

# The subthreshold autistic traits in patients with adult-onset obsessive-compulsive disorder: a comparative study with adolescent patients

## *I tratti autistici sottosoglia in pazienti con disturbo ossessivo-compulsivo a insorgenza nell'età adulta: uno studio comparativo con pazienti adolescenti*

CAGDAS OYKU MEMIS<sup>1</sup>, DOGA SEVINCOK<sup>2</sup>, BILGE DOGAN<sup>1</sup>, CANSU BAYGIN<sup>1</sup>, MUTLU OZBEK<sup>2</sup>,  
AYSE KUTLU<sup>3</sup>, BURCU CAKALOZ<sup>4</sup>, LEVENT SEVINCOK<sup>1</sup>

E-mail: lsevincok@adu.edu.tr

<sup>1</sup>Department of Psychiatry, Adnan Menderes University, Aydin, Turkey

<sup>2</sup>Department of Child and Adolescent Psychiatry, Adnan Menderes University, Aydin, Turkey

<sup>3</sup>Child Diseases and Pediatric Surgery Training and Research Hospital, Department of Child and Adolescent Psychiatry, Izmir, Turkey

<sup>4</sup>Department of Child and Adolescent Psychiatry, Pamukkale University, Turkey

**SUMMARY. Objective.** The primary objective of this study was to compare the adult-onset and adolescent obsessive-compulsive disorder (OCD) patients in terms of the subthreshold autistic traits. **Methods.** 29 adolescent, and 45 adult-onset OCD patients were assessed by Autism-spectrum Quotient (AQ). **Results.** The ratio of males to females, the frequency of ritualistic compulsions, and the mean number of lifetime compulsions were significantly higher in adolescents with OCD compared to adult-onset patients. Adult-onset OCD patients had significantly higher scores on total, social skills, attention shifting, and imagination subscales of AQ than adolescent OCD patients. The mean number of compulsions, attention shifting scores of AQ, and female gender significantly predicted the distinction between adolescent and adult-onset OCD patients. In adult-onset patients, there were significant correlations between the mean number of lifetime obsessions and total, social skills, attention switching, communication, and imagination subscale scores of AQ. **Conclusions.** We suggest that subthreshold autistic traits may play a significant role in the occurrence of obsessive-compulsive symptoms (OCS) in adult-onset OCD. Autistic traits seemed to be higher and had a closer relationship with the frequency of lifetime obsessions in AO-OCD patients than in adolescent patients.

**KEY WORDS:** autistic traits, obsessive-compulsive disorder, adolescents, adults.

**RIASSUNTO. Scopo.** L'obiettivo principale di questo studio è stato quello di confrontare i pazienti con disturbo ossessivo-compulsivo (DOC) dell'adulto e dell'adolescenza in termini di tratti autistici sottosoglia. **Metodi.** 29 adolescenti e 45 pazienti con insorgenza in età adulta sono stati valutati con l'Autism-spectrum Quotient (AQ). **Risultati.** Il rapporto tra maschi e femmine, la frequenza delle compulsioni ritualistiche e il numero medio di compulsioni durante la vita erano significativamente più alti negli adolescenti con DOC in confronto ai pazienti con insorgenza in età adulta. Questi ultimi hanno avuto punteggi significativamente più alti su totale, abilità sociali, spostamento dell'attenzione e sottoscale immaginazione di AQ rispetto ai pazienti adolescenti con DOC. Il numero medio di compulsioni, i punteggi in grado di spostare l'attenzione di AQ e il genere femminile hanno previsto in modo significativo la distinzione tra pazienti con DOC in età adolescenziale e adulti. Nei pazienti con insorgenza in età adulta, vi erano correlazioni significative tra il numero medio di ossessioni durante la vita e le abilità totali, di abilità sociali, di cambio di attenzione, di comunicazione e di immaginazione sottoscale di AQ. **Conclusioni.** L'indicazione è che i tratti autistici sottosoglia possano svolgere un ruolo significativo nella comparsa di sintomi ossessivo-compulsivi nell'ADD a esordio in età adulta. I tratti autistici sembravano essere più alti e avevano una relazione più stretta con la frequenza delle ossessioni della vita nei pazienti con AO-OCD rispetto ai pazienti adolescenti.

**PAROLE CHIAVE:** tratti autistici, disturbo ossessivo-compulsivo, adolescenti, adulti.

## INTRODUCTION

Obsessive-compulsive disorder (OCD) is a heterogeneous neuropsychiatric disorder characterized by recurrent intrusive thoughts and repetitive ritualistic acts. The prevalence of OCD is estimated between 0.5-4% in youngs<sup>1,2</sup> and between 2-3% in adults<sup>3</sup>. Many studies have found that child

and adolescent-onset OCD patients had male dominance<sup>4,5</sup>, more severe and resistant symptoms<sup>6-8</sup>, a family history of OCD<sup>9-11</sup>, higher rates of comorbidity with disruptive behavior disorders, attention deficit hyperactivity disorder and Tourette's syndrome<sup>6,9,10,12,13</sup>, other anxiety disorders<sup>14</sup> than adult-onset OCD. Further, adolescent patients are more likely to present with compulsions<sup>15,16</sup>, higher rates of aggres-

### *The subthreshold autistic traits in patients with adult-onset obsessive-compulsive disorder*

sive obsessions, and repeating, ordering/arranging and hoarding compulsions<sup>14,15</sup> than adult OCD patients.

OCD and autism spectrum disorders (ASD) share similar clinical characteristics, particularly symptoms of repetitive or stereotyped behaviors, inflexibility, the need for sameness<sup>17</sup>. Repetitive rituals such as ordering, hoarding, touching, or tapping are frequently seen in autism and many of these behaviours are similar to those seen in OCD patients<sup>17-20</sup>. Autistic-like traits are considered as milder manifestations of psychopathology or as existing at the border between normal and pathological conditions. The presence of restricted repetitive behaviours can be noticed as early as the first 12 months of age who are later diagnosed with ASD<sup>21</sup>. Autistic-like traits, also named as the “broader autistic phenotype”, include reduced social skills, narrow interests, repetitive rituals, and increased attention to details<sup>22</sup>. Previous research has shown a high prevalence of autistic-like traits in both children<sup>17,18,20,23</sup> and adults with OCD<sup>24,25</sup>.

Despite some evidence for several clinical differences between juvenile-onset and adult-onset OCD, some uncertainties still exist in demonstrating the importance of autistic traits in adolescent and adult patients with OCD. It is also unclear whether autistic traits among OCD patients are generally elevated across development, or whether they are concentrated in younger samples. Therefore, this study tried to demonstrate that subthreshold autistic traits are not specific to adolescent OCD patients (A-OCD), but also are associated with adult-onset (AO) OCD. A direct comparison of adolescent and adult-onset OCD may help us to better understand the associations of autistic traits with OCD across two patient groups. The primary objectives of this study were: 1) to compare the adult-onset and adolescent OCD patients regarding the autistic traits; and 2) to investigate the relationships between subthreshold autistic traits and OCD within two age groups. Therefore, comparing the adult-onset and adolescent OCD patients, we hypothesized that the subthreshold autistic traits might also be related to OCD symptomatology in AO-OCD patients as much as or more than in A-OCD patients.

## **MATERIALS AND METHODS**

The individuals with AO-OCD (onset age and current age >18 years; n=45), and (A-OCD) (onset age and current age ≤18 years; n=29) who admitted to Adult, and Child and Adolescent Psychiatry Departments were included in the study. The patients were screened by Structured Clinical Interviews for Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) Axis I Disorders (SCID-I)<sup>26</sup>, or Kiddie Schedule for Affective Disorders and Schizophrenia-Present state and Lifetime version (KSADS-PL)<sup>27,28</sup>. The patients with current and lifetime diagnoses of mental retardation, psychotic disorders, bipolar disorders, alcohol/substance use disorders were excluded from participation. The diagnostic assessment of ASD was made according to DSM-IV-TR criteria for ASD diagnoses such as autism, Asperger's syndrome, or atypical autism. Detailed information on demographic and clinical features of the sample (age at onset of OCD, gender, the presence of comorbid psychiatric diagnoses) was collected from parents, clinical interviews or retrospective investigation of medical records. We defined age at onset of OCD as the age that the patient, or a family member, remembered as the beginning of the obsessive-compulsive symptoms (OCS). Eighteen participants

in adolescent group, and thirty four patients in adult group were under the antidepressant and/or antipsychotic treatment during the assessment. None of the patients were participating in psychotherapy at the time of participation. The study was approved by the institutional review board, and all participants or parents gave their written informed consent before participating.

The severity and content of OCS were determined through the Childhood Yale-Brown Obsessive-Compulsive Scale (CBYBOCS)<sup>29,30</sup> and Yale-Brown Obsessive-Compulsive Scale (YBOCS)<sup>31,32</sup>. The CBYBOCS and YBOCS are semi-structured interviews containing checklists of obsessions and compulsions. Scales assessing the severity of obsessions and compulsions separately (range 0-20) are added to a total score (range 0-40).

Autism symptoms were rated by Autism Spectrum Quotient (AQ)<sup>22</sup>. The AQ is a self-administrated, 50 item questionnaire designed to quantify autism traits in subjects of normal intelligence. The AQ consists of five subscales each containing 10 items assessing social skill, attention switching, attention to detail, communication, and imagination. Each question demands the participant to indicate the extent to which they agree or disagree with the item. Turkish version of AQ was found to be a reliable instrument in university students<sup>33</sup>, and previously used in adolescent studies<sup>34,35</sup>.

## **Statistical analysis**

The group differences were examined using chi-square, and student's t test, according to normal distribution. The correlations between several clinical variables of interest were examined with Spearman correlations. A multiple logistic regression analysis was made to determine the associations between the predictors and the dependent variable (adolescent and adult patients with OCD). All statistical assessments were two tailed, and we considered results to be significant at  $p < 0.05$ . We used SPSS version 22.0 statistical software (SPSS Inc., Chicago, IL, USA) to perform our analyses.

## **RESULTS**

The general description of the adolescent and adult-onset OCD groups are presented in Table 1. As indicated in Table 1, the ratio of males to females was significantly higher in A-OCD group compared to AO-OCD group ( $p = 0.02$ ). The frequency of ritualistic compulsions ( $p = 0.001$ ), and the mean number of compulsions ( $p < 0.0001$ ) were significantly higher in A-OCD patients than in adult patients. AO-OCD patients had significantly higher scores on total ( $p = 0.002$ ), social skill ( $p = 0.03$ ), attention shifting ( $p = 0.004$ ), and imagination ( $p = 0.03$ ) subscales of AQ than A-OCD patients. To determine the variables which would predict the differences between adolescent and adult patients with OCD, six predictors (gender, mean number of compulsions, social skills, attention shifting and imagination subscale scores of AQ, and ritualistic compulsions) were included in a backward multivariable logistic analysis. The final model was found to fit the data adequately (Hosmer and Lemeshow's  $\chi^2 = 5.994$ ,  $p = 0.540$ ). Overall, the model was able to correctly predict 74.6% of the cases. The mean number of compulsions (Exp(B))=0.457, 95% CI: 0.290-0.721,  $p = 0.001$ ), attention shifting scores of AQ (Exp(B))=1.727, 95% CI: 1.198-2.490,  $p = 0.003$ ), and fe-

Table 1. General description of two patient groups.

	Adolescent OCD (n=29)		Adult-onset OCD (n=45)	
	n	%	n	%
Marital status				
Single	29	100	16	35.6
Married	-	-	28	62.2
Divorced/separated	-	-	1	2.2
	Mean	SD	Mean	SD
Age	14.5	2.1	31.0	7.4
Educational level (years)	7.7	2.8	11.9	4.2
The age at onset of OCD	10.7	3.3	22.6	3.9

male gender (Exp(B)=0.294, 95% CI: 0.088-0.988, p=0.048) significantly predicted the distinction between adolescent and adult patients with OCD (Table 3).

The correlation analyses indicated that the communication subscale scores of AQ were significantly correlated with both the mean number of obsessions (r=0.48, p=0.007), and compulsions (r=0.40, p=0.02) in adolescent patients (Table 4). In AO-OCD group, there were significant correlations between the mean number of obsessions and total (r=0.33, p=0.02), social skills (r=0.36, p=0.01), attention switching (r=0.31, p=0.04), communication (r=0.37, p=0.01), and imagination subscale scores of AQ (r=0.34, p=0.02) (Table 5).

**DISCUSSION**

The main purposes of the present study were to compare the A-OCD and A-OCD patients with respect to subthreshold autistic traits, and to investigate the relationships of au-

Table 2. The sociodemographic and clinical comparison of adult-onset and adolescent OCD patients.

	Adolescent OCD (n=29)		Adult-onset OCD (n=45)		Statistical analyses		
	n	%	n	%	χ <sup>2</sup>	df	P
Gender					4.77	1	0.02*
Male/Female	15/14	51.7/48.3	12/33	26.7/73.3			
Comorbid diagnoses of any psychiatric disorders	9	31.0	15	33.3	0.04	1	0.83
Lifetime obsessions							
Contamination	21	72.4	31	72.1	0.001	1	0.97
Agressive	20	69.0	20	46.5	3.53	1	0.06
Sexual	6	20.7	8	18.6	0.04	1	0.82
Hoarding	6	20.7	6	14.0	0.56	1	0.45
Religious	14	48.3	13	30.2	2.40	1	0.12
Somatic	9	31.0	8	18.6	1.48	1	0.22
Lifetime compulsions							
Cleaning	16	55.2	30	69.8	1.59	1	0.20
Checking	25	86.2	29	67.4	3.23	1	0.07
Ritualistic	21	72.4	14	32.6	11.01	1	0.001*
Counting	8	27.6	8	18.6	0.80	1	0.36
Ordering	8	27.6	11	25.6	0.03	1	0.85
Hoarding	6	20.7	4	9.3	1.87	1	0.17
	Mean	SD	Mean	SD	t	df	p
Mean number of lifetime							
Obsessions	3.1	1.4	2.5	1.4	1.74	73	0.08
Compulsions	3.9	1.5	2.5	1.4	3.69	73	<0.0001
CYBOCS/YBOCS							
Total	22.7	6.3	21.6	8.6	0.59	73	0.55
Obsession	11.6	3.5	11.2	4.2	0.42	73	0.67
Compulsion	11.1	3.0	10.4	4.8	0.68	73	0.49
AQ Total	19.1	5.9	23.3	4.9	-3.19	73	0.002*
Social skill	3.6	1.8	4.6	1.8	-2.18	73	0.03*
Attention shifting	4.4	1.9	5.7	1.8	-2.98	73	0.004*
Attention to detail	4.8	2.3	5.1	2.0	-0.53	73	0.27
Communication	2.6	2.1	3.2	1.7	-1.17	73	0.53
Imagination	3.5	1.9	4.5	1.9	-2.13	73	0.03*

*The subthreshold autistic traits in patients with adult-onset obsessive-compulsive disorder*

Table 3. Logistic regression model for adolescent and adult OCD patients.

Independent variables	B	S.E.	Exp(B) (99% CI)	P
The mean number of compulsions	-0.783	0.233	0.457 (0.290-0.721)	0.001
Attention shifting	0.547	0.187	1.727 (1.198-2.490)	0.003
Gender	-1.224	0.618	0.294 (0.088-0.988)	0.048
Constant	0.132	0.934	1.141	0.887

tistic traits with OCD within two groups. Comparing adult-onset and adolescent OCD patients, we hypothesized that the subthreshold autistic traits might also be related to OCD symptomatology as much as or more than AO-OCD patients.

Our results demonstrated that A-OCD group had significantly higher proportion of males compared with AO-OCD group, in accordance with some of the studies<sup>4,5,12-15,36</sup>. Patients with AO-OCD showed a significantly higher proportion of females compared with adolescent patients, consistent with the findings of Dell’Osso et al<sup>37</sup>. Multiple regression analysis also demonstrated that gender was a strong pre-

dictor of adult-onset or adolescent OCD. In this study, age at onset of OCD was not related to the severity of autistic traits within both groups. This finding might indicate that autistic traits have a lifetime and stable course across the patient groups. Autism was traditionally considered as a clinical condition distinct from the general population, but recent evidence suggests autistic traits are continuously distributed across the population from the normal range to the clinical extreme conditions<sup>38-40</sup>. Autistic traits appear to be moderately stable from childhood to early adulthood. In this study, we also failed to find any significant relationships between the current severity of OCD symptomatology and autistic traits. The high proportion of the patients who were under treatment with antidepressants during the assessment period might partly explain this finding. There is no previous agreement on the specific content of OCS associated with adult-onset and adolescent OCD. In the present study, we have found that A-OCD patients had more compulsions, and higher rates of ritualistic compulsions than those with AO-OCD, in consistent with some of the studies which reported that adolescent subjects had more compulsions<sup>14,16</sup>, and higher rates of aggressive obsessions, and repeating, ordering/arranging and hoarding compulsions<sup>14,15</sup> compared to adult OCD patients. Our results also demonstrated that the difference between adult-onset and adolescent OCD patients was significantly predicted by the mean number of lifetime compulsions. This finding is in accordance with some

Table 4. Correlations of AQ scores with age at onset and the mean number of lifetime OCS in adult patients (n=45).

	Age at onset of OCD	The mean number of lifetime compulsions	The mean number of lifetime obsessions	YBOCS Total/obsession/compulsion
AQ Total	0.08	0.24	0.34	0.17/0.19/0.17
Social skill	0.33	0.13	0.25	0.08/0.05/0.12
Attention switching	0.18	0.36	0.14	0.26/0.28/0.23
Attention to detail	0.35	0.12	0.24	0.08/0.12/0.04
Communication	0.16	0.40*	0.48*	0.15/0.18/0.13
Imagination	0.07	0.16	0.24	0.03/0.05/0.03

\*p<0.05

Table 5. Correlations of AQ scores with age at onset and the mean number of lifetime OCS in adult patients (n=29).

	Age at onset of OCD	The mean number of lifetime compulsions	The mean number of lifetime obsessions	YBOCS Total/obsession/compulsion
AQ Total	0.05	0.13	0.33*	0.21/0.22/0.19
Socialskill	0.15	0.27	0.36*	0.23/0.21/0.22
Attention switching	0.17	0.16	0.31*	0.21/0.24/0.18
Attention to detail	0.06	0.01	0.01	0.21/0.24/0.18
Communication	0.06	0.16	0.37*	0.007/0.06/0.07
Imagination	0.08	0.28	0.34*	0.21/0.19/0.23

\*p<0.05

studies which reported that the frequency of compulsions tended to decrease as age increases. Compared to repetitive motor acts and compulsions, which lessen in frequency as an individual gets older, restricted interests and obsessions continue to persist in older populations<sup>21,41-45</sup>. Clinical research demonstrate that autistic traits present in both children<sup>17,18,20,23</sup> and adults with OCD<sup>24,25</sup>. In our study, AO-OCD patients displayed more severe autistic traits than adolescent subjects with OCD. Particularly, the traits in social skills, attention shifting, and imagination domains were considerably higher in adult-onset patients than in adolescent OCD patients. Among these traits, attention shifting scores of AQ were found to be the strongest predictor for adult-onset OCD. Similarly, Cath et al.<sup>20</sup> reported that the adult patients with OCD and ASD had significantly higher scores on AQ subscale 'attention shifting' than the OCD group. In our study, there were also significant differences between two patient groups in terms associations of autistic traits with the mean number of lifetime OCS. In adolescent subjects, the difficulties in communication was found to be significantly correlated with the lifetime frequency of both obsessions and compulsions. In contrast, there were no relationships between the mean number of compulsions and autistic traits within AO-OCD group. However, the all autistic traits except attention to detail displayed significant correlations with the lifetime frequency of obsessions in these patients. These findings might indicate that subthreshold autistic traits in AO-OCD patients had broader and more intense associations with the frequency of obsessions compared to adolescent patients. A previous study<sup>19</sup> found an overall positive correlation between AQ total scores and YBOCS severity scores. Specifically, attention shifting and communication subscales of AQ subscales were significant predictors of OCD symptom severity while the difficulties in attention to detail demonstrated low correlation with OCD symptoms and severity. Attention switching and communication traits were the most important predictors of 'aggression and checking', 'symmetry and ordering' and 'contamination and washing' symptoms. Some studies found several deficits in focused attention, sustained attention, selective attention, attention span, and information processing in comparison to healthy controls<sup>46-48</sup>. Clinical symptoms of inattention have been reported especially in pediatric patients with OCD<sup>49</sup>, and children with OCD have shown deficits in selective and focused attention<sup>20,50</sup>. Difficulties in the social use of language could be a reliable autistic feature Autism symptomatology in the language and communication domain of impairment can also include a significant delay in the acquisition, comprehension and articulation of speech. Communication with the patient is universally impaired to some degree in autism<sup>51</sup>.

### Limitations

The small sample size may prevent the generalization of our findings. Further studies in larger samples are required to confirm the results of this study. Another limitation is that retrospective recall of age at onset of OCD may not be reliable and complicate the precise time, in particularly adult patients. Prospective studies on the relationship of stable autistic and schizotypal traits and OCD soon after onset of the

disorder may be more confidential. The type and severity of OCS may also differ based on the developmental stage of adolescent or adult patients. Furthermore, young children may not adequately report their symptoms.

### CONCLUSIONS

The present study demonstrates the the higher association of stable autistic traits with the rate of obsessions among AO-OCD patients compared to adolescent subjects. Therefore, we can conclude that autistic traits may play a significant role in the occurrence of OCS also in later ages. In further studies, the higher rates of autistic traits in adult-onset OCD patients should be explored considering the influences of genetic factors.

In the present study, the greater number of compulsions, a different OC symptom profile, and higher severity of autistic-like traits in AO-OCD patients may indicate that adolescent and adult-onset OCD have different clinical characteristics. Autistic traits seemed to be higher and had a closer relationship with the frequency of lifetime obsessions in AO-OCD patients than in adolescent patients. Higher rates of autistic traits in adult-onset patients may also reflect an important developmental distinction between the obsession and compulsion components of an OCD diagnosis.

*Declaration of conflicting interests:* the authors declared no conflicts of interest with respect to the research, authorship, and/or publication of this article. Funding The authors received no financial support for the research, authorship, and/or publication of this article.

### REFERENCES

1. Ruscio AM, Stein DJ, Chiu WT, Kessler RC. The epidemiology of obsessive compulsive disorder in the National Comorbidity Survey replication. *Mol Psychiatry* 2010; 15: 53-63.
2. Valleni-Basile LA, Garrison CZ, Jackson KL, et al. Frequency of obsessive-compulsive disorder in a community sample of young adolescents. *J Am Acad Child Adolesc Psychiatry* 1994; 33: 78-91.
3. Karno M, Golding JM, Sorenson SB, Burnam MA. The epidemiology of obsessive compulsive disorder in five US communities. *Arch Gen Psychiatry* 1988; 45: 1094-9.
4. de Mathis MA, Diniz JB, Shavitt RG, et al. Early onset obsessive-compulsive disorder with and without tics. *CNS Spectr* 2009; 14: 362-70.
5. Mancebo MC, Garcia AM, Pinto A, et al. Juvenile-onset OCD: clinical features in children, adolescents and adults. *Acta Psychiatr Scand* 2008; 118: 149-59.
6. do Rosario-Campos MC, Leckman JF, Curi M, et al. A family study of early-onset obsessive-compulsive disorder. *Am J Med Genet B Neuropsychiatr Genet* 2005; 136B: 92-7.
7. Fontenelle LF, Mendlowicz MV, Marques C, Versiani M. Early- and late-onset obsessive-compulsive disorder in adult patients: an exploratory clinical and therapeutic study. *J Psychiatr Res* 2003; 37: 127-33.
8. Millet B, Kochman F, Gallarda T, et al. Phenomenological and comorbid features associated in obsessive-compulsive disorder: influence of age of onset. *J Affect Disord* 2004; 79: 241-6.
9. Chabane N, Delorme R, Millet B, Mouren MC, Leboyer M, Pauls D. Early-onset obsessive-compulsive disorder: a subgroup with a specific clinical and familial pattern? *J Child Psychol Psychiatr* 2005; 46: 881-7.

*The subthreshold autistic traits in patients with adult-onset obsessive-compulsive disorder*

10. Nestadt G, Samuels J, Riddle M, et al. A family study of obsessive-compulsive disorder. *Arch Gen Psychiatry* 2000; 57: 358-63.
11. Garcia AM, Freeman JB, Himle MB, et al. Phenomenology of early childhood onset obsessive compulsive disorder. *J Psychopathol Behav Assess* 2009; 31: 104-11.
12. Masi G, Millepiedi S, Mucci M, Bertini N, Milantoni L, Arcangeli F. A naturalistic study of referred children and adolescents with obsessive-compulsive disorder. *J Am Acad Child Adolesc Psychiatry* 2005; 44: 673-81.
13. Jaisooriya TS, Janardhan Reddy YC, Srinath S. Is juvenile obsessive-compulsive disorder a developmental subtype of the disorder? Findings from an Indian study. *Eur Child Adolesc Psychiatry* 2003; 12: 290-7.
14. Geller DA, Biederman J, Faraone S, et al. Developmental aspects of obsessive compulsive disorder: findings in children, adolescents, and adults. *J Nerv Ment Dis* 2001; 189: 471-7.
15. Geller DA, Biederman J, Jones J, et al. Is juvenile obsessive compulsive disorder a developmental subtype of the disorder?: a review of the pediatric literature. *J Am Acad Child Adolesc Psychiatry* 1998; 37: 420-7.
16. Swedo SE, Rapoport JL, Leonard H, Lenane M, Cheslow D. Obsessive compulsive disorder in children and adolescents. Clinical phenomenology of 70 consecutive cases. *Arch Gen Psychiatry* 1989; 46: 335-41.
17. Zandt F, Prior M, Kyrios M. Repetitive behaviour in children with high functioning autism and obsessive-compulsive disorder. *J Autism Dev Disord* 2007; 37: 251-9.
18. Ivarsson T, Melin KJ. Autism spectrum traits in children and adolescents with obsessive-compulsive disorder (OCD). *J Anxiety Disord* 2008; 22: 969 -78.
19. Anholt GE, Cath DC, van Oppen P, et al. Autism and ADHD symptoms in patients with OCD: are they associated with specific OCD symptom dimensions or OC symptom severity? *J Autism Dev Disord* 2010; 40: 580-9.
20. Cath DC, Ran N, Smit JH, Van Balkom AJLM, Comijs HC. Symptom overlap between autism spectrum disorder, generalized social anxiety disorder and obsessive-compulsive disorder in adults: a preliminary case-controlled study. *Psychopathology* 2007; 41: 101-10.
21. Zwaigenbaum L, Bryson S, Rogers T, Roberts W, Brian J, Szatmari P. Behavioral manifestations of autism in the first year of life. *Int J Dev Neurosci* 2005; 23: 143-52.
22. Baron-Cohen S, Wheelwright S, Skinner R, Martin J, Clubley E. The autism spectrum quotient (AQ): evidence from Asperger syndrome/high functioning autism, males and females, scientists and mathematicians. *J Autism Dev Disord* 2001; 31: 5-17.
23. Stewart E, Cancelliere MK, Freeman J, et al. Elevated autism spectrum disorder traits in young children with OCD. *Child Psychiatry Hum Dev* 2016; 47: 993-1001.
24. Bejerot S, Nylander L, Lindström E. Autistic traits in obsessive-compulsive disorder. *Nord J Psychiatry* 2001; 55: 169-76.
25. Williams JG, Higgins JP, Brayne CE. Systematic review of prevalence studies of autism spectrum disorders. *Arch Dis Child* 2006; 91: 8-15.
26. First M, Spitzer R, Gibbon M, Williams JB. Structured clinical interview for DSM-IV clinical version (SCID-I/CV). Washington, DC: American Psychiatric Press, 1997.
27. Kaufman J, Birmaher B, Brent DA, et al. Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime Version (K-SADS-PL): initial reliability and validity data. *J Am Acad Child Adolesc Psychiatry* 1997; 36: 980-8.
28. Gökler B, Ünal F, Pehlivan Türk B, Kültür EÇ, Akdemir D, Taner Y. Reliability and Validity of Schedule for Affective Disorders and Schizophrenia for School Age Children-Present and Lifetime Version Turkish Version (K-SADS PL-T). *Turk J Child Adolesc Ment Health* 2004; 11: 109-16.
29. Seahill L, Riddle MA, McSwiggin-Hardin M, et al. Children's Yale-Brown Obsessive Compulsive Scale: reliability and validity. *J Am Acad Child Adolesc Psychiatry* 1997; 36: 844-52.
30. Yucelen GA, Rodopman-Arman A, Topcuoglu V, Yazgan MY, Fişek G. Interrater reliability and clinical efficacy of Children's Yale-Brown Obsessive Compulsive Scale in an outpatient setting. *Compr Psychiatry* 2006; 47: 48-53.
31. Goodman WK, Price LH, Rasmussen SA, et al. The Yale-Brown Obsessive Compulsive Scale. I. Development, use, and reliability. *Arch Gen Psychiatry* 1989; 46: 1006-11.
32. Tek C, Ulu B, Rezaki BG, et al. Yale Brown Obsessive Compulsive Scale and US National Institute of Mental Health Global Obsessive Compulsive Scale in Turkish: reliability and validity. *Acta Psychiatr Scand* 1995; 91: 410-3.
33. Gokcen S, Bora E, Eremi S, Aydin C. Psychometric features of Turkish version of autism-spectrum quotient. *Anadolu Psikiyatri Derg* 2010; 11: 253-60 [in Turkish].
34. Aydin A, Saraç T. Investigation of autistic individuals' characteristics and their parents' broad autism phenotype and alexithymia characteristics. *J Acad Soc Sci Studies* 2014; 24: 183-209.
35. Akoguz G. The prevalence of Asperger's Disorder among high school students in Aydin, and Theory of Mind of Asperger's Disorder. Unpublished postgraduate thesis. 2014. Adnan Menderes University, Aydin, Turkey.
36. Albert U, Picco C, Maina G, Forner F, Aguglia E, Bogetto F. Phenomenology of patients with early and adult onset obsessive-compulsive disorder. *Epidemiologia e Psichiatria Sociale* 2002; 11: 116-26.
37. Dell'Osso B, Benatti B, Hollander E, et al. Childhood, adolescent and adult age at onset and related clinical correlates in obsessive-compulsive disorder: a report from the International College of Obsessive-Compulsive Spectrum Disorders (IC-OCS) *Int J Psychiatry Clin Pract* 2016; 20: 210-7.
38. Skuse DH, Mandy WP, Scourfield J. Measuring autistic traits: heritability, reliability, and validity of the Social and Communication Disorders Checklist. *Br J Psychiatry* 2005; 187: 568-72.
39. Constantino JN. The quantitative nature of autistic social impairment. *Pediatr Res* 2011; 69(5 Pt 2): 55R-62R.
40. Robinson EB, Munir K, Munafó M, Hughes M, McCormick MC, Koenen KC. Stability of autistic traits in the general population: further evidence for a continuum of impairment. *J Am Acad Child Adolesc Psychiatry* 2011; 50: 376-84.
41. Taylor MJ, Gillberg C, Lichtenstein P, Lundström S. Etiological influences on the stability of autistic traits from childhood to early adulthood: evidence from a twin study. *Mol Autism* 2017; 8: 5-9.
42. Esbensen AJ, Seltzer MM, Lam KSL, Bodsh JW. Age-related differences in restricted repetitive behaviors in autism spectrum disorders. *J Autism Dev Disord* 2009; 39: 57-66.
43. Selles RR, Storch EA, Lewin AB. Variations in symptom prevalence and clinical correlates in younger versus older youth with obsessive-compulsive disorder. *Child Psychiatry Hum Dev* 2014; 45: 666-74.
44. Chowdhury M, Benson BA, Hillier A. Changes in restricted repetitive behaviors with age: a study of high-functioning adults with autism spectrum disorders. *Res Autism Spectr Disord* 2010; 4: 210-6.
45. Farrell L, Barrett P. Obsessive-compulsive disorder across the developmental trajectory: cognitive processing of threat in children, adolescents and adults. *Br J Psychol* 2006; 97: 95-114.
46. Nakao T, Okada K, Kanba S. Neurobiological model of obsessive-compulsive disorder: evidence from recent neuropsychological and neuroimaging findings *Psychiatry Clin Neurosci* 2014; 68: 587-605.
47. Koch J, Exner C. Selective attention deficits in obsessive-compulsive disorder: the role of metacognitive processes. *Psychiatry Res* 2015; 225: 550-5.
48. Shin NY, Lee TY, Kim E, Kwon JS. Cognitive functioning in ob-

*Memis CO et al.*

- sessive compulsive disorder: a meta-analysis. *Psychol Med* 2014; 44: 1121-30.
49. Abramovitch A, Dar R, Mittelman A, Wilhelm S. Comorbidity between attention deficit/hyperactivity disorder and obsessive-compulsive disorder across the lifespan: a systematic and critical review. *Harvard Rev Psychiatry* 2015; 23: 245-62.
50. Benzina N, Mallet L, Burguière E, N'Diaye K, Pelissolo A. Cognitive dysfunction in obsessive-compulsive disorder. *Curr Psychiatry Rep* 2016; 18: 1-11.
51. Kjelgaard M, Flusberg HT. An Investigation of Language Impairment in Autism: Implications for Genetic Subgroups. *Lang Cogn Process* 2001; 16: 285-308.