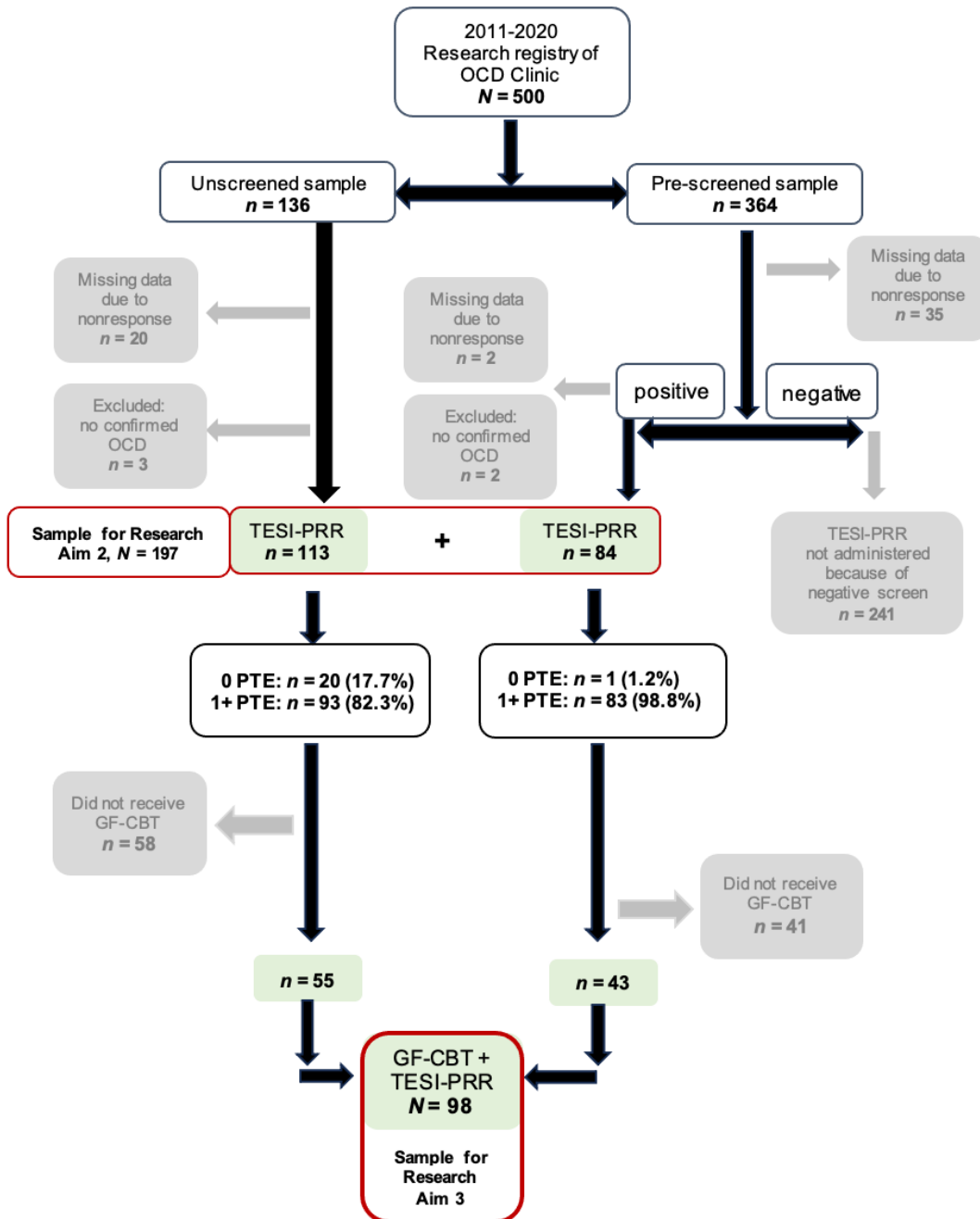


Figure 3. Flow chart of participant flow and TESI-PRR completion for the samples for Research Aims 2 and 3

Note. OCD = obsessive-compulsive disorder; TESI-PRR = Traumatic Events Screening Inventory - Parent Report Revised (Ghosh-Ippen et al., 2002); PTE = potentially traumatic event; GF-CBT = group family-based cognitive-behavioural therapy.

5.2. Measures

5.2.1. The Traumatic Events Screening Inventory - Parent Report Revised

The main measure of the study was The Traumatic Events Screening Inventory - Parent Report Revised (TESI-PRR; Ghosh-Ippen et al., 2002), which is a caregiver report measure that is used to screen for the exposure to a wide range of PTEs over the youth's lifetime. The TESI-PRR was revised from the original Traumatic Events Screening Inventory - Parent Report (TESI-P; Ford et al., 2000) to include traumatic events applicable to early childhood (aged 0 to 6 years), such as the experience of being separated from a primary caregiver for more than a few days. As such, it can be completed by parents of children of any age. The selection of PTEs was determined by reviewing current literature on a wide range of potentially traumatic experiences during childhood (Edwards & Rogers, 1997).

The TESI-PRR consists of 24 items, including 23 items depicting an event that a child could either directly experience or witness (e.g., serious accident, natural disaster, serious injury/illness, physical and sexual abuse), and one open-ended item (i.e., "Have there been other stressful things that have happened to your child?"). The experiences are presented in ascending order of intimacy and victimization, starting with accidents and concluding with sexual abuse. Refer to Appendix A to review TESI-PRR items in detail. If a parent endorses an PTE, they are subsequently asked to indicate the child's age for (a) the first time of exposure, (b) the last time, and (c) the most stressful time, and to state whether their child was strongly affected by the experience. In the BCCH-POP version of the questionnaire, the question "What was this person's relationship to your child?" was omitted.

Caregiver responses were coded as 0 (= not exposed) or 1 (= exposed). The TESI-PRR total score was calculated by summing the number of PTE types to which the youth was exposed. As such, the total score has a range of 0 to 24, with higher scores indicating exposure to a greater number of different types of PTEs. For this study, cumulative lifetime PTE exposure was operationalized by summing the total number of different types of PTEs that the youth was recorded as having experienced by the time of the assessment. It is of note that the TESI-PRR total score does not give any

indication about the unequal impact of individual PTEs on later outcomes. The TESI-PRR total score treats all exposures as equal and ignores research evidence that some PTEs may have a greater impact on later social and health outcomes (Merrick et al., 2017; Ports et al., 2016, 2020). For example, in the current data set, a youth could have a TESI-PRR total score of 1 as their parent indicated that they were exposed to acts of war/terrorism on media, which is the same score for a youth whose parent indicated that they were sexually abused.

For visualization purposes, the present sample was split into three groups based on the youth's level of PTE exposure: no, low, and high. Based on previous research using the TESI-PRR (Humphreys et al., 2016), the score cut-off for the high exposure group was defined as the score closest to the 90th percentile. As such, the sample was divided into the following groups: no PTE exposure (0 PTEs; $n = 20$), low PTE exposure (one to three PTEs; $n = 66$), and high PTE exposure (four or more PTEs; $n = 27$). The same categorization into no, low, and high PTE exposure groups was done by another study using the TESI-PRR (Roberts et al., 2013).

In addition to providing a total score, the TESI-PRR scores can be organized into different summary indices. For example, scores can provide a nonviolent trauma index (e.g., accidents, illness) and a direct victimization index (e.g., assaults, abuse). Scores can also yield indices for witnessing (indirect exposure) versus experiencing (direct exposure to) an event, as well as interpersonal versus non-interpersonal trauma. Based on trauma categories used in previous research in pediatric OCD (e.g., Barzilay et al., 2019) and previous research indicating that traumatic life events of an interpersonal or violent nature (e.g., sexual abuse, physical abuse, and emotional abuse) play a more significant role in the development and expression of OCD in comparison to non-interpersonal or non-violent traumas (e.g., accidents, natural disasters) (Boudreaux et al., 1998; Grisham et al., 2011; Lochner et al., 2002; Mathews et al., 2008; Vidal-Ribas et al., 2015), more attention was paid to sexual, physical, and emotional abuse in the current study. As such, the present study used the following four PTE categories: non-interpersonal trauma, physical abuse, sexual abuse, and emotional abuse. Instead of using the overarching interpersonal trauma category, the interpersonal trauma domain was assessed by examining physical, sexual, and emotional abuse separately to allow for a more fine-grained analysis. Following researchers who also used the TESI-PRR to categorize the events into non-interpersonal events (Musicaro et al., 2020), the non-

interpersonal trauma category included the following events: experienced a serious medical procedure or life-threatening illness, been in a serious accident or injury, seen a serious accident or injury, been in a natural disaster, and been attacked by an animal.

For overall prevalence rates only, the following categories are also included: interpersonal trauma and loss/attachment. The interpersonal trauma category consisted of physical abuse, threats of serious physical harm, experienced or witnessed mugging, experienced kidnapping, or someone close was kidnapped, witnessed physical violence within family, witnessed serious physical threats within family, witnessed physical violence outside family, and been exposed to war, armed conflict, or terrorism, witnessed sexual assault, experienced sexual abuse, and emotional abuse. The loss/attachment category consisted of severe illness/injury of someone close, death of someone close, prolonged separation from caregiver, and suicide attempt/self-harm of someone close.

Reliability. The TESI-P has shown adequate psychometric properties (Choi et al., 2019). Retest reliability scores for TESI-P summary scores were calculated over a 2- to 4-month period. Cohen's kappa scores ranged from .5 to .7 (Ford & Rogers, 1997), which indicates moderate to substantial strength of agreement (Landis & Koch, 1977). Roberts and colleagues (2014) reported a score of .70 for Cronbach's alpha, indicating adequate internal consistency of the TESI-PRR items.

Validity. The TESI-PRR has been validated against another measure of children's exposure to violence. Specifically, the TESI-PRR total score showed a strong correlation ($r = .52, p < .001$) with the total score of the Parent Report of Children's Experiences (PRCE), which is a measure of children's exposure to violence (Berent et al., 2008), indicating that the two instruments measure similar but not identical constructs. A similar strong correlation was observed between the TESI-PRR total score and the PRCE symptom scale ($r = .50, p < .001$), indicating a relationship between exposure to PTEs and physical, psychological, and behavioral symptoms.

5.2.2. Background and Medical Questionnaire

The BCCH-POP invited every family to complete a Background and Medical Questionnaire before attending the initial clinical assessment. The demographic

information that was collected included child age, child gender, child ethnicity, and parent education. The medical information that was assessed included previous treatment history, family mental health history, and developmental childhood history.

In terms of gender/sex measurement, caregivers were asked to indicate the “child's gender” by endorsing one of three options: 1) female, 2) male, and 3) a catch-all category labeled as “other (please describe).” Sex was not assessed in the current secondary data set, which does not align with current best research practices that recommend measuring both sex and gender separately, acknowledging that they are different constructs (Cameron & Stinson, 2019). Specifically, sex refers to biological attributes including physical features, chromosomes, gene expression, hormones, and anatomy; gender refers to the socially constructed roles, behaviors, expressions, and identities (Canadian Institutes of Health Research [CIHR], 2018). It is of note that the current data set used the term “gender”, but it was the parent who identified the youth’s gender and not the youth themselves. As such, to indicate the inseparable nature of gender and sex and its conflated measurement in this data set, it was elected to employ the term gender/sex when discussing study findings, following recommendations by Hyde et al. (2019).

Youth’s ethnicity was reported by parents. Caregivers were provided with 12 categories, including Aboriginal, Arab, Black, Chinese, Filipino, Japanese, Korean, Latin American, South Asian (e.g., East Indian, Pakistani, Sri Lankan), Southeast Asian (e.g., Vietnamese, Cambodian, Malaysian, Laotian), West Asian (e.g., Iranian, Afghan), White, as well as a catch-all category labeled as “other (please describe).” For data analysis, the 13 categories were then reduced to the following 9 categories recommended by recent Canadian standards (Canadian Institute for Health Information [CIHI], 2022): Black (e.g., African, African Canadian, Afro-Caribbean descent), East Asian (e.g., Chinese, Japanese, Korean, Taiwanese descent), Indigenous (First Nations, Inuk/Inuit, Métis), Latin American (Hispanic or Latin American descent), Middle Eastern (e.g., Arab, Persian, West Asian descent such as Afghan, Egyptian, Iranian, Kurdish, Lebanese, Turkish), South Asian (e.g., Bangladeshi, Indian, Indo-Caribbean, Pakistani, Sri Lankan), Southeast Asia (e.g., Cambodian, Filipino, Indonesian, Thai, Vietnamese), White (e.g., European descent), and other ethnicity category (please specify). Additionally, any family who checked off multiple ethnicities was categorized as Multi-Ethnic.

Separate from the TESI-PRR, all parents in the registry ($n = 500$) were given a list of events (negative or positive) and asked whether these events occurred to their child or in their child's immediate family "at the time of OCD onset or worsening." The first question read as follows: "Did any of the following occur to your child at the time of OCD onset or worsening? Please select all that apply or 'none of the above'." Responses included: serious injury or illness, continuing or chronic medical condition (diabetes, heart disease, etc.), pregnancy, entered new school, bullying, getting into trouble at school, alcohol or drug problem, trauma, and any other significant event. The second question read as follows: "Did any of the following positive or negative events occur in your child's immediate family at the time of OCD onset or worsening? Please select all that apply or 'none of the above'." Responses included: serious injury or illness of a family member/friend, continuing or chronic medical condition (e.g., diabetes, heart disease) of a family member/friend, death of family member/friend, divorce/separation, marriage/marital reconciliation, pregnancy, other relative moved into household, moved to new location, began new job, promotion at work, income increased substantially (>20%), job difficulties, income decreased substantially⁵, family financial problems (e.g., went deeply into debt), legal problems, alcohol or drug problem, trauma, and other significant event.

5.2.3. The Anxiety Disorders Interview Schedule for DSM-IV: Parent Version

The Anxiety Disorders Interview Schedule for DSM-IV: Parent Version (ADIS-IV-P) (Silverman & Albano, 1996) was used to assess for anxiety disorders and other psychiatric conditions common to children and adolescents. The ADIS-IV-P is a semi-structured psychiatric diagnostic interview with excellent psychometric properties (Silverman et al., 2001). Test-retest reliability coefficients ranged from .81 to .96 and internal consistency coefficients ranged from .73 to .92 (Silverman et al., 2001). Between September 2018 and May 2020 ($n = 113$), a comparable, but briefer, semi-structured interview was used instead of the ADIS-IV-P. Ph.D.-level clinical psychologists with

⁵ No numerical qualifier was used for income decreased substantially in contrast to income increased substantially (>20%).

expertise in OCD and related comorbidities administered the interview to parents and youth at BCCH-POP's initial clinical assessment. All diagnoses were confirmed via group discussions involving Ph.D.-level psychologists and child and adolescent psychiatrists.

5.2.4. The Children's Yale-Brown Obsessive-Compulsive Scale

The Children's Yale-Brown Obsessive-Compulsive Scale (CY-BOCS; Scahill et al., 1997) was used to assess the symptom severity of OCD over the past 7 days in children and adolescents. The CY-BOCS is a clinician-administered 10-item questionnaire, in which obsessions and compulsions are rated on a scale from 0 to 4 in terms of their frequency, interference with daily functioning, level of distress, youth's attempts at resisting them, and perceived degree of control over them. The CY-BOCS is the gold standard assessment tool for OCD symptoms for youth, and was modeled on the adult version, the Yale-Brown Obsessive Compulsive Scale (Y-BOCS; Goodman et al., 1989). Subscale scores for obsession and compulsion severity each range between 0 to 20 and the total CY-BOCS score ranges between 0 and 40, with higher scores indicating greater or more severe obsessions and/or compulsions (Scahill et al., 1997).

In the publication of the first empirical guidelines for interpreting CY-BOCS scores, Lewin et al. (2014) suggest that OCD severity levels for youth are interpreted based on the following ranges: 0–4 = illness slight, doubtful, transient; 5–8 = mild symptoms; 14–24 = moderate symptoms; 25–30 = moderate-severe symptoms; and 31–40 = severe symptoms. The CY-BOCS demonstrated good internal consistency reliability (Cronbach α = .87) and excellent interrater reliability (intraclass correlation coefficient [ICC] = .84) (Scahill et al., 1997). It also showed significant stronger correlations with a self-report measure of obsessive-compulsive symptoms than with measures of depression and anxiety (Scahill et al., 1997), indicating adequate convergent and discriminant validity.

5.2.5. The Children's Yale-Brown Obsessive-Compulsive Scale-Symptom Checklist

The CY-BOCS (Scahill et al., 1997) also contains a symptom checklist (SC) with a total of 62 obsessions and compulsions, which are rated for their current and past

presence or absence. Symptoms are grouped into seven obsession categories (contamination, aggressive, sexual, hoarding, magical thoughts/superstitions, religious, and miscellaneous) and eight compulsion categories (washing/cleaning, checking, repeating, counting, hoarding, excessive games/superstitious behaviours, rituals involving other people, and miscellaneous). The checklist is administered in a semi-structured interview format. According to factor analyses of symptom structures (Bloch et al., 2008), in the present study, obsessions and compulsions were organized into four symptom dimensions (symmetry, forbidden thoughts, cleaning, and hoarding) based on their lifetime presence. Specifically, symptoms endorsed as present (currently or lifetime) on the CY-BOCS-SC were given a score of 1 (= indicating presence) and symptoms endorsed as absent were given a score of 0 (= indicating absence).

Initial psychometric support for the CY-BOCS-SC was provided by Gallant et al. (2008), with internal consistency estimates ranging from poor (hoarding dimension = .50) to good (contamination/cleaning dimension = .81) across a five-symptom dimension structure (i.e., symmetry/ordering, hoarding, contamination/cleaning, aggressive/checking, and sexual/religious). In their study, the CY-BOCS-SC also demonstrated good discriminant validity and good to excellent convergent validity, as evidenced by weak associations between the CY-BOCS-SC dimensions and diverging measures (e.g., depressive and anxiety symptoms) and moderate to high correlations with conceptually similar items on the ADIS-IV-P, respectively (Gallant et al., 2008).

5.2.6. The Child OCD Impact Scale-Revised

The Child OCD Impact Scale-Revised (COIS-R)-Parent Report (Piacentini et al., 2007) was used to measure the impact of OCD symptoms on youths' psychosocial functioning. The COIS-R Parent Report covers functioning in four domains: (a) daily living skills, (b) school, (c) family/activities, and (d) social situations. Parents are asked to evaluate 33 items (depicting different situations) based on the degree of how much they find their child's OCD impacts the situation (e.g., "In the past month, how much trouble has your child had doing the following things because of OCD?"). Sample situations include "eating meals at home," "writing in class," "having relatives visit," and "going to a friend's house during the day." Items are scored on a 0 (*not at all*) to 3 (*very much*) Likert scale, leading to a total score ranging from 0 to 99, where higher scores suggest more impairment in different settings. The COIS-R demonstrated very good internal

consistency (Cronbach $\alpha = .83$ to $.91$) and excellent 2-week test-retest reliability scores (ICC = $.80$ to $.88$) (Piacentini et al., 2007). Adequate convergent validity was also reported (Piacentini et al., 2007).

5.2.7. The Child Depression Inventory

The Child Depression Inventory (CDI; Kovacs, 2004) was used to assess depressive symptomatology in youth. The CDI is a 27-item self-rating scale that allows youth (7 to 17 years) to report cognitive, affective, and behavioural signs of depression based upon how the youth has been feeling over the past 2 weeks. Three statements are offered for each item, indicating increasing levels of depressive symptoms, with scores ranging from 0 (*absence of symptom*) to 2 (*definite symptom*). The total score ranges from 0 to 54, with higher scores suggesting a higher depressive state. A total score of 19 or greater has been established as a cut-off score for clinical levels of depressive symptoms in youth (Kovacs, 2004). According to Kovacs (2004), the CDI has well-established validity and good internal consistency reliability (Cronbach $\alpha = .71$ to $.89$). Youth completed the paper-pencil version of the CDI at the initial clinic assessment.

5.2.8. Family Accommodation Scale

The Family Accommodation Scale (FAS; Calvocoressi et al., 1995) was used to assess the degree of family accommodation of the youth's OCD-related behaviours over the previous month. The FAS is designed as a clinician-rated scale. In the BCCH-POP's version of the FAS, parents were asked to rate their involvement in their child's rituals with respect to either frequency or magnitude via 12 items utilizing a 5-Point Likert Scale ranging from 0 (*none or not at all*) to 4 (*every day or extreme*). For example, parents were asked "During the past week, how many times did you directly participate in your child's rituals or in behaviours that you consider odd or senseless?". The FAS total score ranges from 0 to 48, with a higher score denoting greater levels of parental accommodation. Flessner et al. (2009) reported psychometric results that suggested excellent internal consistency for the FAS total score (Cronbach's $\alpha = .90$) and adequate convergent and discriminant validity for the parent-report version of the FAS.

5.2.9. OCD Family Functioning Scale

Part 1 of the OCD Family Functioning Scale (OFF) – Relative Version (Stewart et al., 2011, 2017) was used to assess family impairment due to OCD. The OFF-Part 1–family functioning impairment subscale is designed to assess OCD-related family impairment in routine tasks, socio-occupational/school domain, and family emotional functioning. Parents are asked to rate 21 items on a scale from 0 (*never*) to 3 (*daily/always*). Sample items include “How often does his/her OCD interfere with family [morning routines]?” and “How often does his/her OCD impact the work/school performance of [you]?”. The total score ranges from 0 to 63, with a higher OFF score indicating greater family impairment due to OCD. Stewart et al. (2011) reported good test–retest reliability (ICC = .83) and excellent internal consistency (Cronbach’s $\alpha = .95$) for the OFF-Part 1. The measure also demonstrated adequate convergent and divergent validity, with the family functioning impairment subscale correlating highly with family accommodation (Stewart et al., 2011).

5.2.10. Family Environment Scale

The Cohesion subscale of the Family Environment Scale (FES; Moos & Moos, 1994) was used to assess the degree to which family members provided support and encouragement to each other (family cohesion). Parents were asked to rate nine items on a scale from 1 (*not at all*) to 5 (*very often*). Sample items included “Family members really help and support one another” (reverse coded) and “There is very little group spirit in our family.” The total family cohesion score has a range from 9 to 45, with a higher score indicating less family cohesion. The original FES is a 90-item self-report measure designed to assess the family environment on three dimensions (relationship, personal growth, and system maintenance) via 10 subscales. In terms of the reliability, internal consistency of the Cohesion subscale was evaluated to be adequate (Cronbach’s $\alpha = .67$) in a general youth sample (Boyd et al., 1997) and good in an OCD youth sample (Cronbach’s $\alpha = .72$) (Peris et al., 2012). The measure was only added to a later timepoint and as such only available for a smaller sample.

5.3. Data collection

The BCCH-POP database was established in September 2011 and recruited participants until May 2020. Most self-report measures were collected and managed using REDCap's (Research Electronic Data Capture) tools (Harris et al., 2009) hosted at BCCH's research institute. REDCap is a secure, web-based application designed to support data capture for research studies.

5.4. Description of treatment protocol

The BCCH-POP offered families the opportunity to participate in a group family-based CBT (GF-CBT) treatment program that runs at the clinic three times a year for 10 to 12 weeks via 1.5-hour-long, weekly sessions. The GF-CBT protocol, entitled "OCD is Not the Boss of Me," is a manualized evidence-based treatment program (McKenney et al., 2020; Selles, Belschner et al., 2018) facilitated by staff psychologists and co-facilitated by rotating clinic psychiatrists, social workers, and psychology trainees. To address developmental differences across youth age, the program was delivered to three concurrent groups, divided into children (7–12 years old), adolescents (13–18 years old), and parents of the youth. Each group was provided with separate, developmentally appropriate written materials. The child and the adolescent groups typically consisted of 5 to 6 members each.

Each weekly session included (a) a homework review, (b) an ice-breaker game, (c) didactic materials, (d) ERP exercises, (e) homework planning and troubleshooting barriers, and (f) a 5- to 10-min break mid-session. Except for the first session, each session began with a review of the interim period and homework completion, and an icebreaker game. The sessions were primarily focused on completion of in-session ERPs, with practice time in session ranging from 30 min to 45 min. For the final portion of the session (approximately 15 min), parents and their child were reunited and, with the support of a facilitator, developed exposure tasks for home practice to complete over the next week. This time was also used to problem solve around any treatment-interfering behaviours.

Didactic materials of the treatment program are comparable to other OCD treatment programs and included psychoeducation, symptom monitoring/identification,

symptom externalization, hierarchy building, ERP tasks (e.g., in vivo exposures, imaginal exposures), cognitive restructuring, positive self-talk, anxiety-management strategies, and relapse prevention. Parent materials covered the information/skills learned by their OCD-affected children each week (e.g., psychoeducation, ERP), and focused on parent-specific domains, such as decreasing family accommodation of OCD, building reward systems, and parental self-care. The group format provided an opportunity for peer modeling and support.

Evidence for the effectiveness of the GF-CBT protocol “OCD is Not the Boss of Me” was provided by an open-trial, uncontrolled study (Selles, Belschner, et al., 2018). Over a 5-year period (2011 to 2016), 104 OCD-affected youth aged 8 to 18 years completed the group treatment, and 85 participants with a baseline CY-BOCS score of 16 out of 40 were included in data analysis (subclinical and mild cases were excluded) (Selles, Belschner, et al., 2018). At the end of treatment, significant reductions in clinician- and parent-rated OCD severity ($d = 1.47$ and 1.32 , respectively), youth and parent-rated functional impairment ($d = 0.87$ and 0.67 , respectively), coercive/disruptive behaviors ($d = 0.75$), and family accommodation ($d = 1.02$), as well as improvements in youth-, mother-, and father-rated family functioning ($d = 1.05$, 0.50 , and 0.88 , respectively) were observed (Selles, Belschner, et al., 2018). Improvements were sustained over a 1-month follow-up period, with parent-rated functional impairment even further improving past treatment closure (Selles, Belschner, et al., 2018). Selles, Belschner, et al. (2018) identified homework completion as a core treatment component, with greater homework completion being a significant predictor of symptom reduction. Homework consisted primarily of between-session ERP completion.

5.5. Data analytic plan

Descriptive and inferential analyses for Research Aims 1, 2, and 4 were conducted using IBM SPSS Statistics (Version 25). All other analyses were conducted in R (Version 4.2.0). Boxplots were examined to check for any outliers so data entry errors could be identified before analyses.

5.5.1. Missing data

Given that the study used data collected over a period of approximately 9 years (2011 to 2020) as well as longitudinal data with repeated observations, it was expected that there would be a degree of missing data due to potential questionnaire changes (e.g., updated versions) and attrition (for the longitudinal data for Research Aim 3). Specifically, the administration of items of the TESI-PRR differed across the years. Five TESI-PRR items (severe illness/injury of someone close, animal attack, witnessing threats of family violence, exposure to war or armed conflict, and any other stressful event) were added in 2015, and as such, these items have fewer total responses ($n = 80$ to 82) than the other items ($n = 193$ to 197). All variables in the data set were used independent of missing data. Missing data varied from one variable to the next. Multilevel models were used to answer questions related to the longitudinal data with repeated measures. Multilevel models have the benefit of not requiring complete data sets; when data are missing for one timepoint, parameters can be estimated successfully with the available data instead of needing to impute or delete whole cases (Finch et al., 2019).

5.5.2. Sensitivity analyses

As mentioned in the section on the description of participants, the unscreened subsample was used to examine Research Aim 1. The sample used in Research Aims 2 and 3 consisted of the unscreened and the pre-screened subsamples obtained from the OCD registry, with differing data collection approaches regarding the administration of the TESI-PRR. To address this difference and increase the validity of the statistical approach, sensitivity analyses were conducted. A screener variable was coded that distinguished the families who were pre-screened from the families who received the TESI-PRR without a pre-screen requirement.

For Research Aim 2, a two-way interaction between the count or category of PTEs and the screener variable was tested alongside the baseline variable of interest. This was done to assess whether the association between count or category of PTEs and baseline outcome differed in the subsample that was pre-screened in comparison to the unscreened subsample.

For Research Aim 3, for each treatment outcome, several three-way interactions between timepoint, PTE exposure (count or category), and the screener variable were tested. This was done to assess whether the association between count or category of PTEs and the treatment outcome variable differed based on whether the youth was pre-screened or not.

If the two-way or three-way interaction was *not* statistically significant, this would provide evidence that the two subsamples did *not* differ regarding the associations of interest. As such, the total sample would be utilized for the analysis, with inclusion of the screener variable as a covariate. Adding the screener variable as a covariate would allow for statistical adjustment, accounting for the differences in the pre-screened and unscreened subsamples that arose from different selection methods.

However, if the interaction term was statistically significant, the unscreened and pre-screened subsamples would be analyzed separately. By employing these methods, the study ensured that potential discrepancies arising from the differing sampling procedures were appropriately addressed.

5.5.3. Sample characteristics

Independent-samples *t*-tests were conducted to determine if there were differences in the youths' age, age of OCD onset, OCD severity, and depression severity between the unscreened and pre-screened subsamples. There were no outliers in the data, as assessed by inspection of boxplots. Age, age of onset, OCD severity, and depression severity for each group were normally distributed, as assessed by visual inspection of Normal Q-Q Plots. There was homogeneity of variances in the four variables, as assessed by Levene's test for equality of variances ($p > .466$).

5.5.4. Research Aim 1

To describe the nature of PTE exposure in pediatric OCD, descriptive analyses were performed. In particular, means and percentages of PTE exposure by count and type (as reported by parents) were calculated for the sample ($n = 113$) at the time of the initial clinical assessment at the BCCH-POP (Aims 1.1.1 and 1.2.1). Of the cohort of youth who were reported to have been exposed to at least one type of PTE and who had

available data for the age of OCD onset ($n = 77$), means and percentages for those who reported PTE exposure at any time before OCD onset ($n = 57$) and for those who specifically reported PTE exposure within a 12-month period before OCD onset ($n = 27$) were reported (Aims 1.3.1 and 1.3.2).

5.5.5. Research Aim 2

To determine the nature of the relationship between lifetime PTE exposure and OCD expression, several multiple regression models were performed to examine associations between PTE exposure by count as the independent variable and OCD severity (primary outcome variable) or OCD-related functional impairment (secondary outcome variable) as the dependent variable in each model (Aims 2.1.1, 2.1.2). Given that previous meta-analytic findings showed that females appeared more likely to experience obsessive-compulsive symptoms in response to trauma than males (e.g., Miller & Brock, 2017) and family cohesion was identified as a resilience factor when experiencing trauma (e.g., Masten & Barnes, 2018), the regression model with lifetime PTE count as the independent variable and OCD severity as the dependent variable was re-run with youth gender and family cohesion as moderators (Aim 2.1.1.1). Moderation analyses were conducted with the PROCESS macro V4.3 extension for SPSS by Andrew F. Hayes. Next, depressive symptoms were added to the original regression model (Aim 2.1.1.2) because depressive symptoms have been associated with greater OCD severity in youth (Peris et al., 2010). In a subsequent step, several multiple regression models were performed to examine associations between PTE exposure by category (non-interpersonal trauma, physical abuse, sexual abuse, and emotional abuse) and OCD severity or functional impairment (Aims 2.2.1 and 2.2.2).

To address Research Aims 2.1.3 and 2.2.3, separate binary logistic regression models were performed to examine the effects of lifetime PTE count or category on the likelihood that youth presented with a specific symptom dimension (symmetry, forbidden thoughts, cleaning, or hoarding). The dependent variable was one of the four symptom dimensions (presence/absence of symptom dimension; binary variable) and the independent variable(s) was either PTE exposure by count or category (non-interpersonal trauma, physical abuse, sexual abuse, emotional abuse), leading to eight logistic regression models in total (two per symptom dimension). Odds ratios for the presence of the symptom dimension were calculated by the logistic regression output.

Reciprocal odds ratios for the absence of the symptom dimension were calculated by hand by dividing the odds ratio by 1. Similarly, probabilities were calculated by dividing the odds ratio by the odds ratio plus one ($\text{Probability} = \text{OR}/(1+\text{OR})$).

Lastly, to examine associations between lifetime PTE exposure (count) and several variables (Aim 2.3), a Poisson regression was conducted with PTE count as the dependent variable and (a) family history of OCD (present vs. absent), (b) course of OCD onset (sudden vs. gradual), (c) youth gender, (d) comorbidity (number of co-occurring disorders), and (e) parental educational attainment as the independent variables. Parental educational attainment served as an indicator of socioeconomic status as it is commonly done in research studies (for a review see Diemer et al., 2013).

Regression model assumptions were tested and met, unless otherwise specified. Specifically, independence of residuals was assessed by the Durbin-Watson statistic (Durbin & Watson, 1951) and homoscedasticity was assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. For every regression model, data were assessed for multicollinearity by inspecting the correlation matrix and collinearity statistics. To test whether residuals were approximately normally distributed, the histogram with superimposed normal curve and a P-P Plot were examined. Linearity was assessed by inspection of a plot of studentized residuals against the predicted values. The Poisson regression was evaluated for under- or overdispersion, and it was determined that the dispersion of the Poisson regression fit better than the dispersion of the negative binomial regression.

5.5.6. Research Aim 3

To explore whether OCD-affected youth differed in their response to gold-standard psychosocial treatment for OCD based on lifetime PTE exposure, either by count or category/type, data were analyzed using mixed-effects linear models (MLMs) using the “nlme” package in R (Pinheiro et al., 2017). To address Research Aims 3.1 and 3.2 separately, different models were created for each treatment outcome (i.e., clinician-reported OCD severity, OCD-related functional impairment, family accommodation, family functioning) from baseline to each individual treatment assessment timepoint (treatment midpoint [week 6], post-treatment [week 12], and follow-up [1 month after treatment ended]). Family accommodation and family

functioning were not assessed at treatment midpoint but were assessed at the other three timepoints.

Inclusion of a random participant-level intercept accounted for the fact that timepoints were nested within participants. Fixed effects included assessment timepoint, lifetime PTE exposure by count or category/type, and the interaction between timepoint and lifetime PTE exposure by count or category/type. For Research Aim 3.2, the four PTE categories (non-interpersonal trauma, physical abuse, sexual abuse, emotional abuse) and the top three most frequently reported PTE types within the sample were included.

Model estimates and standard errors were determined using restricted maximum likelihood estimation. The “emmeans” package in R was used to calculate effect sizes based on pre- and post-treatment differences. All effect sizes in this study are reported as Cohen’s *d*, which is defined as the observed difference divided by the population *SD* (Cohen, 1988).

In addition to the multilevel model approach, a categorical approach to answering Research Aim 3.1 was employed, which was congruent with previous research (e.g., Fricke et al., 2007; Shavitt et al., 2010). As such, independent samples *t*-tests were used to examine the relationships between trauma count and (a) treatment response and (b) treatment remission. Treatment response and remission were defined using recommended CY-BOCS cut-off scores (Mataix-Cols et al., 2016; Skarphedinsson et al., 2017). Specifically, treatment response was defined as a 35% reduction from initial CY-BOCS to post-treatment, and symptom remission was defined as 55% reduction from initial CY-BOCS to follow-up timepoint or CY-BOCS total score < 11 (Mataix-Cols et al., 2016; Skarphedinsson et al., 2017). Newer recommendations are mainly aligned with this approach, suggesting a 35% reduction in the CY-BOCS score for treatment response and a CY-BOCS total score of ≤ 12 for treatment remission (Farhat et al., 2022)

5.5.7. Research Aim 4

For Research Aim 4, frequencies and percentages were calculated to represent caregiver endorsement of a list of events (negative or positive) that the caregiver associated with their child's OCD onset *or* worsening.

5.5.8. Multiple comparisons

The current study used an alpha level of .05. In terms of correction for multiple testing, several approaches were carefully weighed based on balancing Type I and Type II errors. The correction for multiple testing is a philosophical question and there is not one correct way (Streiner, 2015). After careful consideration, the Holm's step-down method, also called the Holm-Bonferroni correction (Holm, 1979; Streiner, 2015), was employed as specified below. This correction controls the probability of committing any Type I error (i.e., false positives) in families of comparisons under simultaneous consideration. While similar to the Bonferroni adjustment, Holm's method is less conservative than the Bonferroni method and is applied in stages (Aickin & Gensler, 1996; Menyhart et al., 2021). Holm's adjusted p -values were calculated per family of tests and presented as p^* (Aickin & Gensler, 1996; Gaetano, 2018; Holm, 1979). For the current study, a "family of tests" was defined as multiple tests that fall under a single research aim. The exact approach of the current study of when and how it was corrected for multiple testing is explained by research aim below (Research Aims 1 and 4 only involve descriptive statistics and as such do not need any correction).

Additionally, based on the suggestions of several authors in the field (Fife & Rodgers, 2022; Streiner, 2015; Szucs & Ioannidis, 2017), the current study reported, whenever possible, the direction and magnitude of effects and associations, as well as graphics, instead of focusing only on statistical significance (i.e., all-or-nothing p -value reporting). Similarly, whenever possible, confidence intervals were reported (Szucs & Ioannidis, 2017).

Sample characteristics. When testing for potential differences between different PTE exposure groups (no, low, or high), Holm's step-down method of correction was employed (Holm, 1979). The same method was chosen when testing for potential differences between the unscreened and pre-screened subsamples.

Sensitivity analyses. When testing for significance of the interaction terms for the sensitivity analyses, no correction for multiple comparisons was employed. This approach was chosen to err on the side of detecting a difference as opposed to not because a potential difference could indicate that the sample should be split.

Research Aim 2. All research questions with lifetime PTE exposure by *count* were defined as a family of tests, and all research questions with lifetime PTE exposure by *category* were defined as another family of tests within Research Aim 2, and as such Holm's adjusted *p*-values were calculated for each family of tests. There are no existing studies on the relationship between trauma categories and OCD symptom dimension (Research Question 2.2.3), even in the adult literature. As such, the analysis of Research Question 2.2.3 falls more on the exploratory side of the exploratory/confirmatory data analysis continuum (Fife & Rodgers, 2022), and in addition to statistical significance testing, the size and direction of odd ratios and confidence intervals are reported for associations that have an unadjusted *p*-value smaller than or close to .05.

Research Aim 3. All research questions with lifetime PTE exposure by *count* were defined as a family of tests. Research Question 3.2 was added post-hoc and as such it was interpreted in a hypothesis-generating fashion instead of a hypothesis-confirming one, and no correction for multiple testing was employed.

Chapter 6. Results

6.1. Sample characteristics

A detailed summary of descriptive data for the unscreened subsample included in all research aims is found in Table 6. The entire sample for Research Aim 1 consisted of $n = 113$ unscreened youth with OCD (ages 6 to 19) with a mean age of 13.4 years ($SD = 3.1$) at the time of assessment and an average age of OCD onset of 8.8 years ($SD = 3.3$). Their caregivers identified 44.5% of the youth as female, 55.5% as male and none as non-binary. At the time of assessment, 81.6% of youth had already received some form of treatment (pharmacological and/or psychological)⁶, and the youth presented with an average OCD severity of 21.6 ($SD = 6.7$), which is in the moderate range of symptom severity (Lewin et al., 2014). Generally consistent with local population demographics, the sample consisted of the following youth ethnicities: White (71.4%), Multi-ethnic (12.2%), East Asian (7.1%), South and Southeast Asian (5.1%), Indigenous (3.1%), and other ethnicity category (1.0%). In terms of parental educational attainment, 80.4% of caregivers endorsed a bachelor's degree or higher as highest education of caregivers.

⁶ Typically, to be eligible to be seen at the OCD specialty clinic, the youth with OCD needs to have tried prior treatments in their community.

Table 6. Descriptive characteristics of the unscreened sample of youth with OCD ($n = 113$) and the pre-screened sample ($n = 84$)

		Unscreened sample ($n = 113$)		Pre-screened sample ($n = 84$)		Comparison	
Youth characteristics		<i>n</i>	<i>M (SD)</i>	<i>n</i>	<i>M (SD)</i>	<i>p</i>	<i>p*</i>
Youth age (years)		109	13.43 (3.08)	84	14.53 (2.91)	.013	.156
Youth age at OCD onset (years)		111	8.77 (3.34)	83	9.76 (3.47)	.047	.376
OCD symptom severity; CY-BOCS Total (Baseline)		81	21.64 (6.70)	65	24.11 (6.87)	.027	.243
Depressive symptoms severity		75	12.73 (10.26)	40	15.55 (10.09)	.161	.650
Youth characteristics		<i>n (%)</i>		<i>n (%)</i>		<i>p</i>	<i>p*</i>
Youth gender	Female	49 (44.5)		46 (54.8)		.135	.540
	Male	61 (55.5)		37 (44.0)			
	Non-binary	0 (0)		1 (1.2)			
	Missing data (<i>n</i>)	3		0			
Youth ethnicity	White	70 (71.4)		57 (70.4)		.147	.540
	Multi-Ethnic	12 (12.2)		8 (9.9)			
	East Asian	7 (7.1)		5 (6.2)			
	South and Southeast Asian	5 (5.1)		5 (6.2)			
	Indigenous	3 (3.1)		2 (2.5)			
	Other ethnicity	1 (1.0)		4 (4.9)			
	Missing data (<i>n</i>)	15		3			
	Lifetime psychiatric comorbidity	At least one comorbidity	44 (39.8)		55 (65.5)			<.001	.018
Any anxiety disorder		31 (27.4)		37 (44.0)			
Any mood disorder		8 (7.1)		13 (15.5)			
ADHD		9 (8.0)		14 (16.7)			
PTSD		0 (0)		3 (3.6)			
Any tic disorder		10 (8.8)		17 (20.2)			
Previous treatment	Pharmacological or psychological	84 (79.2)		50 (61.0)		.004	.056
	Psychological treatment	71 (82.6)		31 (62.0)			
	Pharmacological treatment	54 (60.7)		34 (68.0)			
	Missing data (<i>n</i>)	10		4			
Exposure to PTE	no exposure to PTE	20 (17.7)		1 (1.2)		<.001	.018
	low exposure to PTE	66 (58.4)		33 (39.3)			
	high exposure to PTE	27 (23.9)		50 (59.5)			
Family characteristics		<i>n (%)</i>		<i>n (%)</i>		<i>p</i>	<i>p*</i>
Family history of OCD	Present	32 (80.0)		38 (46.3)		<.001	.018
	Missing data (<i>n</i>)	73		2			
Marital status	Married	80 (79.2)		52 (65.0)		.067	.376
	Separated/divorced	18 (17.8)		21 (26.3)			
	Other	3 (3.0)		7 (8.8)			
	Missing data (<i>n</i>)	12		4			
Household educational attainment	High school degree or less	5 (4.9)		6 (7.8)		.450	.540
	Trade school/college	15 (14.7)		16 (20.8)			
	Undergraduate degree	49 (48.0)		29 (37.7)			
	Graduate degree	33 (32.4)		26 (33.8)			
	Missing data (<i>n</i>)	11		7			

Note. PTE = potentially traumatic event; OCD = obsessive-compulsive disorder; CY-BOCS = Children Yale-Brown Obsessive-Compulsive Scale; ADHD = attention-deficit/hyperactivity disorder; PTSD = post-traumatic stress disorder, p^* = Holm's adjusted p -value.

Descriptive data for the pre-screened subsample ($n = 84$) that was included in Research Aims 2 and 3 are presented in Table 6. Based on Mann-Whitney U-Test analysis, the youth in the unscreened subsample were exposed to significantly fewer PTEs ($Mdn = 2.0$, $IQR = 2$; range = 0–10) than the youth in the pre-screened subsample ($Mdn = 4.0$, $IQR = 3$; range = 0–13), $p < .001$, Holm's adjusted $p^* = .018$.

Based on the results of independent t -tests, the unscreened subsample did not statistically differ from the pre-screened subsample regarding youth age, age of OCD onset, OCD symptom severity, and depressive symptoms, all $ps > .013$ (all $p^*s > .156$).

Using chi-square tests of independence and Fisher's exact tests, differences in categorical variables between the unscreened and pre-screened subsamples were assessed. In comparison to the unscreened subsample, a significantly smaller percentage in the pre-screened subsample reported a family history of OCD in comparison to the unscreened subsample (46% vs. 80%, $p < .001$, $p^* = .018$). Additionally, a significant higher percentage of youth in the pre-screened subsample presented with at least one co-occurring disorder (66% vs. 40%, $p < .001$, $p^* = .018$).

Table 7. Descriptive characteristics of OCD-affected youth (N = 113) with no (n = 20), low (n = 66), and high (n = 27) exposure to PTEs

		No PTE exposure (n = 20)	Low PTE exposure (n = 66)	High PTE exposure (n = 27)	Comparison	
Youth characteristics		M (SD)	M (SD)	M (SD)	p	p*
Youth age (years)		12.81 (3.58)	13.53 (2.88)	13.63 (3.20)	.633	1.00
Youth age at OCD onset (years)		8.53 (3.45)	9.37 (3.00)	8.91 (2.93)	.539	1.00
OCD symptom severity; CY-BOCS Total (Baseline)		22.93 (5.64)	21.38 (6.64)	21.35 (7.61)	.717	1.00
Depressive symptoms severity		12.08 (7.96)	11.36 (10.47)	16.32 (10.68)	.209	1.00
Youth characteristics		n (%)	n (%)	n (%)	p	p*
Youth gender	Female	8 (40.0)	29 (46.0)	12 (44.4)	.894	1.00
	Male	12 (60.0)	34 (54.0)	15 (55.6)		
	Other	0 (0.0)	0 (0.0)	0 (0.0)		
	Missing data (n)	0	3	0		
Ethnicity of youth	White	13 (76.5)	39 (70.9)	18 (69.2)	.869	1.00
	Multi-Ethnic	1 (5.9)	7 (12.7)	4 (15.4)		
	East Asian	1 (5.9)	4 (7.3)	2 (7.7)		
	South and Southeast Asian	1 (5.9)	3 (5.5)	1 (3.8)		
	Other ethnicity ^b	1 (5.9)	2 (3.6)	1 (3.8)		
	Missing data (n)	3	11	1		
Lifetime psychiatric comorbidity	At least one comorbidity	8 (40.0)	22 (33.3)	15 (55.6)	.139	1.00
	Any anxiety disorder	6 (30.0)	16 (24.2)	9 (33.3)	.645	1.00
	Any mood disorder	0 (0)	2 (3.0)	6 (22.2)	.002	.030
	ADHD	2 (10.0)	3 (4.5)	4 (14.8)	.235	1.00
	PTSD	0 (0)	0 (0.0)	0 (0.0)	–	
	Any tic disorder	1 (5.0)	5 (7.6)	4 (14.8)	.429	1.00
Previous treatment	Pharmacological or psychological	15 (83.3)	51 (85.0)	18 (72.0)	.363	1.00
	Missing data (n)	2	6	2		
Family characteristic		n (%)	n (%)	n (%)	p	p*
Family history of OCD (presence)		7 (87.5)	17 (77.3)	8 (80.0)	.826	1.00
	Missing data (n)	12	44	17		
Marital status	Married	11 (64.7)	49 (84.5)	20 (76.9)	.199	1.00
	Separated/divorced	4 (23.5)	8 (13.8)	6 (23.1)		
	Other	2 (11.8)	1 (1.7)	0 (0.0)		
	Missing data (n)	3	8	1		
Household educational attainment	High school degree or less	0 (0.0)	2 (3.4)	3 (12.0)	.372	1.00
	Trade school/college	2 (11.1)	9 (15.3)	4 (16.0)		
	Undergraduate degree	9 (50.0)	30 (50.8)	10 (40.0)		
	Graduate degree	7 (38.9)	18 (30.5)	8 (32.0)		
	Missing data (n)	2	7	2		

Note. PTE = potentially traumatic event; OCD = obsessive-compulsive disorder; CY-BOCS = Children Yale-Brown Obsessive-Compulsive Scale; ADHD = attention-deficit/hyperactivity disorder; PTSD = post-traumatic stress disorder; p* = Holm's adjusted p-value.

While the entire sample was used for the descriptive analyses for Research Aim 1 ($n = 113$), for visualization of the data, the sample was separated by lifetime PTE exposure into three groups: no PTE exposure = 0 PTEs, low PTE exposure = 1–3 PTEs, and high PTE exposure = 4+ PTEs (see description for categorization in the Method section). Table 7 provides a detailed summary of descriptive data for the study sample divided by PTE exposure.

Using the step-down approach of the Holm method (Holm, 1979), potential differences between the three groups were assessed using one-way analyses of variance (ANOVA) and chi-square tests of independence. One-way ANOVAs indicated that the three groups did not statistically differ regarding the youth's age, age of OCD onset, OCD symptom severity, and depressive symptoms, all $ps > .209$ (all $p^*s = 1.00$). Chi-square tests of independence indicated that the three PTE exposure groups did not statistically differ regarding proportions of youth gender, youth ethnicity, presence of at least one comorbidity, previous treatment status (i.e., having received prior pharmacological or psychological treatment), parental marital status, and household educational attainment, all $ps > .139$ (all $p^*s = 1.00$).

While the three groups did not significantly differ in the proportion of youth with at least one comorbidity, potential differences in five comorbidities (i.e., any anxiety disorder, any mood disorder, ADHD, PTSD, and any tic disorder) were examined. Analyses showed that the three PTE exposure groups significantly differed in the proportion of lifetime mood disorders, $\chi^2(2, n = 113) = 12.58, p = .002$ ($p^* = .030$); with the high PTE exposure group having a higher proportion of mood disorders (22%) in comparison to the low (3%) and no PTE exposure (0%) groups. The youth in the three PTE exposure groups did not statistically differ regarding the presence of any other comorbidity category, all $ps > .235$ (all $p^*s > .235$).

6.2. Research Aim 1: Description of the nature of PTE exposure in pediatric OCD

1.1 PTE exposure frequency

1.1.1 What is the lifetime rate of PTE exposure among youth with OCD, and to how many different types of PTEs, on average, are youth with OCD exposed based on parent report?

Of the 113 caregivers who completed the TESI-PRR without prior screening, 82.2% ($n = 93$) reported that their child was exposed to at least one type of PTE in their lifetime. According to caregiver report, youth with OCD were exposed to a median of two types of PTEs ($Mdn = 2.0$, $IQR = 2$; range = 0–10) at the time of the initial assessment. Based on caregiver report on the TESI-PRR, more than half of youth with OCD were exposed to multiple types (two or more) of PTEs (54.9%, $n = 62$). See Figure 4 for a histogram that details the frequency distribution of PTE exposure (by count).

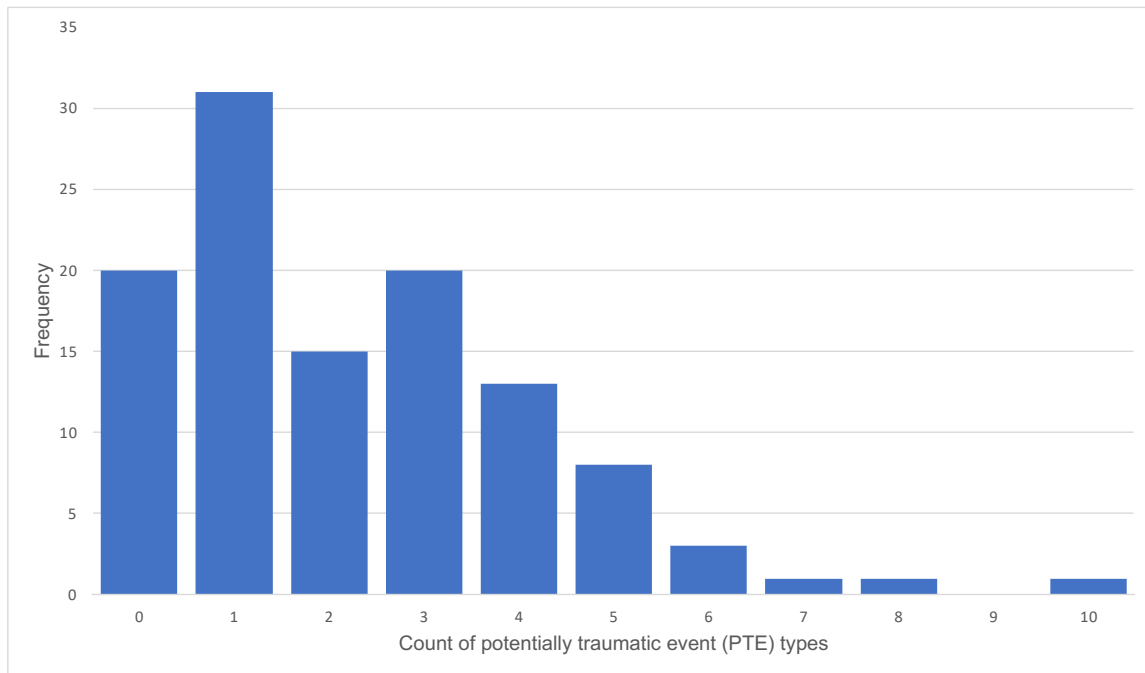


Figure 4. Histogram: Count of PTE types ($n = 113$)

When dividing the sample into three groups (no, low, and high PTE exposure), 17.7% ($n = 20$) had no PTE history (no PTE exposure group), 58.4% ($n = 66$) experienced 1 to 3 different types of PTEs (low PTE exposure group), and 23.9% ($n = 27$) experienced 4+ different types of PTEs (high PTE exposure group).

The TESI-PRR contains an item that could arguably be checked off by almost any family. The item reads as follows: “Has your child heard or seen acts of war and terrorism on TV or radio?”. When the TESI-PRR item “heard/seen acts of war/terrorism on media” was omitted from the total count, the prevalence rate of lifetime exposure to PTEs decreased to 70.8% ($n = 80$) and the median number of PTEs that a youth with OCD was exposed to in their lifetime reduced to one type of PTE ($Mdn = 1.0$, $IQR = 3$; range = 0–9).

1.2 PTE exposure type

1.2.1 What types of PTEs do youth with OCD experience in their lifetime based on parent report?

As shown in Table 8, in addition to heard/seen acts of war/terrorism on media (52.7%; $n = 59$ of 112), the five most prevalent lifetime PTEs included the death of someone close (46.4%; $n = 51$ of 110), prolonged separation from caregiver (26.8%; $n = 30$ of 112), emotional abuse (17.0%; $n = 19$ of 112), witnessing physical assault within the family (13.8%; $n = 15$ of 109), and the child experiencing a serious medical procedure or illness (13.4%; $n = 15$ of 112).

Table 8. Prevalence rates of youth exposure to PTEs (a) lifetime, (b) before OCD onset, and (c) within 12 months prior to OCD onset for Research Aim 1 (*n* = 113)

Potentially traumatic event	Lifetime			Before OCD onset			12 months prior to OCD onset	
	<i>N</i>	<i>n</i>	%	<i>N</i>	<i>n</i>	%	<i>n</i>	%
Exposure to at least one PTE	113	93	82.2	77 ^a	57	74.0	27	35.1
PTE category								
Any loss or attachment PTE	113	66	58.4		39	50.6	19	24.7
Any interpersonal PTEs	113	45	39.8		23	29.9	9	11.7
Any non-interpersonal PTE	113	23	20.4		10	13.0	2	2.6
PTE type								
Heard/seen acts of war/terrorism on media	112	59	52.7		21	27.3	5	6.5
Death of someone close	110	51	46.4		27	35.1	12	15.6
Prolonged separation from caregiver	112	30	26.8		17	22.1	9	11.7
Emotional abuse	112	19	17.0		8	10.4	2	2.6
Witnessed physical assault within family	109	15	13.8		7	9.1	2	2.6
Serious medical procedure or life-threatening illness	112	15	13.4		8	10.4	1	1.3
Witnessed physical assault outside family	109	14	12.8		4	5.2	0	0.0
Physical assault/abuse	111	11	9.9		9	11.7	5	6.5
Suicide attempt/self-harm of someone close	112	9	8.0		3	3.9	1	1.3
Sexual abuse	112	7	6.3		5	6.5	2	2.6
Experienced or witnessed mugging	113	7	6.2		2	2.6	0	0.0
Been in a serious accident	113	4	3.5		2	2.6	1	1.3
Family member jailed/arrested	111	3	2.7		3	3.9	0	0.0
Threat of serious physical harm	111	3	2.7		2	2.6	0	0.0
Physical neglect	113	3	2.7		1	1.3	0	0.0
Natural disaster	113	3	2.7		0	0.0	0	0.0
Witnessed serious accident	112	2	1.8		0	0.0	0	0.0
Kidnapped (child/someone close)	111	1	0.9		0	0.0	0	0.0
Witnessed sexual abuse	112	0	0.0		0	0.0	0	0.0

Note. ^a = 77 of the 93 youth who were exposed to at least one PTE had data for OCD onset available. OCD = obsessive-compulsive disorder; PTE = potentially traumatic event. As described in the Method section, five items from the Traumatic Events Screening Inventory - Parent Report Revised (TESI-PRR; Ghosh-Ippen et al., 2002) were added at a later timepoint to the questionnaire and are not included in the list above (severe illness/injury of someone close, animal attack, witnessing threats of family violence, exposure to war or armed conflict, any other stressful event).

1.3 Temporal precedence

1.3.1 What percentage of PTE types preceded the onset of OCD, and what percentage was specifically reported within a 12-month period prior to OCD onset?

Of the cohort of youth who were reported to be exposed to at least one type of PTE and who had available data for the age of OCD onset ($n = 77$), 74.0% (57 of 77) reported that at least one type of PTE preceded their child's OCD onset. When examining the 12-month period before OCD onset, 35.1% (27 of 77) of parents reported that the exposure to at least one type of PTE occurred within that period.

1.3.2 What types of PTEs preceded the onset of OCD, and which ones occurred within 0-12 months prior to OCD onset?

The *death of someone close* was the most frequently endorsed type of PTE to precede OCD onset, both for an unspecified amount of time before OCD onset (35.1%, $n = 27$ of 77) and within a 12-month period before OCD onset (15.6%, $n = 12$ of 77). The next most frequently endorsed type of PTE was heard/seen acts of war/terrorism on media (27.3%, $n = 21$ of 77) for preceding OCD onset at any timepoint, and the exposure to prolonged separation from a caregiver (11.7%, $n = 9$ of 77) for 0-12 months pre-OCD (see Tables 8 and 9 for more details).

Table 9. The top 5 most often endorsed PTE types (a) lifetime, (b) before OCD onset, and (c) within 12 months prior to OCD onset

Lifetime ($n = 93, 82.2\%$)	Before OCD onset ($n = 57, 74.0\%$)	Within 12 months prior to OCD onset ($n = 27, 35.1\%$)
1. Heard/seen acts of war/terrorism on media (52.7%)	1. Death of someone close (35.1%)	1. Death of someone close (15.6%)
2. Death of someone close (46.6%)	2. Heard/seen acts of war/terrorism on media (27.3%)	2. Prolonged separation from a caregiver (11.7%)
3. Prolonged separation from a caregiver (26.8%)	3. Prolonged separation from a caregiver (22.1%)	3. Heard/seen acts of war/terrorism on media (6.5%)
4. Emotional abuse (17.0%)	4. Physical abuse (11.7%)	4. Physical abuse (6.5%)
5. Witnessed physical assault within family (13.8%)	5. Emotional abuse/Serious medical procedure or life-threatening illness (10.4%)	5. Emotional abuse/Sexual abuse/Witnessed physical assault within family (2.6%)

Note. OCD = obsessive-compulsive disorder; TESI-PRR = The Traumatic Events Screening Inventory - Parent Report Revised (Ghosh-Ippen et al., 2002).

6.3. Research Aim 2: Description of the relationship between cumulative lifetime PTE exposure and pediatric OCD expression

2.1 Relationship between cumulative lifetime PTE exposure and pediatric OCD expression

2.1.1 What is the relationship between cumulative lifetime PTE exposure and OCD severity, including obsession severity and compulsion severity?

Sensitivity analyses indicated that the two-way interaction term was not significant, $F(3, 149) = 2.24, p = .086$. As such, a multiple linear regression model with the total sample (unscreened and pre-screened subsamples) and the screener variable as covariate was conducted to examine the relationship between cumulative lifetime PTE exposure and clinician-reported youth OCD symptom severity.

Multiple regression analyses indicated that the association between cumulative lifetime PTE exposure and OCD severity was not statistically significant⁷, $b = -0.22$, 95%CI [-0.67, 0.24], $p = .352$ ($p^* = 1.00$). When examining obsessions and compulsions separately, the associations between cumulative lifetime PTE exposure and obsession severity or compulsion severity were not significant, $b = -0.08$, 95%CI [-0.32, 0.15], $p = .479$ ($p^* = 1.00$) and $b = -0.11$, 95%CI [-0.35, 0.14], $p = .391$ ($p^* = 1.00$), respectively.

2.1.1.1 Is the relationship between cumulative lifetime PTE exposure and OCD severity moderated by youth gender or family cohesion?

The above model with OCD severity as the dependent variable and cumulative lifetime PTE exposure as the independent variable was re-run with youth gender and family cohesion as moderators. Neither youth gender nor family cohesion were significant moderators of the relationship between cumulative lifetime PTE exposure and OCD severity, $F(2, 153) = 0.09, p = .764$ ($p^* = 1.00$) and $F(3, 53) = 0.13, p = .717$ ($p^* = 1.00$), respectively. When examining obsession severity and compulsion severity separately, results remained the same and indicated that youth gender was not a

⁷ From this point on, “significantly” or “significant” refers to “statistical significance.”

significant moderator for the relationship between cumulative lifetime PTE exposure and obsession severity or compulsion severity, $F(3, 149) = 0.07, p = .975 (p^* = 1.00)$ and $F(3, 152) = 0.65, p = .586 (p^* = 1.00)$, respectively. Similarly, family cohesion was not a significant moderator for the relationship between cumulative lifetime PTE exposure and obsession severity or compulsion severity, $F(3, 52) = 0.41, p = .747 (p^* = 1.00)$ and $F(3, 53) = 0.44, p = .731 (p^* = 1.00)$, respectively.

2.1.1.2 What is the relationship between cumulative lifetime PTE exposure and OCD severity when controlling for youths' depressive symptoms?

Sensitivity analyses indicated that the two-way interaction term was not significant, $b = 0.60, 95\%CI [-0.47, 1.66], p = .268$. As such, the presence of depressive symptoms was added to the multiple regression model of the total sample with the screener variable as covariate. The association between the presence of depressive symptoms and OCD severity was significant, $b = 0.20, 95\%CI [0.08, 0.31], p = .001 (p^* = .020)$. In other words, for every unit change in the depressive symptom score measured by the CDI, the CY-BOCS Total Score increased by 0.20 units. The association between cumulative lifetime PTE exposure and OCD severity was not significant, $b = -0.10, 95\%CI [-0.64, 0.43], p = .699, (p^* = 1.00)$.

When examining obsession severity and compulsion severity separately, sensitivity analyses indicated that the two-way interaction terms for obsession severity and compulsion severity were not significant, $b = 0.20, 95\%CI [-0.32, 0.71], p = .455$, and $b = 0.31, 95\%CI [-0.30, 0.93], p = .317$, respectively. As such the total sample with the screener variable as covariate was used for the analyses. The results remained the same for the association between obsession severity and compulsions severity with lifetime PTE exposure, all $ps > .630$ (all $p^*s = 1.00$) but differed for depressive symptoms. Specifically, the association between depressive symptoms and obsession severity was significant, $b = 0.11, 95\%CI [0.06, 0.17], p < .001 (p^* = .020)$. In other words, for every unit change in the depressive symptom score measured by the CDI, the CY-BOCS Obsession severity score increased by 0.11 units. The association with compulsion severity did not reach statistical significance when using Holm's adjusted p -values, $b = 0.07, 95\%CI [0.00, 0.14], p = .047 (p^* = .799)$.

2.1.2 What is the relationship between cumulative lifetime PTE exposure and the youth's OCD-related functional impairment in this sample?

Sensitivity analyses indicated that the two-way interaction term was not significant, $b = 0.68$, 95%*CI* [-1.95, 3.30], $p = .612$, and as such the total sample with the screener variable as covariate was used. With the total sample, based on Holm's adjusted p -values, multiple regression analyses indicated that the association between cumulative lifetime PTE exposure and OCD-related functional impairment was not significant, $b = 1.71$, 95%*CI* [0.46, 2.99], $p = .008$ ($p^* = .144$).

2.1.3 What is the relationship between cumulative lifetime PTE exposure and any of the obsessive–compulsive symptom dimensions?

Four binary logistic regressions were performed to ascertain the effects of cumulative lifetime PTE exposure on the likelihood that youth presented with a specific OCD symptom dimension. Each of the four OCD symptom dimensions (symmetry, forbidden thoughts, cleaning, and hoarding) were entered as binary dependent variable (lifetime presence/absence of symptom dimension) and lifetime PTE exposure (count) served as the independent variable.

Sensitivity analyses indicated that the two-way interaction terms were not significant, all $ps > .316$, and as such the total sample with the screener variable as covariate was used. Binary logistic regression analyses indicated that the associations between any of the four OCD symptom dimensions and lifetime PTE exposure (count) were not significant, all $ps > .217$ (all $p^*s = 1.00$). See Table 10 for detailed results.

Table 10. Logistic regression predicting likelihood of obsessive–compulsive symptom dimension based on cumulative lifetime PTE exposure

OCD symptom dimension	Included (n)	Absence n (%)	Presence n (%)	χ^2	<i>p</i>	<i>p</i> *	OR	95% CI for OR
Symmetry	155	14 (9.0%)	141 (91.0%)	1.52	.217	1.00	0.92	[0.72, 1.08]
Forbidden thoughts	149	40 (26.8%)	109 (73.2%)	0.06	.801	1.00	1.02	[0.87, 1.20]
Cleaning	155	24 (15.5%)	131 (84.5%)	0.08	.773	1.00	0.98	[0.82, 1.16]
Hoarding	152	101 (66.4%)	51 (33.6%)	0.86	.354	1.00	0.94	[0.81, 1.08]

Note. OCD = obsessive-compulsive disorder; CI = Confidence interval; OR = Odds ratio; *p** = Holm's adjusted *p*-value

2.2 Relationship between the *category* of lifetime PTE exposure (non-interpersonal trauma, physical abuse, sexual abuse, emotional abuse) and OCD expression

2.2.1 What is the relationship between any of the PTE *categories* and OCD severity?

A multiple regression was conducted to test for the relationship between the four PTE categories (non-interpersonal trauma, physical abuse, sexual abuse, emotional abuse) and clinician-reported youth OCD symptom severity. Sensitivity analyses indicated that the two-way interaction terms were not significant, all *ps* > .119, and as such the total sample was used and the screener variable was entered as a covariate.

The multiple regression model indicated that none of the associations between the evaluated PTE categories and OCD symptom severity were significant, $F(5, 141) = 1.37, p = .240 (p^* = 1.00)$. Regression coefficients and confidence intervals can be found in Table 11 (below).

Table 11. Multiple regression results for OCD severity and PTE categories

CY-BOCS Total	<i>b</i>	95% CI for <i>b</i>	β	<i>p</i>	<i>p</i> *	<i>R</i> ²	Adj. <i>R</i> ²
Model						0.05	0.01
Constant	18.97			<.001			
Non-interpersonal trauma	-1.65	[-4.13, 0.83]	-0.12	.190	1.00		
Physical abuse	-2.03	[-5.11, 1.06]	-0.11	.196	1.00		
Sexual abuse	-0.59	[-4.13, 2.96]	-0.03	.745	1.00		
Emotional abuse	1.11	[-2.00, 4.22]	0.06	.480	1.00		

Note. OCD = obsessive-compulsive disorder; PTE = potentially traumatic event; Model = Enter Method in SPSS statistics; *b* = unstandardized regression coefficient; *CI* = Confidence interval; β = standardized coefficient, *R*² = coefficient of determination; adj. *R*² = adjusted *R*²; *p** = Holm's adjusted *p*-value

Similarly, no significant associations were observed between any of the PTE categories and obsession severity, $F(5, 137) = 0.83, p = .529 (p^* = 1.00)$ or compulsion severity, $F(5, 140) = 1.82, p = .114 (p^* = 1.00)$.

2.2.2 What is the relationship between any of the PTE categories and functional impairment?

A multiple regression was conducted to test for the relationship between the four PTE categories (non-interpersonal trauma, physical abuse, sexual abuse, emotional abuse) and OCD-related functional impairment. Sensitivity analyses indicated that the interaction terms for sexual abuse and non-interpersonal trauma were significant, $p = .008$, and $p = .018$, respectively. As such, separate multiple regression models were conducted for the unscreened and the pre-screened subsamples.

Based on adjusted Holm's *p*-values, none of the associations between OCD-related functional impairment and PTE categories were significant for the pre-screened and the unscreened subsamples, $F(4, 73) = 1.91, p = .118 (p^* = 1.00)$, adjusted *R*² = .05, and $F(4, 94) = 3.44, p = .011 (p^* = .319)$, adjusted *R*² = .09, respectively. Table 12 presents the regression coefficients and confidence intervals of the multiple regression model for the unscreened subsample because for this sample, the model and several regression coefficients were significant before the multiple testing adjustment.

Table 12. Unscreened sample: Multiple regression results for OCD-related functional impairment (COIS-R) and PTE categories

COIS-R	<i>b</i>	95% CI for <i>b</i>	β	<i>p</i>	<i>p</i> *	<i>R</i> ²	Adj. <i>R</i> ²
Model						0.13	0.09
Constant	37.53	[32.52, 42.53]	–	.000			
Non-interpersonal trauma	-11.76	[-22.28, -1.24]	-0.22	.029	.783		
Physical abuse	15.82	[1.42, 30.22]	0.22	.032	.832		
Sexual abuse	17.25	[0.59, 33.91]	0.21	.043	1.00		
Emotional abuse	-2.93	[-14.28, 8.42]	-0.05	.609	1.00		

Note. OCD = obsessive-compulsive disorder; COIS-R = Child Obsessive-Compulsive Impact Scale-Revised; PTE = potentially traumatic event; Model = Enter Method in SPSS statistics; *b* = unstandardized regression coefficient; *CI* = Confidence interval; β = standardized coefficient, *R*² = coefficient of determination; adj. *R*² = adjusted *R*²; *p** = Holm's adjusted *p*-value.

2.2.3 What is the relationship between any of the PTE categories and any of the obsessive–compulsive symptom dimensions?

Sensitivity analyses indicated that none of the two-way interaction terms were significant, $p > .239$. Four separate binary logistic regression models were conducted to investigate the association between a particular OCD symptom dimension (symmetry, forbidden thoughts, cleaning, and hoarding) and a specific PTE exposure category. Results are presented in detail in Table 13. When using Holm’s adjusted p -values, none of the ORs were statistically significant (all p^* s $> .180$).

Table 13. Binary logistic regression models examining association between OCD symptom dimensions and PTE exposure categories

OCD symptom dimension	Trauma type	<i>n</i>	OR	95%CI for OR	χ^2	<i>p</i>	p^*
Symmetry	Non-interpersonal trauma	149	1.21	[0.31, 4.74]	0.07	.785	1.00
	Physical abuse	149	0.21	[0.06, 0.74]	5.91	.015	.420
	Sexual abuse	149	1.00	[0.19, 5.38]	0.00	.996	1.00
	Emotional abuse	149	0.36	[0.10, 1.34]	2.32	.127	1.00
Forbidden thoughts	Non-interpersonal trauma	143	1.83	[0.70, 4.77]	1.54	.215	1.00
	Physical abuse	143	2.50	[0.66, 9.40]	1.83	.176	1.00
	Sexual abuse	143	8.98	[0.99, 81.14]	3.82	.051	1.00
	Emotional abuse	143	0.20	[0.07, 0.63]	7.66	.006	.180
Cleaning	Non-interpersonal trauma	149	1.04	[0.37, 2.91]	0.01	.937	1.00
	Physical abuse	149	0.63	[0.20, 2.00]	0.62	.431	1.00
	Sexual abuse	149	0.53	[0.15, 1.91]	0.65	.331	1.00
	Emotional abuse	149	1.63	[0.42, 6.35]	0.69	.482	1.00
Hoarding	Non-interpersonal trauma	146	1.15	[0.52, 2.52]	0.12	.734	1.00
	Physical abuse	146	0.42	[0.14, 1.30]	2.26	.132	1.00
	Sexual abuse	146	1.63	[0.53, 5.01]	0.73	.393	1.00
	Emotional abuse	146	0.38	[0.12, 1.16]	2.91	.088	1.00

Note. OCD = obsessive-compulsive disorder; PTE = potentially traumatic event; CI = Confidence interval; OR = Odds ratio; p^* = Holm’s adjusted p -value.

In contrast to the other analyses, these analyses are exploratory. As such, in addition to statistical significance testing, the following values are reported for associations that have an unadjusted p -value smaller than or close to .05: size and direction of ORs and their CIs, as well as probabilities.

Sexual abuse and forbidden thoughts. The odds for youth who were experienced sexual abuse to present with forbidden thoughts symptoms increased by a factor of 9.0, 95%CI [0.99, 81.14], $p = .051$. For youth who did not experience sexual abuse, the odds of presenting with forbidden thoughts symptoms decreased by 89% ($OR = 0.11$). In probability terms, a youth who experienced sexual abuse had a ~90% chance of presenting with forbidden thoughts symptoms, whereas a youth who did not experience sexual abuse had a ~10% chance of presenting with forbidden thoughts symptoms.

Physical abuse and symmetry. The odds of presenting with symptoms from the symmetry dimension reduced by 79% for youth who experienced physical abuse, $OR = 0.21$, 95%CI [0.06, 0.74], $p = .015$. For youth who did not experience physical abuse, the odds of presenting with symmetry symptoms increased by 4.8 times. In probability terms, a youth who experienced physical abuse had a ~17% chance of presenting with symmetry symptoms, whereas a youth who did not experience physical abuse had an ~83% chance of presenting with symmetry symptoms.

Emotional abuse and forbidden thoughts. Finally, the odds of presenting with forbidden thoughts symptoms reduced by 80% for youth who experienced emotional abuse, $OR = 0.20$, 95%CI [0.07, 0.63], $p = .006$. For youth who did not experience emotional abuse, the odds of presenting with forbidden thoughts symptoms increased by 4.9. In probability terms, a youth who experienced emotional abuse had a ~17% chance of presenting with forbidden thoughts symptoms, whereas a youth who did not experience emotional abuse had an ~83% chance of presenting with forbidden thoughts symptoms.

2.3 Based on lifetime PTE exposure, how did OCD-affected youth compare on the following variables: (a) family history of OCD, (b) course of OCD onset, (c) youth gender, (d) comorbidity, and (e) socioeconomic status?

A Poisson regression was conducted to explore the associations between lifetime PTE exposure (i.e., count of different types of PTEs) and various youth characteristics such as family history of OCD (present vs. absent), course of OCD onset (sudden vs. gradual), youth gender (female vs. male), number of comorbidities, and parental educational attainment (as indicator for socioeconomic status). Data for family

history of OCD and course of OCD onset were only available for the screened subsample, so the analysis for this research question was conducted with the screened subsample only.

Based on Holm's adjusted p -values, the overall model was not significant, likelihood ratio $\chi^2(7) = 15.08, p = .035 (p^* = 1.00)$. Similarly, based on Holm's adjusted p -values, all regression coefficients were non-significant, all p^* s $> .062$.

6.4. Research Aim 3: Effectiveness of gold-standard psychosocial pediatric OCD treatment for youth with OCD affected by PTEs

Research Aim 3 included 98 youth diagnosed with OCD between the ages of 8 and 19 years, with an average age of 14.8 years ($SD = 2.7$). Caregivers identified 54.1% of the youth as female, 44.9% as male, and 1.0% as non-binary. At the time of assessment, 82.2% of youth had already received some form of treatment (pharmacological and/or psychological), and the youth presented with an average OCD severity of 23.8 ($SD = 5.9$), which is in the moderate range of symptom severity (Lewin et al., 2014). Table 14 presents a detailed overview of clinical characteristics of the sample.

As shown in Table 15, the three most prevalent lifetime PTEs that youth in the sample for Research Aim 3 experienced included: (a) heard/seen acts of war/terrorism on media (64.9%; $n = 63$ of 97), (b) death of someone close (54.7%; $n = 52$ of 95), and (c) prolonged separation from caregiver (32.0%; $n = 31$ of 97). Prevalence rates for other PTEs can be found in Table 15. Other stressful events described by families included parental separation/divorce, moving, parental or sibling mental illness, bullying, death of a pet, parental ongoing conflict (verbal and emotional abuse), and parental abandonment.

Table 14. Descriptive characteristics of treatment sample (n = 98)

Youth characteristics		M (SD)
Youth age (years)		14.81 (2.72)
Youth age at OCD onset (years)		9.56 (3.44)
OCD symptom severity; CY-BOCS Total (Baseline)		23.82 (5.85)
Depressive symptoms severity		14.24 (9.51)
Youth characteristics		n (%)
Youth gender	Female	53 (54.1)
	Male	44 (44.9)
	Non-binary	1 (1.0)
	Missing data (n)	0
Youth ethnicity	White	65 (74.7)
	East Asian	7 (8.0)
	Multi-Ethnic	4 (4.6)
	South and Southeast Asian	4 (4.6)
	Indigenous	3 (3.4)
	Other ethnicity	4 (4.6)
	Missing data (n)	11
Lifetime psychiatric comorbidity	At least one comorbidity	64 (65.3)
	Any anxiety disorder	44 (44.9)
	Any mood disorder	14 (14.3)
	ADHD	13 (13.3)
	PTSD	2 (2.0)
	Any tic disorder	16 (16.3)
Previous treatment	Pharmacological or psychological	74 (82.2)
	Psychological	57 (77.0)
	Pharmacological	51 (67.1)
	Missing data (n)	8
Exposure to PTE	no PTE exposure	10 (10.2)
	low PTE exposure	47 (48.0)
	high PTE exposure	41 (41.8)
Family characteristics		n (%)
Family history of OCD	Present	34 (54.8)
	Missing data (n)	36
Marital status	Married	60 (67.4)
	Separated/divorced	24 (17.0)
	Other	5 (5.6)
	Missing data (n)	9
Household educational attainment	High school degree or less	7 (8.0)
	Trade school/college	18 (20.5)
	Undergraduate degree	33 (37.5)
	Graduate degree	30 (34.1)
	Missing data (n)	10

Note. OCD = obsessive-compulsive disorder; CY-BOCS = Children Yale-Brown Obsessive-Compulsive Scale; PTE = potentially traumatic event.

Table 15. Prevalence rates for youth exposure to PTEs for the treatment sample ($n = 98$)

	<i>N</i>	<i>n</i>	%
Lifetime exposure to at least one PTE	98	87	89.8
PTE category	<i>N</i>	<i>n</i>	%
Any loss or attachment PTE	98	66	67.3
Any interpersonal PTE	98	49	50.0
Any interpersonal violence	98	36	36.7
Any non-interpersonal PTE	98	32	32.7
PTE type	<i>N</i>	<i>n</i>	%
Heard/seen acts of war/terrorism on media	97	63	64.9
Death of someone close	95	52	54.7
Severe illness/injury of someone close ^a	43	20	46.5
Other stressful event ^a	43	18	41.9
Prolonged separation from caregiver	97	31	32.0
Serious medical procedure or life-threatening illness	97	24	24.7
Emotional abuse	97	22	22.7
Witnessed physical assault within family	95	18	18.9
Witnessed physical assault outside family	97	9	16.5
Suicide attempt/self-harm of someone close	96	13	13.5
Sexual abuse	97	11	11.3
Physical assault/abuse	96	10	10.4
Been in a serious accident	98	10	10.2
Witnessed serious physical threats within family ^a	43	4	9.3
Been attacked by animal ^a	43	3	7.0
Family member jailed/arrested	98	6	6.1
Experienced or witnessed mugging	98	5	5.1
Witnessed serious accident	97	2	2.1
Kidnapped (child/someone close)	95	2	2.1
Witnessed sexual abuse	97	2	2.1
Physical neglect	98	2	2.0
Natural disaster	98	1	1.0
Been exposed to war, armed conflict, or terrorism ^a	43	0	0.0

Note. OCD = obsessive-compulsive disorder; PTE = potentially traumatic event; ^a = As described in the Method section, five items from the Traumatic Events Screening Inventory - Parent Report Revised (TESI-PRR; Ghosh-Ippen et al., 2002) were added at a later timepoint to the questionnaire. These 5 TESI-PRR items included severe illness/injury of someone close, animal attack, witnessing threats of family violence, exposure to war or armed conflict, any other stressful event. As such, these items have fewer total responses ($n = 43$) than the other items ($n = 95$ to 98).

3.1 How do youth with OCD differ in their response to gold-standard psychosocial treatment based on cumulative lifetime PTE exposure, considering variables such as (a) OCD severity, (b) OCD-related functional impairment, (c) family accommodation, and (d) family functioning?

First, a simple mixed-effects linear model was conducted to determine whether GF-CBT was effective in reducing treatment outcomes for this sample of OCD-affected youth ($n = 98$). Main effects indicated that OCD-affected youth who received evidence-based GF-CBT with ERP demonstrated significant reductions in clinician- and parent-rated OCD severity (Cohen's $d = 1.99$, 95% CI [1.63, 2.35] and 1.85, 95% CI [1.48, 2.23], respectively), parent-rated OCD-related functional impairment (Cohen's $d = 1.38$, 95% CI [1.03, 1.72]), and family accommodation (Cohen's $d = 1.49$, 95% CI [1.13, 1.85]), as well as improvements in parent-rated family functioning (Cohen's $d = 1.11$, 95% CI [0.74, 1.48]) from baseline to end of treatment. All pre- to post-treatment effect sizes were large (Cohen, 1988).

Results were maintained over the 1-month follow-up period, with large effect sizes for clinician- and parent-rated OCD severity (Cohen's $d = 1.91$ 95% CI [1.55, 2.27] and 1.88 95% CI [1.48, 2.28], respectively), parent-rated OCD-related functional impairment (Cohen's $d = 1.57$, 95% CI [1.19, 1.95]), and family accommodation (Cohen's $d = 1.43$, 95% CI [1.04, 1.82]), as well as improvements in parent-rated family functioning (Cohen's $d = 0.91$, 95% CI [0.49, 1.33] from baseline to end of treatment.

Second, before conducting the interaction models for lifetime PTE exposure and timepoint for each treatment outcome, several three-way interaction terms between timepoint, lifetime PTE count, and the screener variable were examined. All three-way interaction terms were non-significant, all $ps < .088$. See Table B.1 in Appendix B for an overview of the results for all three-way interaction terms. Given the results of these sensitivity analyses, the total sample of $n = 98$ with the screener variable as a covariate was used for all subsequent analyses.

Analyzing the mixed-effects linear models for interaction effects indicated that lifetime exposure to PTE did not moderate the changes from baseline to post-treatment for all treatment outcomes. Similarly, lifetime PTE exposure did not moderate treatment outcome changes from baseline to 1-month follow-up. Table 16 presents the results for Research Aim 3.1 in detail.

Table 16. Changes in treatment outcomes based on cumulative lifetime PTE exposure across treatment

		<i>n</i>	# of obs	Baseline	Midpoint	Post-treatment	1-month follow-up	Baseline vs. Midpoint				Baseline vs. Post-treatment				Baseline vs. 1-month follow-up			
				<i>M</i> (<i>SE</i>)	<i>M</i> (<i>SE</i>)	<i>M</i> (<i>SE</i>)	<i>M</i> (<i>SE</i>)	Change between baseline and midpoint	Interaction between PTE count and change	<i>SE</i>	<i>p</i>	Change between baseline and post-treatment	Interaction between PTE count and change	<i>SE</i>	<i>p</i>	Change between baseline and follow-up	Interaction between PTE count and change	<i>SE</i>	<i>p</i>
CY-BOCS	Clinician-reported OCD severity	79	285	23.9 (0.76)	19.2 (0.78)	15.3 (0.78)	15.6 (0.79)	-6.81	0.48	0.34	.155*	-8.41	-0.09	0.31	.761*	-8.36	-0.42	0.34	.218*
CY-BOCS-PR	Parent-reported OCD severity	81	250	23.6 (0.76)	19.7 (0.81)	15.8 (0.83)	15.7 (0.87)	-5.18	0.01	0.32	.966*	-5.71	0.47	0.33	.162*	-5.76	0.03	0.38	.927*
COIS-R	Functional impairment	91	278	39.0 (2.02)	31.8 (2.10)	25.6 (2.13)	23.8 (2.25)	-4.20	-1.06	0.71	.137*	-10.53	-0.40	0.75	.595*	-7.38	-0.36	0.85	.675*
FAS	Family Accommodation	89	206	19.6 (1.17)		10.4 (1.25)	10.8 (1.33)					-5.65	-0.52	0.48	.279*	-5.85	-0.41	0.55	.459*
OFF-Part 1	Family Functioning	87	185	30.8 (1.46)		22.3 (1.60)	23.8 (1.76)					-2.67	-0.60	0.63	.348*	-7.50	0.07	0.73	.923*

Note. PTE = potentially traumatic event; OCD = obsessive-compulsive disorder; # of obs = number of data points collected per participant summed across the sample; SE = standard error; CY-BOCS = Children Yale-Brown Obsessive-Compulsive Scale; CY-BOCS-PR = Children Yale-Brown Obsessive-Compulsive Scale-Parent-rated; COIS-R = Child Obsessive-Compulsive Impact Scale-Revised; FAS = Family Accommodation Scale; OFF-Part 1= OCD Family Functioning Scale-Relative Version.

* All Holm's adjusted *p** values = 1.00.

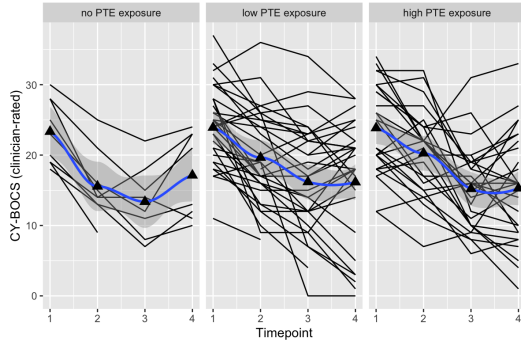


Figure 5. OCD severity trajectory based on lifetime PTE exposure

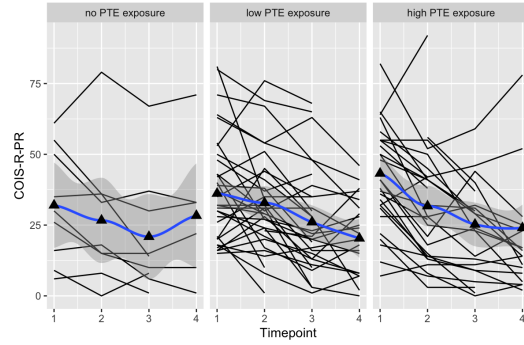


Figure 8. Functional impairment trajectory based on lifetime PTE exposure

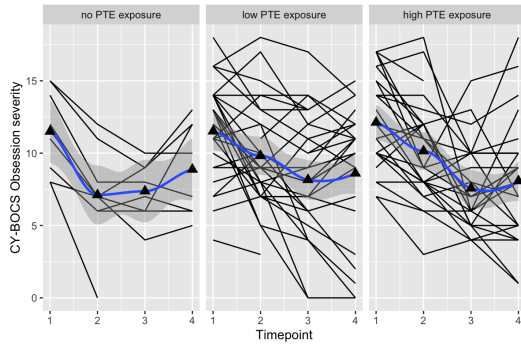


Figure 6. Obsession severity trajectory based on lifetime PTE exposure

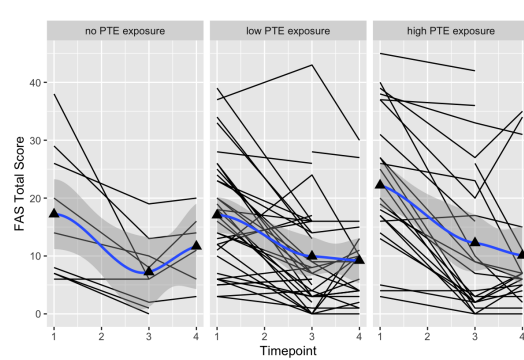


Figure 9. Family accommodation trajectory based on lifetime PTE exposure

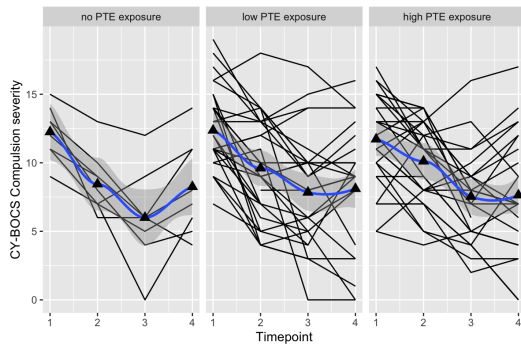


Figure 7. Compulsion severity trajectory based on lifetime PTE exposure

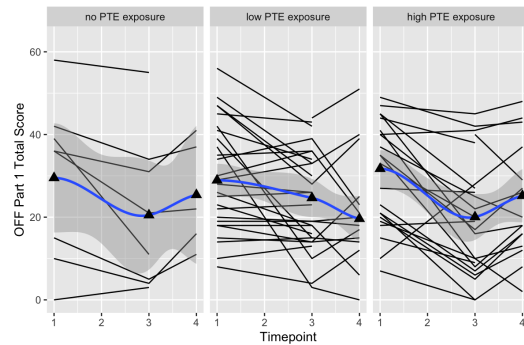


Figure 10. Family functioning trajectory based on lifetime PTE exposure

When using a categorical approach to address Research Aim 3.1, the results remained the same. Independent samples *t*-tests showed that lifetime PTE exposure was not significantly associated with (a) treatment response status, at post-treatment, $t(70) = -4.03, p = .688$, and 1-month follow-up, $t(67) = -0.53, p = .600$, and (b) treatment remission status, either indicated by 55% CY-BOCS reduction at post-treatment, $t(70) = 1.00, p = .320$, and 1-month follow-up, $t(67) = -1.09, p = .281$, or a CY-BOCS total score of 11 or less at post-treatment, $t(71) = -0.18, p = .861$, and 1-month follow-up, $t(69) = -0.38, p = .704$ (all p^* s = 1.00).

For visualization purposes, lifetime exposure to PTE was categorized into three groups: no PTE exposure (0 PTEs), low PTE exposure (1-3 PTEs), and high PTE exposure (4+ PTEs) (see Method section for description of grouping). Figures 5–10 illustrate how treatment outcomes changed over time based on PTE exposure, with individual trajectories shown via black lines and the average, smoothed trajectory shown via a thicker blue line.

3.2 How do youth with OCD differ in their response to gold-standard psychosocial treatment based on lifetime exposure to a specific PTE type/category, considering variables such as: (a) OCD severity, (b) OCD-related functional impairment, (c) family accommodation, and (d) family functioning?

Before conducting the interaction models for PTE exposure category/type and timepoint for each treatment outcome, several three-way interaction terms between timepoint, PTE category/type, and the screener variable were examined. All three-way interaction terms were non-significant, all $ps < .068$. See Table B.2 in the Appendix B for an overview of the results for the three-way interaction terms. Given the results of these sensitivity analyses, the total sample of $n = 98$ with the screener variable as a covariate was used for all subsequent analyses. As indicated in the Method section, given that these analyses were post-hoc, a significance level of .05 was used.

Tables 17 to 20 present detailed results of the mixed-effects linear models analysing changes in treatment outcome variables based on exposure to a specific PTE category/type across treatment timepoints. The following is a brief summary of the main findings.

Physical abuse. Interaction effects indicated that exposure to physical abuse blunted reductions in the COIS-R score (see Table 18). Specifically, from baseline to treatment midpoint, physical abuse moderated the change in the COIS-R score by 12.2-points, $p = .020$. Thus, the COIS-R score *increased* by 6.5 points for youth with OCD who had been exposed to physical abuse, whereas the COIS-R score *decreased* by 5.7 points in youth with OCD who had not been exposed to physical abuse.

Emotional abuse. Exposure to emotional abuse blunted reductions in both the COIS-R and OFF-Part 1 scores from baseline to 1-month follow-up (see Tables 18 and 20). Specifically, emotional abuse moderated the change in the COIS-R by 10.0 points, $p = .021$, and the OFF-Part 1 change by 7.8 points, $p = .040$. Thus, in youth with OCD exposed to emotional abuse compared to youth with OCD who were not exposed to emotional abuse, the COIS-R score *increased* by 0.9 points instead of *decreasing* by 9.1 points, and the OFF-Part 1 score decreased by 0.9 points instead of 8.7 points. Of note, the data suggest that the effect of emotional abuse on treatment effects for the COIS-R increases over time; from 3.7 points (baseline to midpoint) to 4.9 (baseline to end-of-treatment) and 10.0 points (baseline to follow-up) (see Table 18). Similar increases were observed for the OFF-Part 1 scores, from 3.8 (baseline to end-of-treatment) to 7.8 points (baseline to follow-up) (see Table 20). Thus, the interacting effect of emotional abuse on treatment outcome changes increases in magnitude over time and reaches statistical significance during the maintenance phase (i.e., baseline to follow-up).

Death of someone close. In contrast to these blunted COIS-R reductions by the exposure to physical abuse and emotional abuse, a history of exposure to the death of someone close *increased* reductions in the COIS-R score from baseline to midpoint and from baseline to end of treatment (see Table 18). Specifically, a history of exposure to the death of someone close moderated the change in the COIS-R score by -9.1 points from baseline to treatment midpoint, $p = .006$. Additionally, exposure to the death of someone close moderated the change in the COIS-R score by -6.9 points from baseline to post-treatment, $p = .040$. Thus, for youth who experienced the death of someone close compared to youth who were not exposed to this PTE type, the COIS-R score decreased by 10.2 points instead of 1.1 points from baseline to midpoint and 15.7 points instead of 8.8 points from baseline to end-of-treatment.

Table 17. Changes in OCD severity (CY-BOCS) based on PTE category/type across treatment

	<i>n</i>	# of obs	Baseline vs. Midpoint				Baseline vs. Post-treatment				Baseline vs. 1-month follow-up			
			Change between baseline and midpoint	Interaction between CY-BOCS change and PTE category/type	SE	<i>p</i>	Change between baseline and post-treatment	Interaction between CY-BOCS change and PTE category/type	SE	<i>p</i>	Change between baseline and follow-up	Interaction between CY-BOCS change and PTE category/type	SE	<i>p</i>
Non-interpersonal trauma	79	285	-7.33	-1.39	1.71	.419	-8.49	-0.25	1.67	.879	-8.51	-1.79	1.70	.294
Physical abuse	78	284	-7.10	-0.10	2.42	.967	-8.47	-0.63	2.32	.786	-8.27	-0.62	2.42	.799
Sexual abuse	79	285	-7.83	2.83	2.30	.310	-8.59	0.68	2.22	.751	-8.26	0.12	2.31	.955
Emotional abuse	78	281	-7.67	1.95	1.72	.258	-8.10	1.16	1.70	.497	-7.69	0.48	1.73	.781
Heard/seen acts of war/terrorism on media	78	281	-7.65	1.21	1.54	.433	-8.74	0.98	1.54	.525	-8.53	0.40	1.57	.801
Death of someone close	76	277	-7.82	2.86	1.48	.055	-8.92	1.11	1.49	.456	-8.12	-2.13	1.49	.154
Prolonged separation from caregiver	78	281	-8.00	2.92	1.57	.064	-8.77	0.68	1.57	.665	-8.19	-0.08	1.57	.962

Note. # of obs = number of data points collected per participant summed across the sample; CY-BOCS = Children Yale-Brown Obsessive-Compulsive Scale; PTE = potentially traumatic event; SE = standard error.

Table 18. Changes in OCD-related functional impairment (COIS-R) based on PTE category/type across treatment

	<i>n</i>	# of obs	Baseline vs. Midpoint				Baseline vs. Post-treatment				Baseline vs. 1-month follow-up			
			Change between baseline and midpoint	Interaction between COIS-R change and PTE category/type	<i>SE</i>	<i>p</i>	Change between baseline and post-treatment	Interaction between COIS-R change and PTE category/type	<i>SE</i>	<i>p</i>	Change between baseline and follow-up	Interaction between COIS-R change and PTE category/type	<i>SE</i>	<i>p</i>
Non-interpersonal trauma	91	278	-4.61	0.16	3.96	.967	-10.07	3.74	3.05	.357	-7.03	2.80	4.26	.512
Physical abuse	89	276	-5.68	12.20	5.18	.020	-11.45	5.59	6.10	.361	-7.36	-3.31	6.14	.590
Sexual abuse	90	277	-3.82	-4.88	5.37	.364	-10.92	-0.23	5.21	.965	-8.36	1.53	5.76	.791
Emotional abuse	90	276	-5.10	1.69	3.68	.646	-12.07	4.86	3.88	.213	-9.07	10.03	4.32	.021
Heard/seen acts of war/terrorism on media	90	274	-3.00	-3.10	3.39	.363	-10.34	-1.40	3.42	.684	-6.87	-2.52	3.93	.522
Death of someone close	88	269	-1.15	-9.14	3.24	.006	-8.77	-6.91	3.33	.040	-4.58	-6.26	3.65	.088
Prolonged separation from caregiver	91	278	-4.33	-1.47	3.44	.670	-11.64	2.44	3.53	.490	-7.97	1.67	3.83	.664

Note. OCD = obsessive-compulsive disorder; # of obs = number of data points collected per participant summed across the sample; SE = standard error; COIS-R = Child Obsessive-Compulsive Impact Scale-Revised; PTE = potentially traumatic event.

Table 19. Changes in family accommodation (FAS) based on PTE category/type across treatment

	<i>n</i>	# of obs	Baseline vs. Post-treatment				Baseline vs. 1-month follow-up			
			Change between baseline and post-treatment	Interaction between FAS change and PTE category/type	<i>SE</i>	<i>p</i>	Change between baseline and follow-up	Interaction between FAS change and PTE category/type	<i>SE</i>	<i>p</i>
Non-interpersonal trauma	89	206	-5.96	0.79	2.52	.755	-6.47	-2.98	2.73	.278
Physical abuse	87	204	-6.42	3.62	4.09	.378	-6.11	1.88	4.12	.649
Sexual abuse	88	205	-5.41	-2.94	3.32	.377	-6.10	-0.54	3.68	.884
Emotional abuse	88	205	-5.39	-1.58	2.47	.525	-5.65	0.67	2.81	.812
Heard/seen acts of war/terrorism on media	88	203	-5.29	-0.76	2.19	.730	-4.90	-1.96	2.53	.440
Death of someone close	86	199	-6.61	-1.97	2.17	.366	-5.65	-3.56	2.40	.141
Prolonged separation from caregiver	89	206	-4.92	-2.76	2.25	.223	-5.56	-0.80	2.46	.744

Note. # of obs = number of data points collected per participant summed across the sample; FAS = Family Accommodation Scale; OCD = obsessive-compulsive disorder; PTE = potentially traumatic event; *SE* = standard error. FAS was not collected at midpoint.

Table 20. Changes in family impairment (OFF-Part 1) based on PTE category/type across treatment

	<i>n</i>	# of obs	Baseline vs. Post-treatment				Baseline vs. 1-month follow-up			
			Change between baseline and post-treatment	Interaction between OFF-PR change and PTE category/type	<i>SE</i>	<i>p</i>	Change between baseline and follow-up	Interaction between OFF-PR change and PTE category/type	<i>SE</i>	<i>p</i>
Non-interpersonal trauma	89	206	-5.96	0.79	2.52	.755	-6.47	-2.98	2.73	.278
Physical abuse	85	183	-4.52	9.94	5.49	.073	-8.08	8.76	5.03	.085
Sexual abuse	86	184	-3.19	-0.73	4.34	.867	-8.70	3.06	4.92	.535
Emotional abuse	86	183	-4.21	3.75	3.16	.238	-8.73	7.75	3.73	.040
Heard/seen acts of war/terrorism on media	86	183	-2.25	-2.24	2.84	.431	-6.85	-3.63	3.48	.300
Death of someone close	84	180	-2.54	-0.54	2.90	.852	-7.41	-0.22	3.22	.945
Prolonged separation from caregiver	85	187	-3.37	0.62	2.91	.832	-8.07	1.10	3.33	.743

Note. # of obs = number of data points collected per participant summed across the sample; OCD = obsessive-compulsive disorder; OFF-Part 1= Part 1 of OCD Family Functioning Scale-Relative Version; PTE = potentially traumatic event; *SE* = standard error. OFF-Part 1 was not collected at midpoint.

6.5. Research Aim 4: Caregiver perception of OCD onset or worsening

4.1 What percentage of parents associated their child's OCD onset or worsening with a stressful life event in the youth's life?

As mentioned earlier, all parents in the registry database ($N = 500$) were given a list of events (negative or positive) and asked whether these events occurred to their child or in their child's immediate family "at the time of OCD onset or worsening" (original wording of the question does not separate association with OCD onset from OCD worsening; see further details in the Discussion section). A sample of 472 parents responded to that question. Based on the parent's perception, 68.0% ($n = 321$ of 472) of families associated the onset or worsening of OCD with a stressor in the child's or their child's immediate family's life. Table 21 lists these events in descending order. The top five events were: other significant event in youth's life not listed (23.3%, $n = 110$), transition to a new school (20.1%, $n = 95$), move to a new location (15.5%, $n = 73$), serious injury or illness of the child (13.8%, $n = 65$) or of a family member/friend (13.1%, $n = 62$), and death of a family member/friend (13.1%, $n = 62$).

Table 21. Positive or negative event in youth's life or immediate family's life at time of OCD onset or worsening (*n* = 472)

	<i>n</i>	%
Association with any positive or negative event in youth's life or youth's immediate family life	321	68.0
Type of event in youth's life	<i>n</i>	%
Any event in youth's life	255	54.0
Other significant event in youth's life	110	23.3
Entered new school	95	20.1
Serious injury or illness (youth)	65	13.8
Bullying	40	8.5
Trauma in youth	34	7.0
Youth got into trouble at school	15	3.2
Youth had continuing or chronic medical condition (e.g., diabetes)	12	2.5
Youth alcohol or substance problem	3	0.6
Youth's pregnancy	0	0.0
Youth's immediate family life	<i>n</i>	%
Any event in youth's immediate family life	218	46.2
Family moved to new location	73	15.5
Serious injury/illness of family member/friend	62	13.1
Death of family member/friend	62	13.1
Parental divorce/separation	42	8.9
Parent began new job	37	7.5
Family financial problems	31	6.6
Other significant event in child's immediate family	28	5.9
Continuing or chronic medical condition (family member/friend)	24	5.1
Parent job difficulties	16	3.4
Relative moved into house	12	2.5
Parent pregnancy	9	1.9
Trauma in child's immediate family	9	1.9
Marriage/marital reconciliation	6	1.3
Income decreased substantially	9	1.9
Income increased substantially	5	1.1
Parent got promotion at job	4	0.8
Family legal problems	3	0.6

Note. OCD = obsessive-compulsive disorder.

Chapter 7. Discussion

The present study investigated the role of trauma in pediatric OCD using data from a large clinical sample of a specialized pediatric OCD clinical and research program. The role of trauma in OCD is a topic that has received less attention in pediatric OCD research than in adult OCD research (Brander et al., 2016; Wislocki et al., 2022). For example, only 12% of studies in a recent systematic review of environmental risk factors for OCD (Brander et al., 2016) included samples of children or adolescents (or both) when investigating the association between traumatic life events and OCD. This is a small proportion given that 75% of OCD cases begin in childhood (Taylor, 2011a). To address this gap in the literature, the present study investigated three primary research questions: (a) what is the nature of PTE exposure in pediatric OCD, including PTE frequency, PTE type, and temporal precedence?; (b) what is the relationship between lifetime PTE exposure and the expression of pediatric OCD (e.g., severity, functional impairment, OCD symptom dimension, comorbidity)?; and (c) do youth with OCD respond differently to gold-standard psychosocial treatment for pediatric OCD based on lifetime exposure to PTE (count or category/type)?

To answer these research questions, a data set of a clinical sample of children and adolescents with OCD (6 to 19 years) was analyzed using a mixture of descriptive and inferential statistical analyses, including multiple regression, binary logistic regression, and Poisson regression, as well as mixed-effects linear models. It is crucial to reiterate that this study was designed to provide insights into the relationships, associations, and patterns observed within the sample of interest. The study was not designed to infer causality among the variables investigated.

Several major findings can be reported. First, the study found that the majority of youth with OCD (~82%) experienced at least one type of PTE in their lifetime, according to parent report, which seems to be consistent with numbers in the general youth population. Furthermore, approximately three-quarters of youth experienced at least one PTE at any timepoint before OCD onset (~74%) and around one third (~35%) experienced at least one PTE within 12 months before OCD onset. The most frequently reported PTE type preceding OCD onset – both at any timepoint before OCD onset and within 12 months before OCD onset – was the death of someone close. Exposure

prevalence rates for specific childhood abuse categories in youth with OCD appear similar to the rates seen in the general youth population.

OCD-affected youth in the high PTE exposure group presented with higher percentages of lifetime mood disorders (~22%) than youth with low PTE exposure levels (~3%) or no PTE exposure (0%). PTE exposure groups did not statistically differ regarding proportions of youth gender, youth ethnicity, parental marital status, previous treatment status, and parental educational attainment.

Second, regarding the relationship between lifetime PTE exposure and OCD, the study found that lifetime PTE exposure was not significantly associated with OCD severity or OCD-related functional impairment. Additionally, odds ratios indicated that sexual and emotional abuse may be related to the forbidden thoughts dimension and physical abuse to the symmetry dimension of OCD; however, more research on OCD symptom dimensions and trauma categories is needed to confirm such relationships.

Third, the study did not find evidence for an association between cumulative lifetime PTE exposure and the effectiveness of gold-standard psychosocial treatment for pediatric OCD. However, when considering specific trauma categories, post-hoc analyses suggest that exposure to physical abuse, emotional abuse, and the death of someone close moderated the rate of improvement during treatment.

This chapter provides an in-depth discussion of these findings and their implications. As previously mentioned, due to the limited research on the intersection of trauma and *pediatric* OCD, comparisons to existing studies in the *adult* literature are made unless stated otherwise. The study's strengths and limitations are critically evaluated, and suggestions for future research and implications of the findings are discussed.

7.1. Sample Characteristics

When comparing the three PTE exposure groups (high, low, and no PTE exposure), the high PTE exposure group presented significantly more often with a lifetime mood disorder (22%) than the low (3%) and no PTE exposure (0%) groups. While the three groups did not statistically differ on any other lifetime comorbidity, a pattern in the data was noted. Specifically, in comparison to youth in the low and no PTE

exposure groups, youth in the high PTE group had higher percentages of comorbid ADHD (15% vs. 5% vs. 10%) and any tic disorder (15% vs. 8% vs. 5%). This is consistent with the adult literature that noted a relationship between ACEs and comorbidity in an OCD adult sample (Visser et al., 2014), with the number of ACEs being significantly related to comorbid lifetime affective, eating, and substance use disorders.

7.2. Research Aim 1: Description of the nature of PTE exposure in pediatric OCD

1.1 PTE exposure frequency

1.1.1 Percentage of youth with history of lifetime exposure to PTEs

In the current sample, ~82% of youth with OCD had a history of lifetime PTE exposure and experienced a median of two types of PTEs. This percentage is at the high end of the range of previously reported trauma exposure prevalence rates in adult OCD studies, which varied from 17.7% to 89.3% (Caspi et al., 2008; Cromer et al., 2007; Fricke et al., 2007; Gershuny et al., 2008; Grisham et al., 2011; Hemmings et al., 2013; Huppert et al., 2005; Przeworski et al., 2014; Shavitt et al., 2010). In the general youth population, trauma exposure ranged from ~62% to 68% in two independent studies (Copeland et al., 2007; McLaughlin et al., 2013). As such, the prevalence rate of PTE exposure of ~82% in the current sample of OCD youth appears higher than the prevalence rate in the general youth population. However, when the prevalence rate of lifetime PTE exposure was recalculated without the TESI-PRR item “heard/seen acts of war/terrorism on media,” the prevalence rates of trauma exposure between the current OCD youth sample (~71%) and the general youth population appear more similar (68%). It should be noted that these comparisons with the general population are speculative, as the current study did not have a direct comparison group of typically developing youth and therefore cannot establish whether the observed prevalence of trauma is specific to the clinical population being studied or if it reflects broader trends in the general population.

The above stated prevalence rates of trauma exposure in previous OCD samples vary partly due to sample characteristics and definitional issues. Previous studies in adults have reported the lowest rates of trauma exposure in first-time treatment-seeking

adults and the highest rates in treatment-resistant adults. In this study's sample, ~82% of youth had already received some form of treatment (pharmacological or psychological) before presenting at the specialized OCD clinic. Therefore, the current sample could be considered a treatment-resistant population, and the rate of trauma exposure aligns with the higher base rate reported in treatment-resistant adult OCD samples.

When comparing trauma exposure rates among studies, it is important to consider the study's definition of trauma, which can range from broad to narrow. In the current study, a broader definition of trauma was used, including non-life-threatening events such as emotional abuse, prolonged separation from caregiver, and the death of someone close. Additionally, the current study only evaluated whether parents endorsed a specific event happening to their child but not whether the event was experienced as traumatic for the child or not. As such, due to the fact that a broader definition of trauma was used and because only the parents' perspective was captured, the current study uses the term *potentially* traumatic effects (PTEs). In contrast, previous pediatric studies (e.g., Lafleur et al., 2011) used a definition of trauma equivalent to meeting Criterion A of DSM-5's PTSD diagnosis, which is narrower and requires exposure to death, threatened death, actual or threatened serious injury, or actual or threatened sexual violence. Thus, the high trauma exposure rate in the current study may be partly due to its broader measurement of trauma exposure using the TESI-PRR.

1.2 PTE exposure type

The findings of the present study indicate that youth with OCD experience a variety of PTE types, including sexual, physical, and emotional abuse. At the time of the assessment, approximately half of the sample had heard or seen acts of war and terrorism on TV or radio (~53%) or experienced the death of someone close (~46%). Approximately a quarter of the OCD-affected youth had been separated from a parent/caregiver that they depend on for security or love for more than a few days (~27%), and approximately one in six youth in the sample had experienced emotional abuse (~17%).

Approximately one in seven youth had witnessed physical assault within the family (~14%), witnessed physical assault outside of the family (~13%), or undergone a serious medical procedure or life-threatening illness (~13%). Approximately 1 in 10 youth had experienced physical assault/abuse (~10%), while approximately 1 in 12 had

someone close attempting suicide or harming themselves (~8%). Another 1 in 15 experienced sexual abuse (~6%) or being mugged or witnessing a mugging (~6%).

Types of traumatic events that were less frequently selected (equal or less than 5%) included been in a serious accident or injury (~4%), had a family member arrested (~3%), experienced a threat of serious physical harm (~3%), physical neglect (~3%), natural disaster (~3%), witnessed serious accident or injury (~2%), and experienced or witnessed kidnapping (child or someone close) (~1%). None of the caregivers indicated that their child was present when someone else was being forced to engage in any sort of sexual activity (referred to in the study as witnessed sexual abuse).

The prevalence rates of sexual, physical, and emotional abuse endorsed by parents of OCD-affected youth in the current study were compared to prevalence rates reported in community-based youth samples. Overall, rates across the three PTE categories are similar when compared to the general population (Moody et al., 2018), with emotional abuse being the most frequently reported PTE category (~17%), followed by physical abuse (~10%) and sexual abuse (~6%).

Specifically, the 17% prevalence rate of emotional abuse in the current sample (defined by the study measure as the child repeatedly being told they were no good; yelled at in a scary way; or someone threatening to abandon, leave, or send them away) seems aligned with the rate of emotional abuse in the general population; the pooled prevalence rate of childhood emotional abuse of 10 non-clinical studies in North America was ~20% (Moody et al., 2018).

Similarly, the 10% prevalence rate of physical abuse in the current study (defined by the study measure as hitting, pushing, choking, biting, or burning; a punishment that caused physical injury or bruises; or an attack with a gun, knife, or another weapon) seems aligned with the rate of physical abuse in the general population; the pooled prevalence rate of childhood physical abuse of 22 non-clinical North American samples was ~12% (Moody et al., 2018).

Finally, the 6% of prevalence rate of sexual abuse in the current OCD youth sample is a bit lower than the pooled prevalence rate of sexual abuse of approximately 9% found in the general youth population of a combined analysis of 18 non-clinical North American samples (Moody et al., 2018).

These findings suggest that exposure rates for specific childhood abuse categories in OCD youth seem comparable to exposure rates seen in the general population.

1.3 Temporal precedence

1.3.1 Percentage of PTEs that preceded OCD onset

Of the youth who were reported to have been exposed to a PTE in their lifetime, approximately three-quarters of parents (~74%) reported that at least one PTE preceded their child's OCD onset at any timepoint before OCD onset, and one-third (~35%) of parents reported that at least one PTE occurred within the 12-month period before OCD onset.

There is only one known recent pediatric study that investigated the temporal relationship between trauma exposure and OCD onset. In Vazquez et al.'s (2022) study, 50% of parents reported that their child was exposed to an ACE before their child's OCD diagnosis, while the other 50% reported the exposure occurred after receiving the diagnosis. The authors of the study concluded that there was no clear association between ACEs and OCD diagnosis. It is of note that Vazquez et al. (2022) examined the temporal relationship of ACE exposure and OCD diagnosis rather than OCD onset. It has been documented that pediatric OCD is often diagnosed much later than the actual onset of the disorder (Stewart et al., 2004). In fact, research shows that it takes, on average, 3 years for children and adolescents to undergo assessment and receive a diagnosis (Stewart et al., 2004). As such, it is not clear whether Vazquez et al.'s study can make a statement regarding the temporal relationship between trauma and OCD onset.

In adults, Murayama and colleagues (2020) surveyed 281 adults with OCD and found that approximately two-thirds (~61%) experienced a stressful life event, including traumatic life events, before OCD onset, and for approximately half of the sample (57%) the event happened 1 month before OCD onset. While these authors examined a different period before OCD onset (1 month versus 12 months), the percentage of stressful life events that occurred before OCD onset is comparable to the current study (74% vs. 61%, respectively).

1.3.2 Types of PTEs that preceded OCD onset

The five PTEs with the highest frequencies (range ~10%–35%) that preceded OCD onset at any time point before OCD onset included (listed in descending order of frequency): (a) death of someone close (~35%), (b) heard or seen acts of war and terrorism on TV or radio (~27%), (c) prolonged separation from a caregiver (~22%), (d) physical assault/abuse (~12%), and (e) emotional abuse/serious medical procedure or life-threatening illness (~10%). The top five PTEs (range ~3%–16%) that were reported to have occurred within 12 months prior to OCD onset included (a) the death of someone close (~16%), (b) prolonged separation from a caregiver (~12%), (c) heard or seen acts of war and terrorism on TV or radio (~7%), (d) physical assault/abuse (~7%), and (e) emotional abuse/sexual abuse/witnessed physical assault within family (~3%). The two most frequently reported PTEs in the period 0-12 months prior to OCD onset (i.e., death of someone close and prolonged separation from a caregiver) belong to the interpersonal trauma category. This finding is similar to that of Thomsen and Mikkelsen (1995), who evaluated an OCD youth sample and found that most of the traumatic events that preceded OCD onset were family-related, including parental divorce, the death of someone close, and financial problems.

When comparing the types of PTEs that youth experienced (a) at the time of assessment (lifetime), (b) before OCD onset, and (c) within 12 months prior to OCD onset, it was noted that the death of someone close was most frequently reported both at any timepoint before OCD onset and within 12 months prior to OCD onset, but not at the time of assessment (lifetime frequency). In adults, the death of a close family member was the most frequently reported traumatic event type within the 12 months before the OCD onset (Rosso et al., 2012). Based on lifetime frequency, the event “heard or seen acts of war and terrorism on TV or radio” was expected to be the most frequently reported PTE type preceding OCD onset. Interestingly, in community-based youth studies examining the general prevalence rates of traumatic events, the most frequently reported traumatic event was the death of a loved one (Costello et al., 2002; McLaughlin et al., 2013). As such, the death of a loved one may be generally the most frequently reported PTE. Additionally, Ivarsson et al. (2016) compared youth with OCD to healthy controls and found that youth with OCD had similar prevalence rates of loss

experiences than healthy controls (Ivarsson et al., 2016). That said, Ivarsson et al.'s study had small group numbers ($n = 25$ per group). Future studies need to include a comparison group to make definitive statements about the frequency of events.

7.3. Research Aim 2: Description of the relationship between cumulative lifetime PTE exposure and pediatric OCD expression

2.1.1 and 2.1.2 Association between cumulative lifetime PTE exposure and OCD expression (severity and functional impairment)

In the current pediatric OCD sample, OCD symptom severity did not seem to be associated with cumulative lifetime PTE exposure. Previous studies demonstrated inconsistent findings regarding the relationship between OCD severity and trauma exposure. Specifically, some studies demonstrated a positive relationship between OCD severity and trauma exposure (e.g., Miller & Brock, 2017; Barzilay et al., 2019), whereas other studies did not find such an association (e.g., Selvi et al., 2012; Visser et al., 2014).

The current study's research methodology aligns with previous adult studies that did not find a significant correlation between exposure to potentially traumatic events and the severity of OCD symptoms (e.g., Selvi et al., 2012; Visser et al., 2014). Similar to the current study, these studies utilized a clinical sample and assessed OCD symptom severity using the gold-standard assessment tool (i.e., the Y-BOCS).

In contrast, studies that demonstrated a dose-response relationship between obsessive-compulsive symptoms and trauma employed different methodologies. For instance, Barzilay et al. (2019) utilized a community sample consisting of youth with subclinical-level obsessive-compulsive symptoms (not meeting full OCD criteria outlined in the DSM-5). Furthermore, Barzilay et al. assessed symptoms using a screening questionnaire that had not been validated.

When adjusting for multiple comparisons, the association between OCD-related *functional impairment* and lifetime PTE exposure was not statistically significant. This is inconsistent with Vazquez et al.'s (2022) recent findings of youth with OCD and no ACE history having lower parent-reported functional impairment (measured by the same

functional impairment measure, the COIS) than youth with OCD and a history of ACEs. Similarly, the finding is inconsistent with those of Copeland et al. (2007), demonstrating that the functional impairment (e.g., disruption of important relationships, school problems, physical problems, and exacerbation of emotional problems) of a community youth sample increased when exposed to more than one traumatic event.

It is of note that when examining the pattern of the data and moving away from significance testing, it was noted that OCD-affected youth with higher PTE exposure seemed more functionally impaired than those with lower PTE exposure. Specifically, in the current sample, functional impairment measured by the COIS-R score increased by 1.7 units (indicating more impairment) for every additional PTE type experienced.

Theoretically, a link between functional impairment and trauma exposure could be mediated through increased experiential avoidance (i.e., attempting to control or avoid distressing internal experiences or unwillingness to remain in contact with them). This is based on previous research indicating that experiential avoidance significantly mediated the association between childhood trauma and obsessive-compulsive symptoms (e.g., Kroska et al., 2018), and avoidance being linked to functional impairment in youth with pediatric OCD (Lewin, Caporino, et al., 2010; Piacentini et al., 2007; Storch et al., 2010).

In sum, on the basis of this study, we cannot conclude that there is a statistically significant association between cumulative lifetime PTE exposure and functional impairment. However, based on the observed pattern in the current study and previous findings in this area, it seems worthwhile for future research to specifically target functional impairment in relation to lifetime PTE exposure in an OCD youth sample. If a connection between higher functional impairment and greater trauma exposure in OCD-affected youth is confirmed, it could have significant implications for clinical practice. Specifically, when devising treatment plans for youth with OCD and a documented history of trauma, it may be crucial to prioritize enhancing daily living skills, academic performance, family dynamics, and social functioning to improve overall functioning.

2.1.1.1 Moderation of the association between cumulative lifetime PTE exposure and OCD severity

Gender/sex. In the current study, gender/sex did not moderate the relationship between cumulative lifetime PTE exposure and OCD severity. This finding is contrary to meta-analytic findings of *adult* studies showing that the association between past trauma and obsessive-compulsive symptom severity varied as a function of gender/sex, with females appearing more likely to experience obsessive-compulsive symptoms in response to trauma than males (Miller & Brock, 2017). The authors of these studies interpreted their findings based on the cognitive theory of OCD development, which asserts that women seem more susceptible to maladaptive cognitions and more likely to perceive traumatic events as threatening (Irish et al., 2011).

Similarly, the current finding is contrary to the only pediatric study investigating the association between trauma exposure and OCD severity in relation to sex using a community youth sample (Barzilay et al., 2019). Specifically, female youth reported more obsessive-compulsive symptoms than male youth if they had experienced more traumatic events (Barzilay et al., 2019).

The absence of a moderation effect of gender/sex in the current study may be attributed to the inclusion of both children and adolescents. Studies conducted on a large longitudinal birth cohort indicate that sex differences in developing post-traumatic stress symptoms as a response to a traumatic experience are not apparent during early childhood and only emerge during adolescence (Haag et al., 2020). The reasons for this gender/sex difference appearing in adolescence and being dormant in childhood are unknown.

Family cohesion. In the current study, family cohesion was not a significant moderator of the relationship between OCD severity and cumulative lifetime PTE exposure, which was contrary to expectations. Family cohesion was included as a moderator as previous research highlighted it to be a protective factor in promoting resilience despite trauma exposure (Daniels & Bryan, 2021; Masten & Barnes, 2018). Specifically, previous findings suggested that individuals remained resilient when faced with complex trauma in childhood if they experienced strong family cohesion (Daniels & Bryan, 2021).

2.1.3 Association between cumulative lifetime PTE exposure and OCD symptom dimensions

The present study's findings suggest that cumulative lifetime PTE exposure does *not* appear to be differentially associated with the four OCD symptom dimensions: namely symmetry, forbidden thoughts, contamination, and hoarding. In other words, having a history of PTE exposure does not predict the pattern of OCD symptoms in youth. Previous research exploring this relationship, even with adult populations, is scarce and has produced inconsistent findings (Cromer et al., 2007). Most adult studies reported that the *forbidden thoughts* dimension (i.e., having inappropriate religious, sexual, or violent obsessions) is most strongly associated with trauma exposure (Daniels & Bryan, 2021; Fullana et al., 2009; Grisham et al., 2011).

Within the pediatric literature, only two studies have investigated the relationship between trauma exposure and OCD symptom dimensions. One study examined a community sample (Barzilay et al., 2019), while the other focused on a clinical sample (Lafleur et al., 2011). The current study's findings replicate the results of the pediatric study with a clinical sample (Lafleur et al., 2011), which also found no association between trauma exposure and the dimensions of OCD symptoms. Consequently, these findings suggest that the lifetime exposure to PTEs may not be linked to a specific symptom content in children and adolescents diagnosed with OCD.

2.2. Relationship between the *category* of lifetime PTE exposure (non-interpersonal trauma, physical abuse, sexual abuse, emotional abuse) and OCD expression

2.2.1 and 2.2.2 Association between PTE category and OCD severity and functional impairment

The present study investigated the relationship between exposure to a specific PTE category (non-interpersonal trauma, physical abuse, sexual abuse, emotional abuse) and OCD severity or OCD-related functional impairment in a clinical pediatric sample. Contrary to previous research, there was no significant association between any of the four PTE categories and OCD severity or functional impairment. This was surprising given that a previous community-based pediatric study found that sexual assault was most strongly associated with obsessive compulsive symptoms compared to

other assault types (Barzilay et al., 2019). Additionally, several adult studies have reported that traumatic life events of an interpersonal or violent nature, such as sexual and physical abuse, are more strongly linked to the development of OCD compared to non-interpersonal or non-violent traumas (Boudreaux et al., 1998; Grisham et al., 2011; Lochner et al., 2002; Mathews et al., 2008; Vidal-Ribas et al., 2015).

It is of note that the methodology of the current study is quite different from the research studies that found an association between OCD and interpersonal trauma, in terms of sample composition (community vs. clinical) and developmental stage (adult vs. youth). Consequently, considering these differences, it is less surprising that the current study's findings differ from previous findings. The findings may indicate that the relationship between PTE categories and OCD severity or functional impairment are different for youth in clinical settings compared to community-based youth or adult populations.

Additionally, it is of note that when using unadjusted p -values, the multiple regression model for the unscreened subsample indicated that some of the associations between OCD-related functional impairment and PTE categories were significant, and that the magnitude of the regression coefficients for non-interpersonal trauma, physical abuse, and sexual abuse suggest that these variables seem worthy of further study. Specifically, OCD-affected youth presented with more functional impairment when they had been exposed to physical abuse (~16 points difference) or sexual abuse (~17 points difference) than those who had not been exposed to these events. In contrast, OCD-affected youth presented with less functional impairment when they had been exposed to non-interpersonal trauma (~12 points difference) than those who had not been exposed to non-interpersonal trauma.

2.2.3 Association between PTE category and OCD symptom dimension

To our knowledge, this study represents the first exploration of the relationship between a specific PTE category and any of the four OCD symptom dimensions. When adjusting for multiple testing, findings suggest that none of the PTE categories were associated with any of the four OCD symptom dimensions. However, when using an exploratory approach and considering the size of odds ratios and their confidence intervals, findings suggest that exposure to sexual, emotional, and physical abuse may

be uniquely related to a specific OCD symptom dimension. Based on these results, youth exposed to sexual abuse have a higher probability of presenting with forbidden thoughts symptoms than youth who were not sexually abused (90% vs. 10%). In contrast, youth who have experienced emotional abuse have a lower probability of presenting with forbidden thoughts symptoms than youth who were not emotionally abused (17% vs. 83%). Lastly, youth who experienced physical abuse have a lower probability of presenting with symmetry dimensions than youth who were not physically abused (17% vs. 83%).

These findings are hypothesis-generating rather than hypothesis-confirming and require confirmation by an independent data set. However, if confirmed, these findings could have implications for clinical practice and may be helpful in the assessment of OCD. In particular, the findings could be helpful for the assessment of forbidden thoughts symptoms (i.e., sexual, aggressive, and religious obsessions), which are more likely to go unreported and unrecognized due to shame and fear of negative social consequences (Cathey & Wetterneck, 2013). If a link between sexual abuse and forbidden thoughts symptoms is confirmed, clinicians could be advised to pay particular attention to providing psychoeducation about the forbidden thoughts dimension (e.g., normalizing sexual, aggressive, and religious intrusive thoughts) to youth who experienced sexual abuse in order to promote disclosure of these obsessions.

2.3 Lifetime PTE exposure in relation to family history of OCD, course of OCD onset, youth gender/sex, comorbidity, and socioeconomic status

The current study found no significant differences in youth with OCD based on lifetime PTE exposure in relation to number of comorbidities, family history of OCD, course of OCD onset, gender/sex, and socioeconomic status.

The current findings suggest that higher lifetime exposure to PTE does not seem to increase or decrease the likelihood of the number of comorbidities in youth with OCD. This contrasts with some findings in the adult literature that found a relationship between comorbidity and the number of traumatic events (Visser et al., 2014). Findings also suggest that the number of lifetime PTE types is not significantly associated with having a family history of OCD in youth with OCD. These findings differ from previous findings in the adult literature that report that OCD adult cases with a family history of OCD, in

comparison to non-familial OCD cases, were less likely to report or associate their OCD onset with a stressful / triggering life event (Albert et al., 2002; Real et al., 2011). Similarly, the current findings suggest that lifetime exposure to PTE is not significantly associated with presenting more often with a sudden OCD onset (symptoms developing over hours to days) in comparison to a gradual OCD onset (symptoms developing over weeks to months). These findings differ from findings in the adult literature (Rosso et al., 2012) showing that traumatic events play a greater role in OCD cases with a sudden illness onset compared to cases with a gradual OCD onset.

The current study also found no evidence that higher exposure to lifetime PTE increased or decreased the likelihood of belonging to a specific gender/sex category. As such, the results do not replicate findings in the adult literature on sex differences, which suggest that females are more likely to have experienced a traumatic event before OCD onset than males (Bogetto et al., 1999; Rosso et al., 2002). As mentioned earlier, the reason for this discrepancy in gender/sex differences between adult research and the current study may be that gender/sex differences in reactions to trauma emerge later in life, often in the adolescent years (Haag et al., 2020), and as such may not be present in early or middle childhood.

The current study did not find an association between socioeconomic status (proxied by parental educational attainment) and lifetime PTE exposure in a sample of youth with OCD. As such, the current study fails to replicate previous pediatric research that found that children of families with low parental educational attainment have experienced more stressful life events (Reiss et al., 2019). It is worth noting that the composition of the current sample differed from the general population in terms of educational attainment, with a higher percentage of parents holding bachelor's degrees or higher. Specifically, in the study sample, ~80% of participants had at least one parent with a bachelor's degree or higher, whereas only 28.5% and 37.5% of Canadians and Vancouverites, respectively, have achieved a similar level of education (Statistics Canada, 2017). Consequently, the overrepresentation of highly educated parents in the current sample introduces a potential ceiling effect or limited variability in education, which should be taken into account when considering the generalizability of the findings to populations with lower educational attainment.

7.4. Research Aim 3: Effectiveness of gold-standard psychosocial pediatric OCD treatment for youth with OCD affected by PTEs

3.1 Treatment effects based on cumulative lifetime PTE exposure

This is one of the first pediatric studies investigating the impact of lifetime PTE exposure on first-line evidence-based psychosocial treatment response in youth with OCD. Results suggest that cumulative lifetime PTE exposure is not associated with the effectiveness of group family-based CBT with ERP for youth with OCD, enrolled in an open treatment study with respect to changes in OCD severity, OCD-related functional impairment, family accommodation, and family functioning. Stated differently, based on the current findings, OCD-affected youth with differing levels of PTE exposure appear to respond equally well to the gold-standard evidence-based intervention for OCD.

At first glance, the findings of the current study seem surprising given that treatment outcome studies of other youth psychiatric disorders demonstrated that exposure to trauma moderated treatment outcomes. For example, youth with a mood disorder and a trauma history had a poorer response to CBT (Lewis et al., 2010). However, considering the content of interventions (e.g., exposure to feared triggers), psychosocial treatment of trauma-related disorders is more similar to OCD treatment than to mood disorders treatment. Consequently, it is less surprising that comparable treatment outcomes would be observed in trauma-exposed youth with OCD as similar interventions for trauma-related symptoms and OCD are employed (more details on similarities of treatment methods below).

The findings are consistent with a recent pediatric study (Vazquez et al., 2022), which also did not find an association between trauma exposure (evaluated by ACE score) and individual CBT response for a child and adolescent OCD sample. In adults, heterogeneous results were found in terms of treatment outcomes based on trauma exposure. Some studies showed that trauma exposure led to better (Lo, 1967; Shavitt et al., 2010) or equal (Fricke et al., 2017) treatment outcomes, whereas others indicated worse treatment outcomes (Gershuny et al., 2002, 2003; Semiz et al., 2014). This study's findings are in line with those of Fricke et al. (2017), who demonstrated that OCD groups with versus without a trauma history benefitted similarly from a CBT trial. Interestingly, Fricke and colleagues' research methodology is closely aligned with that of

the current study as the authors examined a sample with a trauma history instead of requiring a co-occurring PTSD diagnosis (Gershuny et al., 2002, 2003; Shavitt et al., 2010).

The present study differed from previous research in that the association between PTE exposure and treatment response was evaluated based on *dimensional* outcome variables (continuous variable with a numerical variable) in addition to a categorical approach (dichotomous variables by dividing the sample into treatment responders versus non-responders). That said, findings remained the same when a categorical approach was employed.

There are several possible explanations for the current findings. One possibility is that evidence-based OCD treatment works equally well in reducing OCD symptoms and related outcomes for OCD-affected youth with high and low PTE exposure. As previously noted, gold-standard evidence-based psychosocial treatments for both OCD and PTSD (i.e., the most commonly trauma-related disorder) employ similar underlying principles and techniques (Fletcher et al., 2020). In fact, evidence-based psychosocial treatments for OCD (e.g., CBT with ERP) and PTSD (e.g., prolonged exposure therapy) are both based on principles of CBT and include in vivo and/or imaginal exposure to feared stimuli, targeting experiential avoidance (Fletcher et al., 2020).

Another possibility for the lack of evidence for a potential differential treatment response is that the current analyses may not have sufficiently delved into the intricate dynamics of how potentially traumatic experiences are linked with OCD. Specifically, researchers have proposed two potential relationships between OCD symptoms and lingering traumatic stress: (a) functionally independent (also called *static*), or (b) overlapping and functionally dependent (also known as *dynamically connected*) (Fletcher et al., 2020). In static cases, individuals may develop trauma-incongruent obsessions and compulsions, such as cleaning compulsions following a car accident. In contrast, in dynamically connected cases, obsessions and compulsions are trauma-congruent, as seen in the development of checking compulsions after a violent break-in. In instances of dynamically connected cases, exposures targeting the overlapping themes of trauma and obsessions may trigger trauma symptoms, thereby disrupting the treatment process (Fletcher et al., 2020).

To gain a comprehensive understanding, it may be important to consider these distinct groups (static vs. dynamically connected OCD cases) in future analyses, as findings may differ significantly between them, particularly given that static cases are not hypothesized to show treatment interruptions.

In summary, the findings suggest that lifetime PTE exposure is not linked to the response of pediatric OCD patients to gold-standard OCD treatment (CBT with ERP). Further research is necessary before definitive recommendations can be drawn regarding clinical practice.

3.2 Treatment effects based on PTE category/type

Findings suggest that exposure to physical abuse and emotional abuse (two of the four trauma categories), as well as the death of someone close (the most frequent traumatic event type preceding OCD onset) may differentially impact rates of improvement for OCD-affected youth undergoing psychosocial treatment.

Specifically, the findings indicate that the level of daily psychosocial functioning may improve at a slower rate during treatment for youth who were physically abused relative to those who did not experience this type of trauma. However, at the end of treatment and at the 1-month follow-up appointment, these differences no longer exist and as such, exposure to physical abuse appears to impact the rate of improvement, but not the final treatment outcome related to OCD-related psychosocial functioning.

Similarly, findings suggest that youth who experienced emotional abuse have smaller improvements in their level of daily psychosocial functioning and their OCD-related family functioning at 1-month follow-up assessment. The moderating effect of emotional abuse appeared to increase in magnitude over time throughout treatment and eventually reached statistical significance during the maintenance phase. In other words, emotional abuse, like physical abuse, appears to impact the rate of improvement throughout treatment.

There is a myriad of potential explanations for these findings. Youth who experienced physical or emotional abuse may be less engaged in treatment due to initial distrust (Hepp et al., 2021), exposures may be less effective for them due to dissociation (Rufer et al., 2006; Semiz et al., 2014; Tatlı et al., 2018), or exposures may be activating

traumatic beliefs, which in turn hinder the youth's engagement in exposures and rendering them less effective. It is interesting that both trauma categories moderated changes in the same treatment outcome measures: the youth's psychosocial functioning and family functioning. This could be related to previous research showing that youth who experienced a greater number of adverse childhood events have poorer emotional well-being, which is moderated by lower family functioning (Balistreri & Alvira-Hammond, 2016).

In contrast to the above findings of slower rates of improvement in treatment outcomes, study results suggest that exposure to the death of someone close leads to a faster rate of improvement in OCD-related psychosocial functioning throughout treatment until the end of treatment. This finding is interesting given recent correlational and experimental research demonstrating strong correlations between death anxiety and OCD severity (Menzies & Dar-Nimrod, 2017) and increased cleaning behaviors induced by reminders of death in both community (Strachan et al., 2007) and clinical (Menzies & Dar-Nimrod, 2017) samples. According to Verin and colleagues (2022), some of the primary manifestations of OCD can be perceived as efforts to avoid death in some form (e.g., compulsive handwashing to prevent death by illness, compulsive checking to avoid death by fire).

In sum, the current findings of differential impacts on the rate of improvement based on exposure to specific trauma types suggest the need for further research in this area. Instead of examining lifetime PTE exposure (by count) only, future research could examine effects of categories of PTEs on CBT response. Given that emotional abuse and the death of someone close are events that do not meet DSM-5 criteria for traumatic events (APA, 2013), study results suggest that future research would benefit from broadening the definition of traumatic events.

7.5. Research Aim 4: Caregiver perception of OCD onset or worsening

4.1 Percentage of parents associating the onset or worsening of their child's OCD with a traumatic event in the youth's life

Approximately two-thirds (~68%) of parents associated the onset or worsening of their child's OCD with a negative or positive event that occurred in their child's life. The five life events that were most frequently endorsed included (a) the transition to a new school (~20%), (b) a move to a new location (~16%), (c) a serious injury or illness of the child (~14%) or (d) of a family member/friend (~13%), and (e) death of a family member/friend (~13%).

The phrasing of the question (i.e., "Did any of the following occur to your child *at the time of OCD onset or worsening?*") prevented any conclusions about the life event being distinctly associated with the onset *or* the worsening of OCD. However, the data provided some insight into the parent's perception of their child's OCD symptoms, in that more than half of the parents reported that the beginning and/or exacerbation of OCD symptoms was connected to a specific life event (e.g., transition to a new school). As such, commonly occurring life events such as a school transition or moving homes seem to be related to the onset or worsening of OCD.

Despite their common occurrence, life events, such as moving and school transition, may induce stress in youth that, in turn, may activate or exaggerate intrusive thoughts and repetitive habitual patterns. This is in line with previous theories and studies linking stress with (a) more intrusive thoughts (Horowitz, 1975; Jones & Menzies, 1998), (b) more frequent negative appraisal of intrusive thoughts (Rachman, 1997), (c) waxing and waning OCD symptom severity (Lin et al., 2007), and (d) brain changes associated with habitual patterns in OCD (Adams et al., 2018). The finding is also aligned with previous adult literature, reporting that 37%–64% of adults with OCD report that their illness onset is associated with a stressful life event (Lensi et al., 1996; Real et al., 2011; Rosso et al., 2012).

7.6. Strengths of the study

The present study has several strengths. First, this study examined a large clinical sample of youth with OCD, including both children and adolescents (ages 6 to 19). Except for two studies (Lafleur et al., 2011; Vazquez et al., 2022), the remaining pediatric studies had sample sizes of fewer than 30 participants and included only adolescents (above age 12). As such, the present study addressed some critical gaps in

the literature by assessing a large clinical sample of OCD youth that included children (12 years and younger) in addition to adolescents.

Second, the present study's measurement of trauma presents a strength in several ways. The trauma exposure checklist employed in this study was validated and recommended by two reviews of trauma exposure measures (Stover & Berkowitz, 2005; Strand et al., 2005). In addition, PTE exposure was treated as a dimensional variable (i.e., count of PTEs with a numerical value) instead of a dichotomous variable (i.e., presence or absence of trauma history) that separated the sample into two groups (i.e., trauma vs. no-trauma group) (Murayama et al., 2020). A limitation of previous research is that researchers retrospectively assessed childhood trauma in adult OCD samples, making their data subject to recall bias (Ou et al., 2021). While the present study also identified life events by retrospective interviews, recall bias may have been reduced because childhood PTEs were recorded closer to their actual occurrence. The use of parent reports of PTEs is another strength as it allows for the assessment of earlier events that the youth might not have been able to report (e.g., before the age of 3).

Third, as previously mentioned, this study is one of the first pediatric studies to assess the potential influence of PTE exposure on psychosocial treatment response in pediatric OCD. As such, it addresses a critical gap in the literature and poses suggestions for future research in this area with the aim of improving treatment outcomes in pediatric OCD.

Furthermore, the current study collected data on PTE exposure age as well as OCD onset age. As such, the temporal relationship between PTE exposure and OCD onset could be investigated. This was a limitation of previous research, which did not have access to temporal data (Fontenelle et al., 2011; Kracker Imthon et al., 2020).

Finally, this study contributes to the pediatric literature in terms of illuminating the potential relationship between PTE exposure and symptom content. This relationship has only been investigated in two previous pediatric studies (Barzilay et al., 2019; Lafleur et al., 2011), producing contradictory results.

7.7. Limitations and further research directions

Despite its significant strengths, the current study has several limitations that should be considered when evaluating the findings. First, PTE exposure was assessed by parent report only and may have overlooked PTEs that the youth experienced, but that the parent may not know about. Previous research has demonstrated that parent and youth ratings of *total* trauma exposure have an overall fair agreement ($\kappa = 0.35$) (Skar et al., 2021). For different *types* of trauma exposure, the lowest agreement was noted for accidents and illnesses ($\kappa = 0.35$) and the highest agreement for sexual abuse ($\kappa = 0.49$) (Skar et al., 2021). Based on Skar and colleagues' (2021) findings, it is recommended that future studies include both youth and caregivers in trauma screening procedures to gain a more complete picture of the youth's experiences and treatment needs. For example, the child self-report version of the TESI (i.e., TESI-C) could be administered in addition to the TESI-PRR (Ford et al., 2002).

Second, while reducing participant burden is an important aspect to consider in research, future research should administer the trauma questionnaire to all participants without any screening questions to provide unambiguous results.

Third, the present study lacked a comparison group, which did not allow for a direct comparison of PTE exposure prevalence rates between youth with and without OCD. Future research could include a control group of typically developing youth to allow for such comparisons. In an ideal study, which would contribute to the field's intended shift from focusing on risk factors for psychopathology to factors promoting resilience against traumatic stress (Snijders et al., 2018), community youth would be followed over time, tracking their development and history, including their exposure to traumatic events, and comparing those who develop OCD to those who do not. This line of research would help identify protective factors in addition to risk factors for pediatric OCD. While the present study included family cohesion as a potential protective factor, more research is needed to identify other protective factors promoting resilience and mental well-being. Along this line of research, adding a resilience measure would be beneficial.

Fourth, the current study could not account for specific characteristics of PTEs (frequency of experience, relationship to perpetrator) that might influence relationships

between PTE exposure and outcomes. Specifically, the trauma exposure checklist used in the current study only assessed the presence/absence of potentially traumatic experiences and failed to capture how often (i.e., frequency), how long (i.e., duration), and how intense (i.e., intensity) a specific PTE occurred for the youth. This limitation resulted in the loss of valuable information. For example, in the current study, two participants (A and B) could both be counted as having experienced physical abuse. However, participant A experienced recurrent physical abuse from their caregiver while participant B experienced one incident of physical assault by a classmate. Despite these different experiences, their data were counted as identical. To gain a more comprehensive understanding of the impact of trauma on individuals, future research should include measures of frequency of exposure (number of incidents) within each type of event, duration, and intensity of traumatic events, as previous studies have shown that prolonged, repeated trauma can have different effects than a single traumatic event (Cloitre et al., 2009; Herman, 1992).

Related to the example above, another limitation was the present study's omission of the TESI-PRR question concerning the relationship to the person involved in the trauma/perpetrator (i.e., "What was this person's relationship to your child?"). This is a drawback as previous research has shown that the relationship to the perpetrator may impact adjustment to the trauma and pervasiveness of the symptoms (Feinauer, 1989; Ketring & Feinauer, 1999). For example, childhood sexual abuse caused the survivor greater distress when the offender was considered to be a known and trusted person versus a stranger (Feinauer, 1989). Future research in this area should include a question about the relationship between the trauma-exposed youth and the other person involved in the traumatic event. Another further constraint of the TESI-PRR is that it asks the respondent double-barreled questions – two conceptually separate questions at the same time but allowing only one answer – which is inconsistent with best practices on effective item construction (Jhangiani & Chiang, 2015). For example, one single item from the TESI-PRR reads as follows: "Has anyone ever kidnapped your child? (including a parent or relative) or has anyone ever kidnapped someone close to your child?" with the response option of "yes" or "no". This item should be split into two separate items—one item concerning whether "the youth was kidnapped" and one about "knowing that someone close was kidnapped".

Fifth, another potential limitation of the present study is its generalizability. The study sample was recruited from a tertiary, specialized OCD clinic within a hospital and may not represent the population treated in primary or secondary healthcare settings. Additionally, the families in the study were highly educated (being twice as likely to have a bachelor's degree or higher than the broader Vancouver population), which could limit the applicability of the overall study findings to OCD-affected youth from families with lower levels of educational attainment.

Lastly, although the current study offered initial insights into the impact of trauma on the leading psychosocial treatment for pediatric OCD, it did not explore methods to enhance treatment outcomes for patients who have both a trauma history and OCD. Future studies could examine whether incorporating evidence-based treatments for trauma into the treatment plan for OCD patients – such as cognitive restructuring of trauma-related beliefs or prolonged imaginal exposure to trauma-related memories – leads to better treatment outcomes. Given the current findings, it would be worthwhile for future research to examine a potential connection between OCD-related functional impairment and PTE exposure in youth with OCD (e.g., greater impairment being associated with greater PTE exposure). Similarly, more research on the relationship between OCD symptom dimensions and PTE categories is needed.

7.8. Clinical implications

Despite its limitations, the study's findings hold potential clinical implications for the assessment and treatment of children and adolescents with OCD.

7.8.1. Assessment implications

Given that approximately 8 of 10 youth with OCD were exposed to at least one potentially traumatic event, clinicians are encouraged to inquire about potentially traumatic events as well as resilience factors when assessing youth with OCD. Obtaining information about the youth's trauma history will contribute to a more thorough assessment and as such may lead to a more complete case formulation, which in turn may facilitate better treatment outcomes. For example, youth who were previously deemed non-responders to a manualized family-based CBT group for anxiety showed a significant reduction of their anxiety symptoms after being provided with an

individualized, case formulation-based CBT trial that addressed personal and contextual symptom-maintaining and protective factors (Lundkvist-Houndoumadi et al., 2016).

The assessment of trauma exposure can be facilitated by asking families to complete screening measures such as the one used in the current study, the TESI-PRR (Ghosh-Ippen et al., 2002) for assessing parent-report or the TESI-C (Ford et al., 2002) for assessing child self-report. The Structured Trauma-Related Experiences and Symptoms Screener (STRESS) (Grasso et al., 2015) is another option. The STRESS is a self-report instrument for youth aged 7 to 18 that yields a comprehensive trauma history profile, including the age of occurrence of 25 adverse childhood experiences (Grasso et al., 2015). For a full list of pediatric trauma and resilience screeners, see Traub and Boynton-Jarrett (2017).

If there is no time for a screening questionnaire, Traub and Boynton-Jarrett (2017) suggest that the most basic screening is to ask patients and caregivers the following question: “Has anything scary or upsetting happened to you/your child or your family?”.

7.8.2. Treatment implications

The study’s results suggest that gold-standard treatment protocols, such as GF-CBT with ERP, may be effective in treating OCD-affected youth regardless of their history of trauma exposure. However, given the high rate of reported trauma exposure in the study sample as well as differential impacts of specific trauma types on improvement rates, it is advised to approach treatment delivery for OCD-affected youth with a trauma-informed lens. Additionally, monitoring trauma-related symptoms throughout the treatment process could help identify potential barriers to successful exposure and response prevention and allow for targeted troubleshooting. Both recommendations are further explained below.

Trauma-informed lens. In their book, *Trauma-informed practices with children and adolescents*, Steele and Malchiodi (2012) remind practitioners that the youth’s sense of safety in therapy can be strengthened by using a structured approach, explaining the intervention process in detail (what will be asked of the child and how it has helped others), following the youth’s pace, and providing choice and control to the

youth. One way to provide control is to let youth know that they always have the choice to refuse an intervention or stop an ongoing intervention at any point. Another point that Steele and Malchiodi emphasize is to normalize the many physical, emotional, and cognitive reactions that youth experience in relation to processing a difficult event or situation. In relation to OCD treatment, this can mean normalizing the many reactions to ERP.

The authors also note that it can be helpful to involve at least one supportive adult to reinforce what is learned (Steele & Malchiodi, 2012). Practitioners are encouraged to use open-ended questions to show curiosity and begin and end the session with a safe activity. A safe activity is something that the youth enjoys and that moves them into a comfortable state (e.g., play, music, relaxation activity, guided imagery). Starting and ending the session with such an activity will contribute to identify helping professionals as “safe people” (Steele & Malchiodi, 2012).

Given that pediatric OCD affects the entire family (Stewart et al., 2017) and the well-established psychosocial treatment for pediatric OCD – namely family-focused CBT – typically involves the youth’s caregiver(s) (Freeman et al., 2018), a brief summary of general trauma-informed treatment delivery guidelines by the Substance Abuse and Mental Health Services Administration (SAMHSA) (2014) is provided. SAMHSA developed six key principles fundamental to a trauma-informed approach, which include (a) safety; (b) trustworthiness and transparency; (c) collaboration and mutuality; (d) peer support; (e) empowerment, voice, and choice; and (f) cultural, historical, and gender issues.

Unpacking these key principles, *safety* encompasses physical and emotional safety, which can be established by providing hazard-free, accessible, and well-lit spaces, ensuring privacy and confidentiality, and making patients heard by active listening, validation, and respectful treatment in a non-judgmental atmosphere (SAMHSA, 2014). *Trustworthiness* is established by promoting transparency, (e.g., communication of qualification, expectations, treatment goals), consistency, accountability, and maintenance of interpersonal boundaries. *Choice* is about giving the individual choices and options throughout the treatment process, so the individual has control over the services that they receive. It requires the clinician’s flexibility in modifying treatment plans based on clients’ changing needs and preferences. This is an

essential component because control was taken away from a person during a traumatic event. *Collaboration* relates to shared planning and goal setting and seeing the other person as the expert of their experiences, while *empowerment* emphasizes skill development and enhancement, and recognizes the individual's strengths. Interestingly, the use of collaboration in OCD treatment (e.g., collaborating with clients when designing OCD exposures) led to better treatment outcomes in a recent clinical study with a clinical sample of adults with OCD (Ong et al., 2022).

Monitoring trauma-related symptoms. In addition to a trauma-informed lens, monitoring the development of trauma-related symptoms may be beneficial. In their case studies, Fletcher and colleagues (2020) observed that OCD adult cases with a trauma history developed trauma-related symptoms over the course of OCD treatment, even though they did not present with trauma-related symptoms at the initial assessment. Based on their observations, treatment often stalled when ERP exercises targeted trauma-related areas (Fletcher et al., 2020). The authors hypothesized that when obsessional themes and trauma content overlap, OCD symptoms may serve as a maladaptive way to cope with the trauma-related symptoms as rituals provide a sense of control (Lang et al., 2015) and mask avoidance behaviours (Fletcher et al., 2020). As OCD treatment progresses and ERPs target trauma-related themes, trauma-related beliefs may be triggered, unearthing intense feelings of guilt and shame, that in turn undermine engagement in treatment (Fletcher et al., 2020). For instance, patients who have experienced a break-in may struggle with refraining from checking doors/windows to target harm obsessions, while those who have been exposed to grief and loss through an infectious illness may struggle with refraining from cleaning/hand-washing compulsions during the ERP task. Engaging in ERPs can also trigger a feeling of losing control similar to what was experienced during a traumatic event (Ataria, 2015; Hancock & Bryant, 2018). It may be beneficial to prepare patients for the anticipation of such feelings.

To promote effective treatment outcomes, providers should closely monitor their patients for potential increases in trauma-related symptoms as treatment for OCD progresses, particularly when ERPs target obsessional themes that overlap with trauma themes. However, further research in this area is needed before definitive treatment recommendations for pediatric OCD can be made.

7.9. Concluding summary

The present study examined the nature of trauma via PTE exposure in pediatric OCD, including PTE frequency, type, and temporal precedence, as well as the relationship between lifetime PTE exposure and the expression of pediatric OCD in a large clinical sample. It is one of the first studies to explore OCD treatment effects based on exposure to PTEs (by count and category/type). While trauma is the overarching umbrella term, the term PTE was chosen to more accurately represent the secondary data that were used.

The findings of the present study contribute to the field's understanding of the intersection between trauma and OCD, which is an area that has received less attention in youth than in adult samples. It is of note that the study did not aim to establish causality but rather explore relationships and associations of trauma in pediatric OCD.

The study adds to the existing literature that suggests a significant relationship between trauma and OCD, and it specifically provides data on the prevalence of PTE exposure among youth with OCD. Approximately one third of traumatic events were experienced within 12 months prior to OCD onset, providing some evidence for the temporal relationship between PTE exposure and OCD onset. Exposure to the death of a loved one was most frequently mentioned to precede OCD onset, both at any time point and within 12 months prior to OCD onset. In general, based on the findings of this study, interpersonal traumatic events, including sexual abuse, emotional abuse, and physical abuse, seem to play a greater role in relation to OCD expression than non-interpersonal trauma (e.g., natural disasters, animal attacks, accidents).

Gold-standard psychosocial treatment for OCD seems to be effective for youth with OCD irrespective of their exposure to PTEs. However, exposure to certain PTE types may differentially impact rates of improvements throughout treatment. Overall, the high prevalence rates of PTE exposure in pediatric OCD highlight the need for assessing PTEs and resilience factors, and for adopting a trauma-informed lens when assessing and treating youth with OCD.

More research is needed to fully understand the role of trauma in OCD etiology, expression, and treatment in order to improve services and outcomes for families affected with pediatric OCD.

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Appendix A. Traumatic Events Screening Inventory- Parent Report Revised

Abbreviation	TESI-PRR question
1. Been in a serious accident	Has your child ever BEEN in a serious accident where someone could have been (or actually was) severely injured or died? (Like a serious car or bicycle accident, a fall, a fire, an incident where s/he was burned, an actual or near drowning, or a severe sports injury)?
2. Seen a serious accident	Has your child ever SEEN a serious accident where someone could have been (or actually was) severely injured or died? (e.g., a serious car/bicycle accident, a fall, a fire, an incident where someone was burned, an actual or near drowning, or a severe sports injury)?
3. Been in a natural disaster	Has your child ever been in a natural disaster where someone could have been (or actually was) severely injured or died, or where your family or people in your community lost or had to permanently leave their home (e.g., tornado, fire, hurricane, or earthquake)?
4. Severe illness/injury of someone close	Has your child ever experienced the severe illness or injury of someone close to him/her?
5. Death of someone close	Has your child ever experienced the death of someone close to him/her?
6. Serious medical procedures/life-threatening illness	Has your child ever undergone any serious medical procedures or had a life-threatening illness? Or been treated by a paramedic, seen in an emergency room, or hospitalized overnight for a medical procedure?
7. Prolonged separation from caregiver	Has your child ever been separated from you or another person your child depends on for love or security for more than a few days OR under very stressful circumstances? (e.g., due to foster care, immigration, war, major illness, or hospitalization)
8. Suicide attempt/self-harm of someone close	Has someone close to your child ever attempted suicide or harmed him/herself?

Abbreviation	TESI-PRR question
9. Experienced physical assault/abuse	Has someone ever physically assaulted your child, like hitting, pushing, choking, biting, or burning? Or punished your child and caused physical injury or bruises? Or attacked your child with a gun, knife, or other weapon? (This could be done by someone in the family or by someone not in your child's family)
10. Been physically threatened	Has someone ever directly threatened your child with serious physical harm?
11. Experienced or witnessed mugging	Has someone ever mugged or tried to steal from your child? Or has your child been present when a family member, other caregiver, or friend was mugged?
12. Experienced kidnapping or someone close was kidnapped	Has anyone ever kidnapped your child? (including a parent or relative) Or has anyone ever kidnapped someone close to your child?
13. Been attacked by animal	Has your child ever been attacked by a dog or other animal?
14. Witnessed physical violence within family	Has your child ever seen, heard, or heard about people IN YOUR FAMILY physically fighting, hitting, slapping, kicking, or pushing each other? Or shooting with a gun, stabbing, or using any other kind of dangerous weapon?
15. Witnessed serious physical threats within family	Has your child ever seen or heard people IN YOUR FAMILY threaten to seriously harm each other?
16. Family member jailed/arrested	Has your child ever known or seen that a family member was arrested, jailed, imprisoned, or taken away (e.g., by police, soldiers, or other authorities)?
17. Witnessed physical violence outside family	Has your child ever seen or heard people OUTSIDE YOUR FAMILY fighting, hitting, pushing, or attacking each other? Or seen or heard about violence such as beatings, shootings, or muggings that occurred in settings that are important to your child, such as school, your neighborhood, or the neighborhood of someone important to your child?
18. Been exposed to war, armed conflict, or terrorism	Has your child ever been directly exposed to war, armed conflict, or terrorism?

Abbreviation	TESI-PRR question
19. Heard/seen acts of war/terrorism on media	Has your child ever seen or heard acts of war or terrorism on the television or radio?
20. Experienced sexual abuse	Has someone ever MADE your child see or do something sexual (e.g., touching in a sexual way, exposing self or masturbating in front of the child, or engaging in sexual intercourse)?
21. Witnessed sexual assault	Has your child ever been present when someone was being forced to engage in any sort of sexual activity?
22. Emotional abuse	Has your child ever repeatedly been told s/he was no good, yelled at in a scary way, or had someone threaten to abandon, leave, or send him/her away?
23. Physical neglect	Has your child ever gone through a period when s/he lacked appropriate care (e.g., not having enough to eat or drink, lacking shelter, being left alone when s/he was too young to care for him/herself, or being left with a caregiver who was abusing drugs)
24. Other stressful things	Have there been other stressful things that have happened to your child?

Note. TESI-PRR = Traumatic Events Screening Inventory - Parent Report Revised (Ghosh-Ippen et al., 2002).

Appendix B. Results for three-way interaction terms

Table B.1. Three-way interaction terms between timepoint, cumulative lifetime PTE exposure, and the screener variable for Research Aim 3.1

	CY-BOCS-CR		CY-BOCS-PR		COIS-R		FAS		OFF-Part 1	
	<i>F</i> -test	<i>p</i>	<i>F</i> -test	<i>p</i>	<i>F</i> -test	<i>p</i>	<i>F</i> -test	<i>p</i>	<i>F</i> -test	<i>p</i>
Lifetime PTE exposure	$F(3, 194) = 2.21$	.088	$F(3, 157) = 20.36$	.781	$F(3, 175) = 0.22$	.884	$F(2, 109) = 0.43$	.653	$F(2, 90) = 2.03$	.138

Note. CY-BOCS = Children Yale-Brown Obsessive-Compulsive Scale; COIS-R = Child Obsessive-Compulsive Impact Scale-Revised; FAS = Family Accommodation Scale; OFF-Part 1 = Part 1 of the OCD Family Functioning Scale-Relative Version.

Table B.2. Three-way interaction terms between timepoint, lifetime PTE category/type, and the screener variable for Research Aim 3.2

	CY-BOCS		COIS-R		FAS		OFF-Part 1	
	<i>F</i> -test	<i>p</i>	<i>F</i> -test	<i>p</i>	<i>F</i> -test	<i>p</i>	<i>F</i> -test	<i>p</i>
Non-interpersonal trauma	$F(3, 194) = 0.37$	.772	$F(3, 175) = 2.01$	.114	$F(2, 109) = 0.01$	.991	$F(2, 90) = 2.77$	.068
Physical abuse	$F(3, 194) = 0.93$	.429	$F(3, 175) = 1.20$	.310	$F(2, 109) = 1.28$	.283	$F(2, 60) = 0.94$	.394
Sexual abuse	$F(3, 194) = 0.90$	.444	$F(3, 175) = 0.69$	.562	$F(2, 109) = 0.88$	.419	$F(2, 90) = 0.01$	.989
Emotional abuse	$F(3, 191) = 0.25$	.859	$F(3, 174) = 0.34$	.798	$F(2, 109) = 0.19$	.830	$F(2, 89) = 0.07$	.933
Acts of war/terrorism on media	$F(3, 191) = 1.85$	.140	$F(3, 172) = 0.66$	.580	$F(2, 107) = 1.03$	.362	$F(2, 89) = 1.46$	.239
Death of someone close	$F(3, 189) = 2.11$	.100	$F(3, 169) = 0.95$	.418	$F(2, 105) = 0.11$	.896	$F(2, 88) = 1.73$	.183
Prolonged separation from caregiver	$F(3, 191) = 0.30$	.828	$F(3, 175) = 0.73$	.533	$F(2, 109) = 0.18$	.832	$F(2, 90) = 0.08$	.927

Note. CY-BOCS = Children Yale-Brown Obsessive-Compulsive Scale; COIS-R = Child Obsessive-Compulsive Impact Scale-Revised; FAS = Family Accommodation Scale; OFF-Part 1 = Part 1 of the OCD Family Functioning Scale-Relative Version.