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Obsessive Compulsive Disorder (OCD) In Youth: A Narrative Review

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ABSTRACT

This narrative review on obsessive compulsive disorder (OCD) in youth briefly summarizes research on physical and cognitive symptoms of OCD based on facial, olfactory, sleep, orthorexia, social cognition, attentional bias and brain studies. Secondly, it focuses on risk factors for OCD including genetic factors, co-morbidities, family prevalence, vitamin deficiencies, infection and Covid-19 effects. Treatments are focused on attention bias modification, cognitive behavior therapy, exercise and medications. This literature, while very extensive, is limited to some seemingly uninteresting laboratory paradigms and youth and parent questionnaire data as well as a few effective therapy and medication protocols.

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This narrative review is based on studies on obsessive compulsive disorder (OCD) in youth that have appeared on PubMed for the years 2016-2022. The terms obsessive compulsive disorder (OCD) were entered into the advanced search which yielded 283 papers. Inclusion criteria were peer-reviewed studies that had OCD in the title and that were focused on youth. Exclusion criteria were case reports, non-English papers and research that was focused on other conditions that appear in the same DSM-V category as OCD including body dysmorphic disorder, hoarding disorder and trichotillomania. Following these criteria, 32 papers were selected for this review. The review is organized around the primary symptoms of OCD including physical and cognitive symptoms. These are followed by sections on risk factors including genetic factors, comorbidities, family prevalence, vitamin deficiencies, infection and COVID-19 diagnoses. A section on therapies includes Attention Bias Modification, Cognitive Behavior Therapy, exercise and medications. And the review concludes with limitations of the literature and suggested future directions.

Physical Symptoms

Facial Characteristics

Correlation research has been conducted on facial characteristics of OCD (Wang et al, 2021). In a study on facial characteristics in adolescents with obsessive compulsive disorder as compared to healthy controls, a thinner lower lip was noted in males with obsessive compulsive disorder, and the angle between the nose and lips was smaller in females.

Olfactory Impairment

Olfactory impairment is another physical symptom that has been noted in adolescents with OCD (Bora et al, 2020). In this study, the adolescents were diagnosed based on the Maudsley OCD inventory and they were given Sniffin Sticks to assess their olfactory function. Olfactory impairment was related to symptom severity, and those who were in therapy performed better. Although the relationship between olfactory impairment and symptom severity has not been previously noted for OCD, that relationship has been reported for other disorders including Parkinson's and Alzheimer's.

Sleep Problems

Sleep problems are another physical symptom of OCD. In one study, the Yale – Brown OCD scale was given as well as the Pittsburgh Sleep Quality Index (Miniksar & Ozdamir, 2021). In that study, the symmetry/hoarding symptom group had the worst sleep quality. It's unclear why those with symmetry/hoarding symptoms would have the worst sleep quality unless they were ruminating about their symptoms and unable to sleep.

In another study, also using the Pittsburgh Sleep Quality Index, the relationship between the severity of OCD and sleep disturbances was mediated by the severity of trait anxiety and depression (Segalas et al, 2021). The relationship between the severity of OCD and sleep disturbances as mediated by anxiety and depression is not surprising as sleep disturbances must be more common in comorbid conditions and explained by them. if sleep problems are more associated with internalizing symptoms than with OCD, it's likely that sleep problems are more associated with comorbid OCD and depression. In still another study on sleep in adolescents, sleep – related problems were greater in those with OCD, although they were more associated with internalizing scores than OCD (Nabinger et al, 2018. And, an OCD scale was not used. Instead, eight items were drawn from the CBCL, the CDI and the Multidimensional Anxiety Scale.

Orthorexia Nervosa

Orthorexia nervosa is another physical symptom of OCD (Gkiouleka et al, 2022). This has been defined as an obsessive preoccupation with eating healthy and "pure" foods or as a type of "healthism" which has been defined as thriving for the best possible eating and exercise behaviors. It has been noted to have shared

characteristics with OCD and/or anxious personality, a need to have complete control, a phobia of food impurity and a tendency for perfectionism. Typically, individuals with this obsessive preoccupation have adopted a vegetarian, vegan or pescatarian diet, are a customer at organic food markets, exercise frequently, have amenorrhea and vitamin D deficiency and read labels for excessive sugar and salt. The question has been raised as to whether it should be classified as an eating disorder or even a symptom of OCD as the diet is very healthy in general. It would seem from the healthy eating habits of these participants with orthorexia nervosa that they may be healthier individuals except for their amenorrhea and vitamin D deficiency. A pescatarian, vegetarian or vegan diet would be presumably healthier than the alternatives. Vitamin D deficiency has been noted in OCD independent of the type of diet and probably should be part of the therapy protocol.

Cognitive problems

Social Cognition

Social cognition might be a problem for those with OCD. In one study entitled “Direct gaze holds attention”, youth with OCD had no differential response to an avatar with direct versus no direct gaze, implying avoidance of eye contact (Dalmaso et al, 2022). The finding of no direct gaze implies avoidance of eye contact in OCD. That’s not typically given as a key symptom of OCD, and in the case of this study, the finding of no direct gaze may relate to the avatar being a boring stimulus. In another study entitled “Decreased theory of mind skills, increased emotional dysregulation and poor insight”, 50 adolescents with OCD were compared to 50 healthy adolescents (Yazici & Yazici, 2019). Those with OCD showed less ability to “read minds in the eyes” and had emotional dysregulation, especially those with poor insight. These authors suggested that those with OCD have a lesser ability to read minds in the eyes but it’s not clear how anyone really ‘reads minds in the eyes’.

Attentional Bias to Threatening Stimuli

Attentional bias to threatening information is a common cognitive experience by those with OCD that can lead to the onset and maintenance of OCD (Wang et al, 2021). In this study, adolescents were given the Yale-Brown Obsessive-Compulsive Scale, and attentional bias was noted to fearful and disgusting threat stimuli during a dot probe task. Specifically, “facilitated attention” was noted during fearful stimuli and “difficulty disengaging” was noted during disgusting threat stimuli. The dot probe task is a measure of attention to a threatening stimulus. Its reliability has been challenged for its internal consistency and its test-retest reliability. It would also seem to be a boring task as the stimuli are all very similar either in terms of drawings or faces which would be expected to lead to habituation of the task.

Persistent Uncertainty Leads to Cognitive Rituals

A theoretical review summarizes these cognitive biases and deficits (Hezel & McNally, 2016). Maladaptive appraisals, heightened responsibility, and metacognitive beliefs (for example, the need to control one’s thoughts) are reviewed. The authors concluded with the phenomenon that persistent uncertainty leads to cognitive rituals. it’s not clear the degree to which maladaptive appraisals and metacognitive beliefs contribute to the persistent uncertainty that reputedly leads to cognitive rituals. Examples given for maladaptive appraisal, namely heightened responsibility, and for metacognitive beliefs, namely the need to control one’s thoughts, would presumably be positive experiences unless taken to the extreme.

Error-related Negativity

Another cognitive phenomenon noted in those with OCD has been labeled “error–related negativity” in event-related potentials following mistakes in a flanker task to assess performance monitoring (Hanna, 1997). The flanker task involves identifying the direction of central

arrows in a stream of arrows. This increased error-related negativity amplitude found in individuals with OCD happens during tasks that elicit response conflict and overactive performance monitoring. The flanker task seems extremely boring so the performance monitoring and the resulting error- related negativity may relate to boredom. This particular study is also confounded by very unequal sample sizes.

Hyperactivation of the Orbitofrontal Cortex

Another study of the brain has suggested hyperactivation of the orbitofrontal cortex that mediates thoughts about threatening harm (obsessions) which lead to attempts to neutralize the perceived threats (compulsions) (Krebs & Heyman, 2015). Decreased activation was noted following Cognitive Behavior Therapy, demonstrating a degree of plasticity.

Risk Factors

Several risk factors have been noted for OCD. These include genetic factors, comorbidities, family prevalence, vitamin deficiencies, infection and COVID-19.

Genetic Factors

In a review on twin studies, 45–65% of the variance was explained by genetic factors (Krebs & Heyman, 2015). In a meta-analysis of these gene studies, the genetic influence appeared to be polygenic (serotonergic, dopaminergic and glutamatergic systems). It's unclear if the genetic influence is polygenic (e.g. serotonergic and dopaminergic). The response to SSRIs is not therapeutic, and for those who are non-responders, a dopaminergic antagonist is therapeutic. Typically, eight sessions of CBT are therapeutic, but in this case, it appeared that 12 to 20 sessions were necessary. Having a comorbidity rate of 80% for depression or anxiety likely affected the slower response to treatment. Phone and internet therapy were effective in this study. The relative effectiveness of CBT via phone or Internet would be an important comparison.

In another study on the genetics of OCD and related disorders, similar genes were noted for OCD, hoarding and body dysmorphic disorder (Grunblatt, 2021). The similar genetics noted for these disorders is surprising given the very different behavior characteristics. They presumably appear in the same category because they are sometimes comorbid. On the other hand, the frequency of anxiety and depression as comorbidities of OCD has not led to the lumping of those conditions. These arbitrary classifications of the DSM-V have been noted for other syndromes.

Comorbidities

Because of comorbidities, OCD has now been classified in the DSM-V system as OCD and related disorders including body dysmorphic disorder, hoarding disorder, and trichotillomania. Although it is reputedly a heterogeneous symptom profile, only a short specifically OCD symptom screener with six items has been created including 1) washing or cleaning a lot; 2) checking things a lot; 3) thoughts that keep bothering you; 4) daily activities that take a long time to finish; 5) getting upset by a mess; and 6) these problems trouble you (Krebs & Heyman, 2015).

Despite these problems, there's often insight into the irrationality of the fears and egodystonic ideas (i. e. unwanted and inconsistent with the individual's fundamental values). In a paper entitled a "Network perspective on comorbidities of OCD", the authors suggested that the bridge between OCD and depression includes guilt, concentration problems and sadness (Jones et al, 2017). This was determined by computing an association network on the responses of 87 adolescents with OCD. But guilt, concentration problems and sadness are the primary symptoms of depression. In another paper focused on comorbidities of OCD, 74% were reported to have at least one comorbid diagnosis, 50% reported comorbid anxiety disorder, 32% generalized anxiety disorder, 15% social anxiety disorder, 16% externalizing symptoms and 13% ADHD (Demaria et al,

2021). Depression was surprisingly missing from the list of comorbidities in this study.

Family Prevalence

Although the prevalence of OCD has been cited as extremely low at 1 to 3%, the heritability has been notably high (Demaria et al, 2021). These authors suggested that as many as 17% of parents showed OCD with significantly more fathers than mothers showing traits (20% vs. 2%). Although the rate has been cited as low for siblings at 5%, approximately 35% have been shown to be at risk for OCD.

Parents have been implicated in several studies on OCD in youth. For example, in one study on 547 adolescents entitled “External criticism by parents”, emotional self-regulation and external criticism explained 47% of the variance in obsessive beliefs (Halvaiepour et al, 2016). These data are based on the Obsessive Beliefs Questionnaire. Unfortunately, the variance was lumped, so the amount of variance that was explained by external criticism per se is not clear.

In a paper entitled “Perceived parental rearing style”, five OCD symptom dimensions were classified including contamination/cleaning, aggressive/checking, symmetry/ordering, sexual/religious and hoarding (Alonso et al, 2004). This study on 40 OCD youth and 40 healthy controls suggested that there were greater levels of rejection from fathers. Although there were no differences in the levels of overprotection, hoarding was related to low parental emotional warmth. The relationship between hoarding and low parental emotional warmth is not surprising given that collecting may compensate for feelings of rejection or emptiness. if exposure response prevention teaches youth to face anxieties and to progress to more challenging anxieties, it’s not clear how treatment could reduce the anxiety that’s comorbid with OCD.

In another study entitled the “Psychopathology of parents”, comorbid psychopathology was noted in the parents of OCD youth (8 to 15 years old) versus parents of learning disability youth (Liakopoulou, 2012). 48% had contamination thoughts, 42% aggressive obsessions, 52% washing and cleaning compulsions, 32% comorbid disorders and 16% had two comorbid disorders. Greater anxiety, depression, thought problems and externalizing were noted in the parents. The fathers of OCD youth had higher scores than other parents. Specifically, the fathers had more obsessions and compulsions, and the mothers had more compulsions. The high levels of obsessions and compulsions in fathers and compulsions in mothers are not surprising given the genetic predisposition for OCD in youth. The greater anxiety and depression of the parents are not surprising comorbidities, although those are typically associated with internalizing rather than extrernalizing problems. It’s not clear whether it’s specifically fathers who have significantly higher scores than other parents or whether OCD is more frequent in older males than females. It is surprising that the mothers would show more compulsions than obsessions given that obsessions typically precede compulsions.

In a psychoeducational study that was focused on “family accommodation”, the prevalence of OCD was noted to be 1–3% (Demaria et al, 2021). Fears of catastrophic events of death or illness of self or loved ones were common, although they were more associated with male gender. Increased hoarding and saving compulsions and poor insight were also noted. The parents were thought to be engaging in accommodation, meaning helping reduce anxiety so that compulsive behaviors didn’t occur. The authors suggested that the children may experience accommodation as reinforcement of their beliefs. Accommodation was said to be associated with more severe symptoms, treatment failure, internalizing and externalizing symptoms and treatment drop-out. Despite these data on parental influences, there is no evidence for an association between adverse childhood experiences and OCD (Krebs & Heyman, 2015) and no traumatic or adverse

Table 1. Physical symptoms of OCD in youth (and first authors).

Symptoms	First authors
Facial characteristics	Wang
Olfactory impairment	Bora
Sleep problems	Miniskar, Segalas, Nabinger
Orthorexia nervosa	Gkioulaka

Table 2. Cognitive problems of youth with OCD (and first authors).

Problems	First authors
Social cognition	
-avoidance eye contact	Dalmaso
-less theory of mind	Yazici
Attentional bias to threatening stimuli	Yang
Persistent uncertainty	Hezel
Error-related negativity	Hanna
Hyperactivation orbitofrontal cortex	Krebs

Table 3. Risk factors for OCD in youth (and first authors).

Risk factors	First authors
Genetic factors	Krebs, Grunblatt
Comorbidities	Krebs, Jones, Demaria
Family prevalence	Demaria, Halvaiepour, Alonso, Liakopoulou
Family accommodation	Krebs, Ivarsson
Vitamin deficiencies	Esnafoglu, Yazici
Infection and COVID-19	Krebs,Tanir, Khan, Cunning, Guangjun,Schwartz-Lifshitz

Table 4. Therapies for OCD in youth (and first authors).

Therapies	First authors
Attentional Bias Modification	Klawohn
Cognitive Behavior Therapy	Krebs,Borda, Tao
Medications	Kotapati
Exercise	Abrantes, Freedman

attachment relationships were noted in a study on 100 adolescents (Ivarsson & Larsson, 2009).

Several questions arise here. For example, are the fears of catastrophic events, death or illness of self-or-loved ones reality-based either currently or from past experience? Further, the list of comorbidities is missing depression when reportedly 74% of youth with OCD have a comorbid diagnosis of depression. Is the significantly greater prevalence of OCD in fathers related to fathers per se or is there a greater prevalence generally in males?

Vitamin Deficiencies

Vitamin deficiencies have been noted in youth with OCD. For example, in one study on 52 OCD youth and 30 controls, lower levels of vitamin B-12 and vitamin D were noted and higher levels of homocysteine (Esnafoglu et al, 2017). In another study, vitamin D levels were lower in youth with OCD, but no differences were noted in calcium, phosphate and alkaline phosphatase (Yazici et al, 2019). These data on lower vitamin D levels but a non-significant difference are at odds with other vitamin D study data. It's not clear whether the lower levels of vitamin B 12 and D contributed to OCD or they resulted from OCD. It's also not clear whether the deficiencies are limited to these vitamins in particular. Further, it would seem that vitamin therapy could be effective.

Infection and COVID-19 Involvement

Some evidence has been reported for streptococcal infection involvement in OCD, and multiple studies have cited OCD resulting from COVID-19. Streptococcal infection has been noted as a risk factor in a review of the OCD literature (Krebs & Heyman, 2015). But more recently, several studies have cited COVID-19 as a precursor or comorbidity of OCD. In one study called "Exacerbation of OCD during COVID", compulsive cleaning was associated with talking about COVID-19, preoccupation with COVID, and knowing someone with COVID (Tanir et al, 2020). The increased talking about COVID and the worry and concern about self and others during COVID is not surprising and was certainly not limited to those with OCD. The increase in compulsive cleaning may also be a normal behavior for COVID given that many folks were confined to their homes and without employment.

In another study called "COVID- 19 pandemic fears" on a sample of 63 adolescents with pre-existing psychiatric conditions, 90% had pandemic worry and 50% had elevated OCD scores (Khan et al, 2022). A positive correlation was noted between scores on pandemic worries and OCD measures. Given that pandemic worries are correlated with OCD scales, it was surprising that as many as 90% had pandemic worries while only 50% had elevated OCD scores. It would be interesting to know what differentiated the worries of those who had elevated and those who did not have elevated OCD scores. The nature of the worries would help inform therapeutic efforts.

In a review called "The COVID-19 pandemic effects on OCD", 5 of 6 studies suggested that OCD in youth had been exacerbated by COVID-19 (Cunning & Hodes, 2022). In a study on 4006 university students, three surveys were conducted two weeks into the lockdown, after two weeks of online courses and two weeks later (Guangjun et al, 2020). Those with high OCD scores also had high scores on anxiety and fear scales. The authors called this a pandemic by fear and anxiety interaction effect involved in OCD with fear of negative events leading to greater OCD. In contrast, in a study on 29 children and adolescents, COVID-19 did not exacerbate OCD symptoms (Schwartz- Lifshitz et al, 2021). In general, there was better functioning, but this survey was two weeks into the pandemic during isolation/lockdown and the sample was very small. That youth with high OCD scores also had high anxiety and fear scores is not surprising since those are often comorbid. That OCD scores decreased from 11% during lockdown to 4% during online courses is also not surprising given that lockdown was conducive to OCD behavior and

online courses would require course-related work. The fact that COVID-19 has exacerbated OCD in five of six studies on youth is not surprising as COVID-19 has been very worrisome and fearful for the population at large.

Treatments for OCD

Treatments for OCD have included Attentional Bias Modification Training, Cognitive Behavior Therapy (CBT), exercise and medications. These have been used in some studies as separate treatments and in others as combined treatments.

Attentional Bias Modification

Error-related activity has been associated with heightened responses to errors as negative, potentially harmful events by those with OCD (Klawohn et al, 2021). Attentional Bias Modification (ABM) training has been used to reduce the threat of errors. In this study, 23 participants with OCD were trained to attend to neutral versus negative stimuli, while a group of healthy participants performed a sham version of the training. The initially increased ERN amplitudes decreased in the OCD group after the training, whereas no significant changes in ERN were observed in the healthy group, resulting in non-significant group differences after ABM. The decreased ERN amplitudes may have derived from inattentiveness or habituation of negative stimuli. Even though neutral stimuli were likely boring in this paradigm, they would be preferable to negative stimuli.

Cognitive Behavior Therapy

In a recent review of the literature, combining CBT incorporating “exposure with response prevention” and selective serotonin reuptake inhibitors was thought to be the best treatment (Krebs & Heyman, 2015). Cognitive Behavior Therapy was prescribed for 12-20 weekly sessions and the therapists were asked to wait until anxiety calmed down and then perform the exposure response prevention task. Cognitive Behavior Therapy (CBT) was noted to result in a 40 to 65% reduction of symptoms while selective serotonin reuptake inhibitors (SSRIs) resulted in a 29 to 44% reduction in symptoms. Combining CBT and an SSRI resulted in superior outcomes.

Comorbidity is common in up to 80% of cases and having comorbid depression or anxiety has not appeared to affect the response to treatment (Krebs & Heyman, 2015). Non-responders are typically given an SSRI plus a dopamine antagonist and 50% of those non-responders have improved. CBT has been typically given via phone or Internet in recent times.

In a study on 55 adolescents, over-estimation of threat was significantly decreased after CBT (Borda et al, 2017). And, in a metanalysis of 18 randomized controlled trials that included 1353 youth, CBT plus medication was more effective than medication alone (Tao et al, 2022). Escitalopram (Lexapro) was more effective than other SSRIs that were prescribed.

Medications

A different meta-analysis yielded different results (Kotapati et al, 2019). In this meta-analysis, CBT was not benefited by additional SSRIs, but SSRIs were benefited by the addition of CBT. Fluoxetine and sertraline were superior to fluvoxamine. Exposure and response prevention involved teaching patients to face anxieties by refraining from ritualizing behavior and then progressing to more challenging anxieties as they experience success. Still another review of the literature suggested that CBT plus exposure and response prevention, namely repeated exposure to obsessional stimuli without acting out compulsions, was the most effective treatment (Demaria et al, 2021).

Exercise

Exercise was the only other treatment that appeared in this literature. In one study on the acute effects of aerobic exercise, 55 individuals received 12 weeks of exercise or health education (Abrantes et al, 2019). Exercise resulted in a decrease in anxiety and compulsions. However, this was a small and relatively homogeneous sample. The reduction of anxiety and compulsions following 12 weeks of exercise is not surprising given that aerobics

in itself is an anxiety-reducing, compulsive activity. Further, increased serotonin levels are noted during aerobic exercise which in itself could contribute to the decreased anxiety. In a narrative review of the exercise effects on OCD, two observational and nine intervention studies were included (Freedman & Richter,2021). However, the only randomized control trial yielded negative findings.

Methodological Limitations

The diagnostic process for obsessive compulsive disorder is either a short form of six items that primarily pertain to obsessive symptoms or a long, structured interview. Given the brevity of the short-form screen, it is likely to lead to over-diagnosing. The alternative Yale-Brown Obsessive Compulsive Scale is basically a structured interview that covers obsessions and compulsions and how much time is spent on them. The five symptom dimensions of the Yale-Brown Obsessive Compulsive Scale seem to be focused on compulsions rather than obsessions. This scale would seem to be fraught with lots of potential interpretation errors and limited application to small samples. This probably explains why the samples are small and mostly adolescents. Some of the symptoms given for OCD in youth may be characteristic of youth in general such as 'eveningness' or staying up late.

The diagnostic tasks that are also given such as the "dot probe task" are seemingly boring and may have the problem of retaining adolescents' attention. The differential diagnoses of these disorders that are listed under obsessive compulsive disorder including body dysmorphic disorder, hoarding and trichotillomania seem very different symptomatically even though they are classified under the same section of the DSM-V. The comorbidities with depression and anxiety, which supposedly approximate 80%, would seem to complicate selection of therapies, although some have suggested that the comorbidities do not affect the treatment.

It's not clear how cognitive behavior therapy works if the focus is on exposure to the obsession to prevent the compulsion. if you're blocking the compulsion, then how does the obsession get blocked? If CBT is effective for reducing compulsions but not obsessions, it's not clear how CBT would lead to a reduction in the over-estimation of threat. If exposure and response prevention teaches folks to face anxieties and to progress to more challenging anxieties, it's not clear how treatment could reduce the anxiety that's comorbid with OCD. Supposedly, CBT with exposure and response prevention is the most effective therapy for OCD. If that involves repeated exposure of obsessive stimuli without acting out compulsions, how does the therapy ever rid of the obsessions that predisposed to the compulsions? The findings that CBT is effective alone without an SSRI is inconsistent with the findings that pharmacy and CBT together are more effective than pharmacy alone. If CBT is not affected by adding SSRIs, it's not clear why the SSRIs are prescribed. If vitamin deficiencies are a problem, that would suggest prescribing vitamin therapies, but they are not apparent in this literature. Exercise is not only a distractor from obsessive symptoms but also a stimulant for serotonin release which is therapeutic for OCD.

Seemingly, more than one randomized control trial exists in the literature on OCD, so a review is needed of those RCTs.

Despite these methodological limitations and those cited throughout, several physical and cognitive symptoms and risk factors have been identified. Positive responses to therapies like CBT and exercise suggest that OCD is treatable in youth. Further empirical studies are needed to support the primarily survey studies that currently appear in the literature.

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