

# Assessment of risk factors in children suffering from obsessive–compulsive disorder

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## Background

Obsessive–compulsive disorder (OCD) is a debilitating illness. The exploration of risk factors of obsessive–compulsive in childhood will offer a different perspective in order to reduce the prevalence of lifelong OCD.

## Aim of the study

This study assessed some risk factors of OCD in a sample of children suffering from OCD, which included history of stressful and/or traumatic life events, positive family history of OCD, pattern of parenting styles, and evidence for post-streptococcal infection.

## Methods

The study was conducted as a cross-sectional comparative study, targeting school-age children (6–12 years old) who suffered from OCD in comparison with typically developing age-matched and sex-matched normal children.

## Results

Statistically significant differences were detected between histories of trauma exposure, anti-streptolysin O titer, and authoritarian parenting styles among the OCD children, in comparison with those of healthy controls.

## Conclusion

Authoritarian parenting style and trauma exposure, particularly of emotional abuse, were established as the most risk factors for developing childhood OCD.

## Keywords:

children, obsessive–compulsive disorder, risk factors

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## Introduction

Obsessive–compulsive disorder (OCD) is one of the most chronic and disabling psychiatric disorder with a lifetime prevalence of 2–3% in the general adult population (Ruscio *et al.*, 2010). The onset of the first obsessive–compulsive symptom (OCS) occurs during childhood in the majority of cases (De Mathis *et al.*, 2013). However, data on the prevalence of OCD among children and adolescents are scarce. Available prevalence estimates range from 0.1 to 3.6% for pediatric-onset OCD, which is highly underdiagnosed and 90% of affected children are left untreated (American Academy of Child and Adolescent Psychiatry AACAP, 2012). The prevalence of OCS among a community sample of Egyptian students was 15.5%, with 2.2% of them who fulfilled the Diagnostic & Statistical Manual of Mental Disorders, 4th Edition, Text Revision (DSM-IV-TR) criteria for OCD (Rady *et al.*, 2013).

In spite of a range of compelling theories and considerable research, the etiology of developing pediatric OCS and/or OCD remains relatively poorly understood, and no definitive cause can be yet identified. OCD is believed to result from a combination of

neurobiological, genetic, environmental, cognitive, or behavioral factors that combine within a specific individual at a certain time point to trigger onset of the illness (Nestadt *et al.*, 2000).

In OCD, either stress may lead directly and causally to the development of symptomatology through a specific vulnerability, or the disorder may exist independently, but exacerbated by stressful life events that precipitate its onset (Real *et al.*, 2011). Environmental triggers include childhood trauma that has been linked to specific neurobiological changes, and associated with an increase in the risk of developing many psychiatric disorders, including OCD (Brander *et al.*, 2016). A significant association was reported between high levels of OCS and childhood trauma, specifically of emotional abuse and physical neglect, and similarly between OCS and conscientiousness, and between conscientiousness and emotional neglect, or sexual abuse, suggesting an indirect role of childhood

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trauma in the development of OCS (Mathews *et al.*, 2008).

The OCD may be linked to behavior-related habits that one learns over time, or a result of developing learned negative thoughts and behavior patterns, toward neutral situations, which can result from previous life experiences (Zohar and Felz, 2001). Social factors are influences in the social environment that help in developing and sustaining the OCS. Family accommodation of OCS has been found to be common in pediatric OCD, as it has been suggested that the parent's response to their child's behavior and the way by which they react, can affect the OCS by either increasing or decreasing the child's anxiety (Geller, 2010).

In addition and according to the social learning theory that learning occurs within the general familial environment, from observing, modeling, and imitating the attitudes, reactions, and behaviors of others (Vasey and Dadds, 2001; McCullough, 2011). Parents can either provide an environmental context that influences the development of anxiety traits (as by frequent criticism), or reinforce the children's experiences of anxiety. It has been proposed that parenting styles may play a significant role in the development and maintenance of different behavioral and psychiatric disorders, such as childhood anxiety (Matejevic *et al.*, 2014). Researchers have concluded that four types of parenting styles were determined as follows: the authoritarian, authoritative, permissive, and uninvolved (Barnhart *et al.*, 2013; Matejevic *et al.*, 2014).

Clinical observations and systematic investigations have suggested a possible role of immune dysregulation in the pathophysiology of childhood OCD that was originally based on the association between infection by group-A beta-hemolytic streptococci (GABHS), and the abrupt onset and subsequent exacerbations of OCD in a subgroup of children. The obsessive thoughts, compulsive behaviors, and motor or vocal tics appeared 'overnight and out of the blue' and usually reached full-scale intensity within 24–48 h (Teixeira *et al.*, 2014).

Biological triggers may include a child's immune-system response to illnesses as in the case of streptococcal bacterial infection that affects the throat and tonsils. Clinical observations and systematic investigations have shown that a subgroup of children with OCD and/or tic disorders experiences

the onset and subsequent exacerbations of their symptoms following infections with group-A beta-hemolytic streptococci (GABHS), which was called PANDAS (pediatric autoimmune neuropsychiatric disorders associated with streptococcus) (Snider and Swedo, 2003; Martino *et al.*, 2009).

So, this study is aimed at assessment of some risk factors of OCD in children. The study hypotheses are history of stressful and/or traumatic life events is a risk factor in developing OCD in children, different patterns of parenting styles can strongly affect developing of OCD in children, positive family history for OCD is a risk factor in developing OCD in children, and there are significant relations between post-streptococcal infection and OCD in children.

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## Patients and methods

Type of study: a cross-sectional comparative study.

Study setting: Childhood Psychiatry Clinic in Suez Canal University Hospital, Suez Canal Authority, and El-Matafy Psychiatric Outpatient Clinic in Ismailia.

### Study population

Case group: 40 school-age children (6–12 years old) who suffered from OCD according to DSM-5.

Control group: another 40 typically developing children that do not suffer from any psychiatric symptoms and their age and sex matched to the studied group. They were selected from pediatric clinics.

The study excluded children diagnosed with organic brain lesions or medical or neurological disorder, such as Sydenham's chorea, systemic lupus erythematosus, Tourette disorder. Also, children diagnosed with autistic spectrum disorder or had intellectual disabilities were excluded from the study.

Psychiatric interviews were held for parents and children, including history-taking questionnaire, history of stressful and/or traumatic life events [other than post-traumatic stress disorder (PTSD)], and a thorough review of the medical history. Parents were assessed for their parenting styles, lifetime history of OCD, and other psychiatric disorders, with detailed family psychiatric history of each parent.

The aim of the study and adequate explanation of the work to the participants was done primarily, and informed written consents have been obtained from parents, prior to inclusion in the study.

The following diagnostic tools and instruments were applied as follows:

- (1) DSM-5 Diagnostic Criteria: for OCD diagnosis (American Psychiatric Association, 2013).
- (2) Family history of OCD or other psychiatric disorders: detailed family psychiatric history was obtained about each parent and the other siblings, including lifetime history of OCD, as well as other psychiatric disorders.
- (3) History of stressful and/or traumatic life events: both children and caregivers were inquired about the history of any stressful or traumatic life events before illness onset, including physical injury and if resulted from domestic violence (physical abuse), sexual abuse, witnessing to accident, emotional abuse (or maltreatment), and whether or not fulfilling the criteria of PTSD.
- (4) Pattern of parenting styles: using the Parenting Styles Questionnaire (PSQ) Arabic version [I].

The PSQ was designed to provide an inventory of parents' perception concerning their behaviors and attitudes toward their children. It was tested for its validity and reliability, by applying a questionnaire on two different populations, under the same circumstances (50 parents of children at nursery schools) with 30-day interval, showed 0.90 results of Pearson's correlation coefficient, indicating that scale of high validity and reliability and could be used at our research.

- (1) Each parent was evaluated for his/her parenting style, using this instrument, which is composed of 70 self-report items. Each item was answered on a four-point scale, with scoring of one to four. These 70 questionnaire items address seven parenting (maternal and paternal) styles such as democratic, acceptance, authoritativeness, cruelty, rejection, overprotection, and negligence (Robinson et al., 1995).

Laboratory assessment: through withdrawal of blood samples as 3 ml (minimum 1.5 ml) through clean venous puncture from children of both groups (after written parents' consent), for estimation of 'anti-streptolysin O titer (ASOT).' Blood samples were withdrawn using plastic-disposable syringe on plain tubes, by a well-trained nurse, with minimal pain and discomfort that might be occurred. All obtained blood specimens were collected and discarded in labs, than following infection-control measures.

A positive test usually is more than 200 U/ml, with repeated serial blood samples to all positive cases within

a 2–4-week interval, to ensure positive results. A single rising titer of ASO was considered as a weak evidence, while either persistent or double-fold rise in ASOT was considered as a strong evidence for recent streptococcal infection.

#### **Data management and statistical analysis**

All data were recorded and statistical analysis was done using the package SPSS, version 20 (Statistical Package for Social Sciences, NC,USA,SAS institution) for Windows. Qualitative data were expressed as frequency (%).  $\chi^2$  test was used for testing statistical significance of the relationship between different categorical variables. Fisher's exact test (or Monte Carlo correction) was used if more than 20% of expected values were less than 5 or any cell contained an expected value less than 1. Spearman coefficient was used to study the correlation between two different quantitative variables.

Multiple logistic regression analysis was used to identify the predictors for OCD. Tables and graphs were used as appropriate. Statistical significance was considered when *P*value was less than 0.05.

#### **Ethical considerations**

All ethical considerations were considered, including:

- (1) An informed consent was fulfilled by all children parents (father and mother for each child, including both groups 'OCD and control') before taking any data or doing any investigations (regarding withdrawal of blood sample), according to the rules of Research Ethics Committee of Suez Canal University.
- (2) In case of illiterate patients, a witness was available.
- (3) No financial compensation for the patients for time and effort was obtained.

#### **Results**

As shown in Table 1, age and sex of both the studied groups were matched to each other, with a relatively higher distribution of the male sex among OCD children. On the other hand, distribution of age groups among OCD children was in ascending order. There was a statistically significant difference regarding the socioeconomic state, as most of the OCD groups were of middle and low socioeconomic standards respectively, while most of the control groups were of middle standard.

Table 2 shows that the OCD group is statistically significantly different from healthy controls ( $P \leq 0.05$ ), with 40% of the OCD group having a

**Table 1 Sociodemographic characteristics of the two studied groups**

	OCD group (N=40) [n (%)]	Control group (N=40) [n (%)]	P
Sex			
Male	22 (55.0)	22 (55.0)	1.000
Female	18 (45.0)	18 (45.0)	
Age (years)			
6–8	11 (27.5)	11 (27.5)	1.000
8–10	14 (35.0)	14 (35.0)	
10–12	15 (37.5)	15 (37.5)	
Residence			
Urban	29 (72.5)	33 (82.5)	0.284
Rural	11 (27.5)	7 (17.5)	
Socioeconomic state			
Low	15 (37.5)	2 (5.0)	0.001*
Middle	22 (55.0)	31 (77.5)	
High	3 (7.5)	7 (17.5)	
Order among siblings			
First order	23 (57.5)	20 (50.0)	0.501
Others	17 (42.5)	20 (50.0)	

OCD, obsessive–compulsive disorder.

P: P value for comparison between the two studied groups.

\*Statistically significant at P value less than or equal to 0.05.

**Table 2 Comparison between the two studied groups according to history of traumatic life events**

History of trauma	OCS group (N=40) [n (%)]	Control (N=40) [n (%)]	MC P
Negative	24 (60.0)	39 (97.5)	<0.001*
Positive	16 (40.0)	1 (2.5)	
Sexual abuse	2 (5.0)	0	
Physical abuse	2 (5.0)	0	
Witness to accident	3 (7.5)	1 (2.5)	
Emotional abuse	9 (22.5)	0	

MC, Monte Carlo; OCS, obsessive–compulsive symptom.

P: P value for comparison between the two studied groups.

\*Statistically significant at P value less than or equal to 0.05.

**Table 3 Comparison between family history of psychiatric disorders of both the studied groups**

Family psychiatric illness	OCD group (N=40) [n (%)]	Control (N=40) [n (%)]	MC P
Parental	23 (57.5)	8 (20.0)	0.541
Father OCD	6 (15.0)	4 (10.0)	
Mother OCD	16 (40.0)	4 (10.0)	
Both have OCD	1 (2.5)	0	
First-degree relatives	35 (87.5)	24 (60.0)	0.104
Bipolar and related disorders	2 (5.0)	0	
Generalized anxiety disorder	29 (72.5)	24 (60.0)	
Schizophrenia spectrum and other psychotic disorders	4 (10.0)	0	

MC, Monte Carlo; OCD, obsessive–compulsive disorder.

P: P value for comparison between the two studied groups.

history of traumatic life events, particularly of emotional abuse, in comparison with only 2.5% of the control group.

As shown in Table 3, there were no statistically significant differences between both the studied groups, regarding either lifetime diagnosis of OCD among their parents, or family history of psychiatric disorders of their first-degree relatives.

Table 4 shows a statistically significant difference between fathers' parenting styles of both the studied groups, as the authoritarian parenting style was the most distributed type among fathers of OCD children, with obtaining the highest scores on cruelty, and the lowest scores on acceptance as well as rejection, in comparison with the authoritative parenting style, among those of healthy controls, with obtaining the highest scores on acceptance, and the lowest scores on

**Table 4 Comparison between the two studied groups according to fathers' parenting styles, using global assessment and scoring assessment**

Fathers' parenting styles	OCD group (N=40) [n (%)]	Control group (N=40) [n (%)]	P
Global assessment			
Authoritarian	19 (47.5)	6 (15.0)	0.005*
Authoritative	7 (17.5)	19 (47.5)	
Permissive	4 (10.0)	6 (15.0)	
Uninvolved	10 (25.0)	9 (22.5)	
Highest score			
Democratic	0	7 (17.5)	MC $P$ <0.001*
Acceptance	7 (17.5)	15 (37.5)	
Authoritativeness	1 (2.5)	2 (5.0)	
Cruelty	18 (45.0)	4 (10.0)	
Overprotection	3 (7.5)	5 (12.5)	
Negligence	11 (27.5)	7 (17.5)	
Lowest score			
Democratic	8 (20.0)	4 (10.0)	MC $P$ =0.007*
Acceptance	9 (22.5)	2 (5.0)	
Authoritativeness	1 (2.5)	0	
Cruelty	7 (17.5)	18 (45.0)	
Rejection	9 (22.5)	8 (20.0)	
Overprotection	4 (10.0)	1 (2.5)	
Negligence	2 (5.0)	7 (17.5)	

MC, Monte Carlo; OCD, obsessive-compulsive disorder.

P: P value for comparison between the two studied groups.

\*Statistically significant at P value less than or equal to 0.05.

**Table 5 Comparison between the two studied groups according to mothers' parenting styles, using global assessment and scoring assessment**

Mothers' parenting styles	OCD group (N=40) [n (%)]	Control group (N=40) [n (%)]	P
Global assessment			
Absence by death, traveling, and divorce	1 (2.5)	0	MC $P$ <0.001*
Authoritarian	19 (47.5)	5 (12.5)	
Authoritative	15 (37.5)	13 (32.5)	
Permissive (or indulgent)	4 (10.0)	16 (40.0)	
Uninvolved	1 (2.5)	6 (15.5)	
Highest score			
Absence by death, traveling, and divorce	1 (2.5)	0	MC $P$ =0.002*
Democratic	2 (5.0)	1 (2.5)	
Acceptance	12 (30.0)	23 (57.5)	
Authoritativeness	12 (30.0)	5 (12.5)	
Cruelty	7 (17.5)	0	
Overprotection	5 (12.5)	6 (15.0)	
Negligence	1 (2.5)	5 (12.5)	
Lowest score			
Absence by death, traveling, and divorce	1 (2.5)	0	MC $P$ =0.010*
Democratic	3 (7.5)	1 (2.5)	
Acceptance	2 (5.0)	3 (7.5)	
Cruelty	4 (10.0)	15 (37.5)	
Rejection	12 (30.0)	6 (15.0)	
Overprotection	0	3 (7.5)	
Negligence	18 (45.0)	12 (30.0)	

MC, Monte Carlo; OCD, obsessive-compulsive disorder.

P: P value for comparison between the two studied groups.

\*Statistically significant at P value less than or equal to 0.05.

**Table 6 Comparison between the two studied groups according to anti-streptolysin O titer**

ASOT	OCS group (N=40) [n (%)]	Control (N=40) [n (%)]	P
No	13 (32.5)	24 (60.0)	0.046*
Weak	18 (45.0)	10 (25.0)	
Strong	9 (22.5)	6 (15.0)	

No: negative ASO titers less than 200 U/ml.

Weak: single rising titer of ASO (>200 U/ml) followed by negative test (<200 U/ml), after repeated serial blood samples within 2–4-week interval.

Strong: persistent or double-fold rise in ASOT (>200 U/ml), after repeated serial blood samples, within 2–4-week interval.

ASOT, anti-streptolysin O titer; OCS, obsessive–compulsive symptom.

P: P value for comparison between the two studied groups.

\*Statistically significant at P value less than or equal to 0.05.

cruelty, regarding both global and scoring assessment, respectively.

Table 5 shows a statistically significant difference between mothers' parenting styles of both the studied groups, as the authoritarian parenting style was the most distributed type among mothers of OCD children, with obtaining the highest scores on authoritativeness as well as acceptance, and the lowest scores on negligence, in comparison with permissive (or indulgent) parenting style, among those of healthy controls, with obtaining the highest scores on acceptance, and the lowest scores on cruelty, regarding both global and scoring assessment, respectively.

Table 6 shows a statistically significant difference of ASOT results among the OCD children, in comparison with controls, indicating higher incidence of recent group-A beta-hemolytic streptococcal infection among the OCS children ( $P \leq 0.05$ ).

## Discussion

Considering that OCD has a heterogeneous etiology, and the exact causes and underlying pathogenesis of the disorder are not well understood, the purpose of this study was to assess some risk factors in school-aged children suffering from OCD in comparison with age-matched and sex-matched healthy children, who were not suffering from any psychiatric symptoms or disorders.

The results of this study showed that the male sex was relatively predominant among the OCD group. It has been noted also that the OCD was more frequent among children aged from 10 to 12 years, while it was less frequent in children aged from 6 to 8 years. Previous epidemiological studies that studied the correlation between OCD and the socioeconomic status are contradictory and nonconclusive. The current study shows statistically significant

distribution of OCD among children of middle and low socioeconomic state, respectively (Table 1). There were no statistically significant differences between the two studied groups regarding residence, whether being from urban or rural area. The present study could not find any statistically significant differences among the first-born children between both the studied groups (Table 1).

The result of the current study has shown statistically significant history of traumatic life events, that was reported among OCD children, in comparison with others of healthy control, with the majority of them having a history of emotional abuse (Table 2). This result strongly supports evidence of a unique relation between trauma exposure and OCD even in the absence of a formal PTSD diagnosis that comes in line with other several studies (Fontenelle *et al.*, 2012; Kroska *et al.*, 2018). Similarly, studies have found a significantly elevated rate of negative life events that were reported in one year prior to onset of OCD in children in an outpatient setting (Gothelf *et al.*, 2004).

These findings came in agreement with a comparable study that has examined the relationship between childhood trauma and OCD in 938 students, using the LOI-CV. Between 13 and 30% of patients met the criteria for childhood trauma, with the most commonly reported experience that was the emotional neglect. There was a small but significant association between OCD and childhood trauma, particularly emotional abuse and physical neglect (Mathews *et al.*, 2008).

In contrast to our expectations, there was no statistically significant difference in lifetime diagnosis of OCD and other psychiatric disorders, either between parents or the first-degree relatives, of both the studied groups (Table 3).

These findings became consistent with many studies that were researching for age-related changes in anxiety generally, and have shown moderate stability during

childhood and reported an influence of shared environmental factors on emerging OCS, that fades as children enter adolescence (Hudziak *et al.*, 2004; Van Grootheest *et al.*, 2007; Lamb *et al.*, 2010). It was suggested that possible gene–environment interactions include the effect of exposure to a traumatic event or environmental stress that may predispose to the risk of developing childhood OCD, rather than genetic factor alone (Walitza *et al.*, 2008; Walitza *et al.*, 2010). Thus, our results can be explained by the need of multiple risk factors for development of OCD.

Concerning parenting styles, the results of the present study showed a statistically significant difference between parenting styles of both the studied groups, as the authoritarian parenting style was the most prominent style among fathers of OCD children, with obtaining the highest scores on cruelty, in comparison with authoritative style, among those of healthy controls, with obtaining the highest scores on acceptance (Table 4).

On the other hand, the authoritarian parenting style was also the most prominent style among mothers of OCD children, with obtaining the highest scores on authoritativeness as well as acceptance, in comparison with permissive style, among those of healthy controls, with obtaining the highest scores on acceptance (Table 5).

In line with these findings, it was found in previous review that OCS was strongly associated with retrospective and observational studies of authoritarian parenting. Also, authoritative parenting, which includes both high levels of warmth and behavioral control, was negatively correlated with OCS. Analyses revealed that OCS was specifically linked only with authoritarian parenting after taking into account the other parenting styles and general mood and anxiety symptoms (Ballash *et al.*, 2006).

Also, the results of the current study were in agreement with previous research that has hypothesized a central role of social learning as parent–child interactions, in the development of OCD, according to cognitive behavioral theories. The relationships between parenting styles, OCSs, and obsessive beliefs, were examined in a nonclinical sample ( $N=227$ ). The results indicated that the authoritarian parenting style was significantly associated with both OCS and OC beliefs, even after controlling for general distress (Timpano *et al.*, 2010).

Regarding ASOT, the results of the current study showed a statistically significant difference between ASOT of OCD children, in comparison with other healthy controls, indicating evidence of recent group-A beta-hemolytic streptococcal infection among the OCD children (Table 6).

In agreement with our results, the levels of ASOT in addition to other autoantibodies, were assessed in a large cohort study of 77 children and adolescents (59 males, 18 females, with the mean age at  $6.3\pm 2.5$  and  $14.5\pm 2.0$  years) of sudden onset or abrupt exacerbations of OCS and/or tics, to evaluate the prevalence of autoimmune phenomena in patients with PANDAS. On comparison with those of age-matched and sex-matched healthy controls, there were significantly higher ASOT and anti-DNAseB titers, as well as a history of more frequent throat infections than controls among PANDAS patients (Stagi *et al.*, 2014).

A previous study was conducted among 40 adult OCD patients, subdivided into 18 of early onset and 22 of late onset, in comparison with 14 controls of psychiatric patients. It was found that childhood-onset OCD was associated with higher mean ASOT, higher frequencies of tic disorders, and tonsillitis, without any differences in other autoimmune parameters. This can explain the role of autoimmunity in the pathogenesis of some forms of childhood-onset OCD, as in PANDAS (Morer *et al.*, 2006).

Furthermore, it is important to mention that a persistent elevated ASOT will add support, but not provide proof that OCD resulted from a streptococcal infection, which is very common in the school-age children. On the other hand, neither high nor low blood level of ASOT alone could confirm or rule out PANDAS, and further exploration of markers other than ASOT is needed.

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## Conclusion

This study concluded the following:

- (1) Authoritarian parenting style as well as cruelty and authoritativeness, even in the presence of acceptance, were established as the most risk factors or predictors for developing childhood OCD, together with trauma exposure, particularly that of emotional abuse (either of maltreatment or neglect) even in the absence of a formal PTSD diagnosis.
- (2) The role of post-streptococcal infection in OCD pathogenesis could not be excluded, as it was

identified as a risk factor for the development of OCD in school-age children, although we could not provide a definite evidence.

### Limitations of the study

- (1) The foremost and obvious limitation of this study is that it was conducted on a small sample size and in one geographical area. Consequently, the participants might not be representative of the general population, which have consequences in reducing statistical power and capacity to generalize our research's findings.
- (2) The measurements used in this study consisted of self-report questionnaires, most questions were descriptively oriented, and some scores might be a result of faulty observations and/or interpretations of children and their parents. One could argue that these measures lack accuracy and validity.
- (3) PSQ was filled out from parents or even caregivers, who have been assumed the absent role (whether died, divorced, traveling away, or arrested in prison), not sticky to the parent himself, which did not allow for reliable comparisons, and impair the validity of the obtained information.

### Recommendations

- (1) Conducting more extensive, larger, longitudinal studies that will strengthen the statistical significance of our study's results with further monitoring of progression of these symptoms from childhood to adulthood.
- (2) Future research should investigate additional risk and protective factors of OCD. Beyond this, risk factors could be examined in relation to the specific symptom dimensions such as checking, contamination/washing, . . . , etc. On the other hand, protective factors may include social support and religious involvement.
- (3) Preventive strategies should focus on positive parenting and nonviolent caregiving measures, as well as psychoeducation programs on optimal parenting styles with early establishment of effective practices, which are supposed to be important for the child's social and emotional growth adjustment.

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### Conflicts of interest

There are no conflicts of interest.

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