

Individual Differences of OCD and Its Mechanism: A Current Review

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ABSTRACT

Obsessive-Compulsive Disorder (OCD) is considered to be one of the ten most disabling diseases. However, the individual differential manifestations and differential mechanisms of OCD still need to be discussed. This article focused on the individual differences of OCD, including sex and age, analyzed the behavioral, prevalence, and symptom expressions of individual differences of OCD patients, and found some possible risk factors/explanations of the phenomenon at the genetic level. First, this paper analyzed sex differences at a behavioral level, namely symptom patterns and disgust sensitivity is an iconic example that acted as a mediator of the sex differences in one theme of obsessions. Second, age differences were examined in two levels: early age and late age of onset. The age difference of OCD may be a reflection of the consequences of different risk factors. Specifically, OCD of late-onset patients could be due to environmental factors or origins, while the early age of onset reflects more genetic factors. Third, this review also wants to know if age and sex differences of OCD have any interactions. Males may have more genetic risk than females of OCD in all ages, but genetic factors generally present early. Finally, this article also wants to figure out if OCD has any potential benefit from evolutionary perspectives. The potential benefits in both individual and group levels were found. By systematically investigating both age and sex differences of OCD individuals, practitioners may develop more efficient treatments and/or prevention to help patients with specific sex and age and provide a reference for researchers.

Keywords: OCD, Age, Sex, Individual differences, Genetic, Risk factors.

1. INTRODUCTION

Historically, Obsessive-Compulsive Disorder (OCD) was ranked by the World Health Organization in the top 10 of the most disabling illnesses, 11th of leading cause of non-fatal burden in the world, accounting for 2.2% of total YLD (years lost to disability) in the 1990s [1]. Research published in 2020 has estimated the current prevalence of OCD was 1.1% and lifetime prevalence was 1.3% worldwide [2].

Past researches heavily focused on the symptoms, the mechanisms, the subtypes, and the specific obsessions/compulsions themes of OCD [3–9]. Many treatments and prevention were developed through those researches. Individual differences of OCD are present, namely sex and age. Individuals with different sex and age tend to show different behavioral, prevalence, and symptom expressions. However, sex-specific and age-specific behavioral and symptom expressions of OCD are not well studied, and sex-specific and age-specific

treatment and prevention are not well developed. Thus, this article focused on the individual differences of OCD, including sex and age, analyzed the behavioral, prevalence, and symptom expressions of individual differences of OCD patients, and expected to find some possible risk factors/explanations of the phenomenon at the genetic level. First, this paper analyzed sex differences at a behavioral level, namely symptoms patterns, and discussed potential risk factors at a genetic level. Second, this article examined age differences in two levels: early age of onset and late age of onset because different risk factors may cause different ages of onset. Nevertheless, this review also wants to know if age and sex differences of OCD have any interactions. Finally, this article also wants to figure out if OCD has any potential benefit from evolutionary perspectives.

2. OBSESSIVE-COMPULSIVE DISORDER

Obsessive-Compulsive Disorder (OCD) is a common mental disorder where a person has obsessive thoughts

(repetitive thoughts) and compulsive behaviors (repetitive routines) that can cause distress and significantly interfere with person's life [10]. OCD can affect almost everyone, including men, women, and children. Symptoms often start around early adulthood but it could happen early around puberty [10]. Iconic OCD compulsions include excessive handwashing and checking if a door is locked. Many healthy people also have obsessions and compulsions, but a person has OCD only if compulsive behaviors occur to such a degree that person's daily life is significantly negatively affected.

2.1. Diagnostic Criteria of OCD

The Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5; American Psychiatric Association, 2013) is the most widely accepted nomenclature used by clinicians and researchers for the classification of mental disorders. OCD was grouped with other anxiety disorders in DSM-4 because the similarities include (a) similar pattern of comorbidity in pro-bands and families, (b) cognitive and emotional processing, and (c) certain temperamental antecedents such as behavioral inhibition [11]. More recently, DSM-5 changed many details regarding the Diagnostic Criteria of Obsessive-Compulsive Disorder (OCD). The most important change is that OCD was removed from the anxiety disorders to its diagnostic entity called Obsessive-Compulsive and Related Disorders. It includes OCD, body dysmorphic disorder, hoarding disorder, hair-pulling disorder (trichotillomania), and skin picking disorder (excoriation) [12]. This change is mainly due to the differences between OCD, and other anxiety disorders include (a) centrality of anxiety symptoms - anxiety symptom is just a common symptom in OCD while it is the common denominator among anxiety disorders, (b) Neurobiological pathways - contemporary models of anxiety disorders center around amygdala hyperresponsivity and amygdala cortical interactions while contemporary models of OCD center around frontostriatal abnormalities [11].

2.2. Symptoms of OCD

The symptoms of OCD usually the presence of both obsessions and compulsions, but it is possible to have only obsessions or compulsions. Obsessions are defined by recurrent intrusive or unwanted thoughts, urges, images, and impulses [12]. Compulsions are defined by repetitive behaviors or mental acts that the person feels driven to perform in response to an obsession or according to the rules that must be applied rigidly. In contrast, the behavior or mental acts are not connected in a realistic way with what they are designed to neutralize, prevent, or excessive [11,12]. Certain themes often include fear of containment, cleaning compulsions, and unwanted or intrusive thoughts such as doubt [13]. Compulsions are typically performed to react to an

obsession, such as fear of contamination resulting in repetitive hand washing or cleaning. They serve to decrease the intense stress accompanying the obsession [11]. In response to unwanted feelings of doubt, individuals may repeatedly make checks and demand reassurance [11-13]. Patients may hold different obsessive-compulsive disorder beliefs [12]. Most patients recognize that obsessions and compulsions are excessive or unreasonable, while some think obsessive-compulsive disorder beliefs are probably true or certainly true [11,12]. No matter what kind of insights patients have, OCD symptoms still take up a significant time and interfere with individuals' daily life.

3. INDIVIDUAL DIFFERENCE IN PREVALENCE OF OCD

Many researchers claimed a sex and age difference in the prevalence of OCD [2]. The current review will focus on symptoms patterns and genetic perspectives to explain the discrepancies between individuals of different ages and sex.

3.1. Sex Difference of OCD

DSM-5 pointed out that the prevalence rate of women is slightly higher than men, and many other researchers have found consistent sex differences among OCD patients [2, 14–16]. Within them, one research found that women were more likely to experience OCD in their lifetime than men, with a lifetime prevalence rate of 1.5% in women and 1.0% in men [2]. Despite the prevalence rate of women being slightly higher than men, one of the most common results is that males experience the onset of OCD at an earlier age than females.

One possible explanation of the sex difference may be the difference in symptoms patterns such as the frequency of specific compulsions and/or obsessions for a given sex. For instance, women are significantly more present in contamination theme [17], and the contamination fear has been claimed to be the most common symptom theme of OCD [18], accounting for 55% of concerns reported by OCD patients [19]. As a result, if the sex difference of contamination fear is associated with sex difference of disgust sensitivity, then sex difference of the prevalence of OCD may be partially associated with disgust sensitivity. Researchers replicated previous findings and supported that females reported more disgust sensitivity and contamination fears than males [20]. They found that disgust sensitivity retained its predictive capability in relation to contamination fears when other potential predictors such as anxiety sensitivity were considered. In contrast, biological sex lost its predictive capability [20]. As a result, researchers argued that disgust sensitivity acted as a mediator of the sex differences in contamination fears [20]. So, the difference in disgust sensitivity may be

associated with the sex difference in the prevalence of OCD. However, it is important to point out that the approach was mainly correlational; thus, no cause-effect relationship can be concluded.

Another possible explanation of the sex difference may be genetic. Researches back in the 19th century have found that monozygotic twins have a significantly higher chance of both having OCD than dizygotic twins through twin studies [21, 22]. Family studies have recently found that OCD is a familial disorder, and the first-degree relative of probands diagnosed with OCD had nearly five times higher lifetime prevalence of OCD [23]. Many pieces of evidence have shown that OCD is familial, and the following research has estimated that the sex-specific genetic penetrance was 86.7% for females and 78.5% for males, and the baseline risk of the high-risk genotypes was around 6.54 for females and around 3.7 for male [24]. It may explain the sex difference report by OCD patients [24]. In 2018, the research found two significant gene-based associations in females: GRID2 and GRP135, which showed no association in males [25]. GRID2 and GRP135 genes are important to OCD and are expressed in the brain [26, 27]. Although it is challenging to detect significant sex-specific effects for OCD due to its modest effect size, these findings indicate that significant sex-specific effects for OCD likely exist [25].

3.2. Age Difference of OCD

Currently, there are normally two levels regarding the age of OCD, namely early age of onset and late age of onset. Interestingly, early-onset patients generally experienced a more gradual appearance of symptoms while late-onset patients normally reported a sudden onset of the disorder [28]. This implies that OCD of late age of onset patients could be due to environmental factors or origins, while early age of onset reflects more genetic factors [23,28]. Nevertheless, early age of onset patients seems related to specific obsessions and compulsions symptoms such as motor and vocal tics while late age of onset patients do not [28]. Also, depression history and triggering factors are associated with late age of onset, further strengthening the idea that OCD of late age of onset patients is more likely due to environmental factors instead of genetic [28]. In sum, an age difference of OCD may reflect the consequences of different risk factors.

Age and sex differences of OCD may not be independent. "OCD is one of many neuropsychiatric traits exhibiting sex differences in both ages of onset and presentation of symptoms" [25]. We know that age at onset in OCD for males is likely earlier than females [29]. Also, research has found that younger adults were more likely to experience OCD than older adults [2]. Nevertheless, the familial aspect of OCD is more present in patients with a younger age of onset, namely earlier than 17 years old, than older age of onset [23]. Also, as

stated above, both male patients and early age of onset patients tend to have more tics symptoms. Meanwhile, male OCD patients are likely to have an early age of onset [23,28]. Risk factors of male OCD patients may be more often be genetic factors than environmental factors. It is also possible that males have more genetic risk than females of OCD in all ages, but genetic factors generally present in an early age. By investigating both age and sex differences of OCD, we might have a better treatment approach to different specific age and sex patients.

4. EFFECTS OF OCD

OCD indeed has a significant negative impact on patient's daily lives, but OCD treatments may not be all negative. It is possible that OCD treatments do have a positive impact on life from different perspectives.

4.1. Negative Effects of OCD

OCD is still among the most prevalent mental disorders, which is concerning given that obsessions and compulsions could lower-income and quality of life. Not just it, the presence of OCD was associated with a significant increase in mortality risk in both natural and natural causes [30]. It is significant even after adjusting for comorbid anxiety disorder, depression, and substance use disorders [30]. Further research also examined the association between OCD and suicide and has found that OCD is associated with an increased risk of death by suicide [31]. However, after controlling for comorbid disorders, the risk of attempted suicide was reduced significantly, which contrasts with the risk of death by suicide. Due to the high comorbidity and the risk of death of OCD, attempted suicide thought should be monitored for OCD patients [31]. Researchers also found that women with OCD were at a higher risk of suicide than men with OCD [31]. However, there is no significant gender difference in terms of life quality so far [16].

The severity of OCD symptoms may be due to various reasons. One of them could be hormones. Female who is experiencing reproductive events are more likely to report a worsening of OCD symptoms [32]. Reproductive events include the premenstrual period, menopause, and pregnancy. Interestingly, many individuals report improving OCD symptoms during pregnancy [32], which contradicts the study. So, we can only try to discuss that female hormone do affect the severity of OCD symptoms. Another factor could be neuropsychological functions. Research has found that OCD patients performed significantly worse on all neuropsychological tasks such as attention, memory, motor skills, and Visual Spatial Orientation [33], which provide valid evidence of the association between OCD and neuropsychological impairment [33]. Furthermore, research also claimed that the association's trait interpretation may indicate that the neuropsychological

impairment may not be determined by the presence of the OCD trait but by the severity of the OCD symptoms [33]. Finally, comorbidity of other mental disorders is likely associated with the severity of OCD. Depression is a common condition in OCD patients, and comorbid patients are more negatively affected by anxiety symptoms [34]. Although OCD patients and depressed OCD patients both responded positively to treatment, depressed OCD patients show less improvement than non-depressed OCD patients [34].

4.2. Potential Benefits of OCD

Perfectionism is commonly believed to be one of the personality traits not disorder. However, it is a trait often seen in OCPD patients, which is similar to OCD but fully supports their behaviors [35]. OCD, on the other hand, hard to come up with any pros since obsessions and compulsions are against someone's own well. We are only looking from an evolutionary perspective to find any benefits.

Is OCD a dysfunction of beneficial evolutionary traits? Back in 1998, researchers proposed an evolutionary perspective of OCD, which claimed that people can involuntarily generate thoughts of risk scenarios and the prevention behaviors without even experience the risk scenarios [36]. According to the authors, this ability enables humans to be better prepared to face similar risk scenarios in the future, and OCD is a consequence of the malfunction of this system [36]. More recently, researchers claimed that OCD is a consequence of a dysregulation of the system responsible for detecting threats and avoiding harm [37]. Although the two researches differ in detail, they do share the core idea that OCD results in a dysregulation/malfunction of a risk/threat avoiding system. Brune (2006) also had a similar model while focusing on the role of cognitive meta-representation [38]. Evolutionary theories discussed above focused on potential benefits for an individual. Polimeni took a different route and hypothesized that OCD has potential benefits for society [39]. By examine hunting and gathering cultures, the author claimed that majority compulsions such as checking, washing, and counting all carry potential benefits to the group [39]. Suppose OCD is in fact a consequence of a malfunction of beneficial system in either individual, group, or both levels. In that case, OCD research should focus much more heavily on understanding the healthy functions of obsessions and compulsions to understand better how they dysfunctional/dysregulation.

5. CONCLUSION

Through a systematic review of current empirical studies, this paper analyzed the behavioral, prevalence, and symptom expression of individual differences of OCD patients and found some possible risk

factors/explanations of the phenomenon in the genetic level. First of all, it is believed that the OCD prevalence rate of women is slightly higher than men. The difference in symptoms patterns such as the frequency of specific compulsions and/or obsessions forgiven sex may partially explain why, and disgust sensitivity is an iconic example that may act as a mediator of the sex differences in contamination fears (one theme obsessions). Also, males experience the onset of OCD generally at an earlier age than do females. Many evidence has shown that OCD is familial, and two significant gene-based associations in females: GRID2 and GRP135, which thought to be important to OCD and expressed in the brain, showed no association in males. Genetic differences between males and females may be the reason, but this sex difference may not be independent of the age difference. From the perspective of age difference alone, the age difference of OCD may reflect the consequences of different risk factors. Specifically, OCD of late age of onset patients could be due to environmental factors or origins, while early age of onset reflects more genetic factors. Suppose sex difference and age difference are not independent. In that case, males may have more genetic risk than females of OCD in all ages, but genetic factors generally present early. Last, it is commonly believed that mental disorders such as OCD only have negative effects. Still, there may be potential benefits to individual and group survival from an evolutionary perspective. However, some theories still need further research to support. By systematically investigating the age and sex differences of OCD individuals, a practitioner may develop more efficient treatments and/or prevention to help patients with specific sex and age and provide a reference for researchers. A future study with a large sample size is needed to identify the sex-specific, age-specific, and sex-age intersect genetic risk factors for OCD.

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