


Evaluation of cognitive disengagement syndrome in children with obsessive-compulsive disorder: Clinical implications

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Abstract

Cognitive disengagement syndrome (CDS) has been found to be associated with internalizing symptoms. Yet, no study thus far has focused on whether there is an association between obsessive-compulsive disorder (OCD) and CDS. The purpose of this study is to examine the symptom frequency and clinical implications of CDS in children with OCD. The study included sixty-one children with OCD and sixty-six typically developing children. Children were evaluated by a semi-constructed diagnosis interview, Obsessive-Compulsive Inventory, Barkley Child Attention Scale, and Stroop test. The frequency of elevated symptoms of CDS, and total time, total error, and total correction scores of the Stroop test were significantly higher in the OCD group compared to the controls. Elevated CDS symptoms were significantly associated with higher OCD symptom prevalence and poorer performance on the Stroop Test. Moreover, poor insight, hoarding symptoms, mental compulsions, and ADHD comorbidity were significantly higher in those with elevated CDS symptoms than in those without CDS in the OCD group. The findings of this study provide clinical implications that CDS symptoms may contribute to deficits in attentional orientation, conceptual flexibility, and cognitive processing speed in OCD.

Keywords

Obsessive-compulsive disorder, cognitive disengagement syndrome, sluggish cognitive tempo, child/adolescent, executive functions

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Introduction

Obsessive-compulsive disorder (OCD) is characterized by repetitive, intrusive, unwanted, and distressing thoughts, images, or urges (obsessions), and repetitive behaviors or mental acts (compulsions) that a person feels driven to perform in response to the obsessions (American Psychiatric Association, 2013). Pediatric OCD is often present with other psychiatric disorders. In the National Comorbidity Survey Replication, 90% of respondents with lifetime OCD in the general population met the diagnostic criteria for another lifetime disorder (Ruscio et al., 2010). Available prevalence estimates of overall comorbid conditions range from 56% to 91% for pediatric-onset OCD (Ruscio et al., 2010; Saad et al., 2017). The most common psychiatric comorbid conditions include anxiety disorders, depression, tic disorders, attention-deficit/hyperactivity disorders (ADHD), and autism spectrum disorders (Abramovitch et al., 2015; Ruscio et al., 2010; Saad et al., 2017).

Cognitive disengagement syndrome (CDS), formerly known as ‘sluggish cognitive tempo’ (SCT), is characterized by a cluster of symptoms including a sleepy appearance, excessive day-dreaming, being confused, staring blankly, getting lost in one’s thoughts, being sluggish, and slowed behavior/thinking (Barkley, 2013; Becker et al., 2016, 2022). Epidemiological studies have reported that the prevalence of CDS in the community is 11% (Camprodon-Rosanas et al., 2017).

Although first arising from research examining the dimension of ADHD, it is now evident that SCT symptoms are separate from, yet closely related to, ADHD-inattentive (ADHD-IN) symptoms (Becker et al., 2022). Currently, strong empirical evidence exists to support the distinction between CDS and ADHD-IN symptoms (Becker et al., 2020; Burns & Becker, 2021; Servera et al., 2018). Also, it has been stressed that CDS may be best conceived of as a trait-like phenotype rather than a disorder of any kind (Burns et al., 2020). However, research is required to determine whether CDS is better conceived of as its own disorder, a specifier within ADHD, or a transdiagnostic entity. Moreover, unlike ADHD, CDS is more closely associated with internalizing symptoms (anxiety/depression symptoms) (Becker et al., 2020; Camprodon-Rosanas et al., 2017; Mueller et al., 2014). Therefore, it has been stated that CDS may be a valuable factor to investigate not only in ADHD but also in other psychopathologies (Mueller et al., 2014).

Regarding the neuropsychological links between frequently co-occurring ADHD, tic disorders, and OCD, neuropsychological and neuroimaging studies show that similar executive functions are affected in these disorders, suggesting shared etiology factors and mechanisms for these disorders (Vloet et al., 2006). In these disorders, neuropsychological deficits have been documented in executive functions especially impaired inhibition, interference control, and planning, deficits in processing speed, vigilance, and working memory, decreased cognitive flexibility in switching, and cognitive alternation tasks (Brem et al., 2014; Cabarkapa et al., 2019; Geller et al., 2018; Shin et al., 2014). Again, these disorders are assumed to result from frontostriatal pathophysiology and dysfunction within cortico-striato-thalamico-cortical circuit responsible for cognitive control and performance monitoring processes (Cabarkapa et al., 2019; van den Heuvel et al., 2010). This common neurological background and neuropsychological profile may also be possible between OCD and CDS, despite different clinical manifestations in CDS, and CDS being statistically related to other symptom constellations, such as ADHD-Inattentive symptoms (Camprodon-Rosanas et al., 2019; Creque & Willcutt, 2021; Flannery et al., 2017; Geller et al., 2018; Jacobson et al., 2018; Mueller et al., 2014; Shin et al., 2014). In addition, there may be an overlap between the clinical presentation of OCD and CDS, a possible mechanism for which is “mind-wandering” (Christoff et al., 2016). Mind wandering is defined as a sudden attentional shift to our inner cognitions and unrelated inner thoughts, feelings, memories, plans, or wishes rather than the outside world and

here-and-now (Christoff et al., 2016). Mind wandering is a sort of spontaneous thought that is different from but similar to daydreaming which is used most usually as a cardinal item of CDS, and is a mental state in which there are no strong constraints on thought contents (Becker & Barkley, 2021; Christoff et al., 2016). Recent studies have highlighted a potential link between CDS and mind-wandering and that SCT may represent one characterized by internal distractibility (Becker & Barkley, 2021; Fredrick et al., 2020), and found that CDS symptoms are more significantly linked to greater mind-wandering (Fredrick et al., 2020). Similarly, mind-wandering is also closely related to OCD symptomology, and the intrusive nature of obsessional-compulsive thoughts overlaps with the concept of spontaneous mind-wandering that abruptly into one's consciousness without any identifiable evoking stimuli (Cole & Tubbs, 2022; Seli et al., 2017). However, according to Christoff and colleagues, mind wandering is a specific state of spontaneous thought that is less constrained and more goal-directed thought compared with rumination and obsessive thoughts. Furthermore, mind wandering can be readily distinguished from rumination and other types of thought that are characterized by the strongest levels of automatic constraints, such as obsessive thought (Christoff et al., 2016). Researchers have found that the type and extent of OCD symptoms are predicted by the frequency of spontaneous, but not deliberate, mind-wandering experiences (Cole & Tubbs, 2022; Seli et al., 2017). It has been revealed that mind-wandering confers an increase in obsessive-compulsive thoughts and the severity of obsessive-compulsive symptoms is positively associated with excessive mind-wandering (Seli et al., 2017; Wang et al., 2021).

Aims of this article

Determining whether CDS accompanies OCD may be crucial in terms of patient management, treatment modality, and outcomes, because findings indicating the relationship between CDS and OCD symptoms may serve as a guide for investigating novel psychological therapies for OCD. The purpose of this study is to determine the frequency of CDS symptoms accompanying OCD and to describe the differences between clinical features in an OCD sample with and without elevated CDS symptoms.

Materials and methods

Participants

Participants were selected from two child and adolescent psychiatry departments. The sample of the study consisted of 61 children aged 9–13 years who were diagnosed with OCD [36 males (59%), the mean (SD) age: 11.43 ± 0.90 years] and 66 controls [37 males (56.1%), the mean (SD) age: 11.26 ± 0.87 years] who were similar to the patient group in terms of age and sex. The control group was selected from community-based primary and secondary school samples who did not refer to child and adolescent psychiatry for any psychiatric condition. Children with a chronic medical condition such as epilepsy, those with tic disorders, intellectual disability and/or autism spectrum disorder, and those who had major head injury were excluded from the study. To create a more homogeneous group, the OCD sample was selected from children with a diagnosis of OCD for at least 1 year and who had been prescribed only selective serotonin reuptake inhibitors (SSRI) as monotherapy for OCD. Patients using multiple drugs which could affect cognitive assessments, and patients not taking any medication were not included in the study.

Data collection tools

Sociodemographic data form. This form was prepared specifically for the study by the researchers and included information about age, sex, socioeconomic status, psychiatric history and family history, age of onset of OCD confirmed by semi-structured clinical interview, age of diagnosis, duration of OCD, types of obsessions and compulsions, and prescription medications. These parameters were evaluated by the researchers during interviews with children and their parents.

Schedule for affective disorders and schizophrenia for school-age children (6–18 years)-present and lifetime version (K-SADS-PL-DSM-5). This semi-structured interview schedule was updated by [Kaufman et al. \(2016\)](#) and the Turkish version was conducted by [Ünal et al. \(2019\)](#). K-SADS-PL is used to identify current and past episodes of psychopathology in children and adolescents. Current and past symptoms were scored on a three-point scale (1 = “not present,” 2 = “subthreshold,” 3 = “threshold”).

Maudsley obsessive-compulsive inventory (MOCI). MOCI is a self-report scale consisting of 37 questions answered in the form of true-false, developed by [Hodgson and Rachman \(1977\)](#), and used to measure the type and prevalence of obsessive and compulsive symptoms. The Turkish validity and reliability study was performed by [Erol and Savasir \(1988\)](#). While the original scale includes checking compulsions, washing cleaning, slowness, and doubting subscales, the rumination subscale was added in the Turkish version.

Barkley child attention scale (BCAS). It was developed by Barkley to evaluate CDS symptoms in individuals. It includes 12 4-point Likert-type items and consists of two subscales: sluggishness and daydreaming ([Barkley, 2013](#)). The Turkish validity and reliability study was performed by [Firat et al. \(2018\)](#). A child will be above the 93rd percentile for the population, the traditional index of statistical deviation if parents report that three or more of the 12 SCT items occur frequently or more frequently (scores of 3–4). Each item for which the parents report three or four points is deemed to be present. In total, the presence of SCT is mentioned if three or more of the items are present.

Stroop TBAG test. This test assesses the cognitive ability to direct attention, conceptual flexibility, and the processing speed of the mind ([Stroop, 1935](#)). This test reflects three basic processes: selective attention, reading, and color naming. The Stroop Test is one of the tests included in the Neuropsychological Test Battery for Cognitive Potentials and is considered the “gold standard” of attention measures. The test measures the ability to change the perceptual setup according to changing demands and under a “disruptive influence”; the ability to suppress a habitual behavior pattern, and focused/selective attention, and was used in this study to evaluate cognitive potential. The Turkish validity and reliability study was performed by [Karakaş et al. \(1999\)](#). Three types of scores including the time between the beginning and the end of each subtest, the number of errors made, and the number of corrected responses are calculated in the Stroop Test TBAG form.

Statistical analysis

Statistical data were analyzed using SPSS Statistics 22 package program. Continuous variables were shown as mean \pm standard deviation (SD); categorical variables were shown as the numbers (n) and percentage. Comparisons of the groups were performed using the chi-square test, Fisher’s exact test for categorical variables, and Mann–Whitney U test for continuous variables. Correlations were

evaluated using Spearman's correlation coefficients. A value of $p < .05$ was considered statistically significant.

Ethics

Ethical approval for the study was obtained from the local ethics committee and the study was conducted in accordance with Good Clinical Practice procedures and the current revision of the Declaration of Helsinki (2021/2159).

Results

Socio-demographic and clinical characteristics

There was no significant difference between the OCD group and control group in terms of age, sex, and family income (all p values $> .05$). The mean age of onset of OCD symptoms in the study group was found to be 10.08 ± 1.34 years, the mean age at diagnosis of OCD was 10.85 ± 1.62 years, and the mean duration of OCD was 1.16 ± 0.88 years (Table 1).

Table 1. Sociodemographic and clinical characteristics of participants.

The study variables	OCD (n = 61)	HC (n = 66)	p-value*
Sex (n, %)			
Male	36 (59.0)	37 (56.1)	.736
Female	25 (41.0)	29 (43.9)	
Age (mean-years \pm SD)	11.43 \pm 0.90	11.26 \pm 0.87	.629
Family income level (n, %)			.634
The minimum wage/less than minimum wage	22 (36.1)	25 (37.9)	
Above the minimum wage	39 (63.9)	41 (62.1)	
Family history of OCD (n, %)	28 (45.9)	2 (3.0)	<.001***
Family history of psychiatric disorder other than OCD (n, %)	37 (60.7)	12 (18.2)	<.001***
Age of onset of OCD symptoms (mean-years \pm SD)	10.08 \pm 1.34	—	
Age of OCD diagnosis (mean-years \pm SD)	10.85 \pm 1.62	—	
OCD duration (mean-years \pm SD)	1.16 \pm 0.88	—	
Previous psychiatric history (n, %)	9 (14.8)	—	
Insight (n, %)			
Good or fair insight	40 (65.6)	—	
Poor insight	21 (34.4)	—	
Presence of mental compulsions (n, %)	25 (41.0)	—	
Presence of hoarding symptoms (n, %)	10 (16.4)	—	
Presence of cognitive disengagement syndrome (CDS) (only or comorbid with other psychiatric conditions) (n, %)	13 (21.3)	5 (7.6)	.027**
Current psychiatric disorder (n, %)	38 (62.3)	10 (15.2)	<.001***

*The chi-square test for categorical variables and the Mann–Whitney U test for continuous variables were used to test group differences. **Bold font** indicates statistical significance: $p < .05$; ** $p < .05$; *** $p < .001$. Abbreviations: ADHD: attention-deficit/hyperactivity disorder, CDS: cognitive disengagement syndrome, HC: healthy controls, OCD: obsessive-compulsive disorder, SD: standard deviation.

According to the results of the psychiatric examinations, elevated symptoms of CDS (solely or comorbid with other psychiatric disorders) were found in 21.3% ($n = 13$) of the patients with OCD and 7.6% ($n = 5$) of the control group; the difference was statistically significant ($p = .027$). In addition, it was detected that there was a significant difference between the groups in terms of current psychiatric disorder ($p < .001$); 15.2% ($n = 10$) of the participants in the control group were diagnosed with at least one psychiatric disorder. On the other hand, in the study group, 62.3% ($n = 38$) of the patients with OCD had at least one psychiatric disorder diagnosis other than OCD. The socio-demographic and clinical characteristics of participants are presented in [Table 1](#).

Comparison of the MOCI, BCAS, and stroop test scores between the OCD and control groups

As expected, all subscale scores and total scores of MOCI and BCAS were significantly higher in the OCD group compared to the control group ($p < .001$ for all). It was also found that there were statistically significant differences between the groups in terms of the total time, total error, and total correction scores of the Stroop TBAG test. All three scores of the Stroop test were significantly higher in the study group compared to the control group, which indicates that the patients with OCD completed the test in a longer time and with more errors and corrections. The comparisons of the MOCI, BCAS, and Stroop test scores are shown in [Table 2](#).

Correlations between BCAS scores and MOCI and stroop TBAG test scores

According to the correlation analysis, there was a significant positive correlation between BCAS scores (daydreaming, sluggishness, and total scores) and MOCI scores (all subscale scores and total score) ($p < .001$, for all). There was also a positive correlation between all subscales and total BCAS scores and Stroop TBAG Test-total time, total error, and total correction scores ([Table 3](#)).

Table 2. Comparison of the MOCI, BCAS, and stroop test scores between the OCD and control groups.

	OCD ($n = 61$)	HC ($n = 66$)	p -value*
	mean \pm SD	mean \pm SD	
MOCI-checking subscale scores	3.39 \pm 1.42	0.98 \pm 0.48	<.001***
MOCI-cleaning subscale scores	6.90 \pm 1.89	3.35 \pm 0.83	<.001***
MOCI-slowness subscale scores	2.52 \pm 0.74	0.59 \pm 0.65	<.001***
MOCI-doubting subscale scores	3.74 \pm 1.12	1.50 \pm 0.58	<.001***
MOCI-rumination subscale scores	4.74 \pm 0.83	2.95 \pm 0.64	<.001***
MOCI-total scale scores	21.18 \pm 2.80	9.36 \pm 1.99	<.001***
BCAS-daydreaming scores	11.57 \pm 2.63	9.39 \pm 2.25	<.001***
BCAS-sluggish scores	8.39 \pm 2.18	6.62 \pm 2.05	<.001***
BCAS-total scores	19.97 \pm 4.37	16.02 \pm 4.11	<.001***
Stroop TBAG test-total time scores (mean- seconds \pm SD)	120.98 \pm 11.29	107.79 \pm 9.48	<.001***
Stroop TBAG test- total error scores	1.92 \pm 1.57	1.05 \pm 1.01	.001**
Stroop TBAG test- total correction scores	1.44 \pm 1.20	0.76 \pm 0.91	<.001***

*The Mann-Whitney U test was used to test group differences. **Bold font** indicates statistical significance: $p < .05$. ** $p < .01$; *** $p < .001$. Abbreviations: BCAS, Barkley child attention scale; HC, healthy controls; MOCI, Maudsley obsessive-compulsive inventory; OCD, obsessive-compulsive disorder; SD, standard deviation.

Table 3. Correlations between BCAS scores and MOCI and stroop TBAG test scores.

Parameters	BCAS-daydreaming		BCAS-sluggish		BCAS-total scores	
	<i>r</i> *	<i>p</i> *	<i>r</i> *	<i>p</i> *	<i>r</i> *	<i>p</i> *
MOCI-checking subscale	0.504	<.001	0.441	<.001	0.524	<.001**
MOCI-cleaning subscale	0.448	<.001	0.413	<.001	0.479	<.001**
MOCI-checking subscale	0.591	<.001	0.549	<.001	0.630	<.001**
MOCI-doubting subscale	0.359	<.001	0.366	<.001	0.403	<.001**
MOCI-rumination subscale	0.408	<.001	0.478	<.001	0.489	<.001**
MOCI-total scale	0.556	<.001	0.543	<.001	0.607	<.001**
Stroop TBAG test-total time	0.617	<.001	0.455	<.001	0.586	<.001**
Stroop TBAG test- total error	0.532	<.001	0.495	<.001	0.557	<.001**
Stroop TBAG test- total correction	0.511	<.001	0.408	<.001	0.500	<.001**

*Spearman's Correlation analysis. Abbreviations BCAS: Barkley child attention scale, MOCI: Maudsley obsessive-compulsive inventory, OCD: obsessive-compulsive disorder. ***p* < .001.

Clinical features regarding CDS in the OCD group

In the OCD group, when the patients with and without elevated CDS symptoms were compared no differences were found in terms of sex, age of onset of OCD symptoms, duration of OCD, family history of OCD, and family history of psychiatric disorders other than OCD (*p* > .05, for all). On the other hand, it was found that the percentages of poor insight, hoarding symptoms and mental compulsions, and the frequency of ADHD comorbidity were significantly higher in patients with elevated symptoms of CDS compared to those without (*p* < .05 for all). In addition, all MOCI and Stroop-TBAG test scores were significantly higher in patients with elevated CDS symptoms compared to those without (*p* < .05, for all). The results are given in [Table 4](#).

Discussion

To our knowledge, this study is the first study on CDS symptom frequency in OCD. Our findings contribute to the literature by demonstrating the high frequency of elevated CDS symptoms in children with OCD and the positive correlation between increased OCD symptoms and elevated CDS symptoms.

In our OCD sample, the frequency of elevated CDS symptoms was detected to be 21.3%, and this rate was significantly higher compared to the control group (7.6%). More importantly, the frequency of CDS symptoms and OCD symptoms showed a significant positive association. Poor insight, hoarding symptoms, mental compulsions, and the frequency of concomitant ADHD were found to be significantly higher in OCD-elevated CDS symptoms coexistence compared to OCD patients without elevated CDS symptoms. Again, patients with OCD and elevated CDS symptoms performed worse on cognitive testing than patients with low CDS symptoms, suggesting a more severe attention deficit and greater cognitive impairment.

Although the phenomenology of OCD and CDS may appear to differ, both conditions have similar characteristics such as attention problems, high ADHD comorbidity, various deficits in frontal and executive functions, and being associated with internalizing symptoms ([Camprodon-Rosanas et al., 2019](#); [Creque & Willcutt, 2021](#); [Flannery et al., 2017](#); [Geller et al., 2018](#); [Jacobson](#)

Table 4. Clinical features regarding CDS in the OCD group.

	Elevated CDS symptoms: Yes (n = 13)	Elevated CDS symptoms: No (n = 48)	p-value*
Sex (n, %)			.139
Male	10 (76.9)	26 (54.2)	
Female	3 (23.1)	22 (45.8)	
Age of onset of OCD symptoms (mean-years ± SD)	9.77 ± 1.09	10.27 ± 1.18	.124
OCD duration (mean-years ± SD)	1.23 ± 0.92	1.02 ± 0.83	.479
Family history of OCD (n, %)			
Yes	6 (46.2)	22 (45.8)	.984
No	7 (58.8)	26 (54.2)	
Family history of psychiatric disorder other than OCD (n, %)			.176
Yes	10 (76.9)	27 (56.3)	
No	3 (23.1)	21 (43.8)	
Insight (n, %)			
Good or fair insight	4 (30.8)	36 (75.0)	.006***
Poor insight	9 (69.2)	12 (25.0)	
Presence of mental compulsions (n, %)			.001***
Yes	10 (76.9)	15 (31.2)	
No	3 (23.1)	33 (68.8)	
Presence of hoarding symptoms (n, %)			.004***
Yes	6 (46.2)	4 (8.3)	
No	7 (53.8)	44 (91.7)	
Presence of ADHD comorbidity (only or comorbid with other psychiatric conditions) (n, %)			<.001****
Yes	8 (61.5)	4 (8.3)	
No	5 (38.5)	44 (91.7)	
MOCI-checking subscale scores (mean ± SD)	4.77 ± 1.36	3.02 ± 1.19	<.001****
MOCI-cleaning subscale scores (mean ± SD)	7.92 ± 0.49	6.46 ± 2.23	.020**
MOCI-slowness subscale scores (mean ± SD)	3.23 ± 0.60	2.33 ± 0.66	<.001****
MOCI-doubting subscale scores (mean ± SD)	4.38 ± 1.26	3.56 ± 1.02	.031**
MOCI-rumination subscale scores (mean ± SD)	5.54 ± 0.97	4.52 ± 0.65	.001***
MOCI-total scale scores (mean ± SD)	24.38 ± 2.87	20.31 ± 2.08	<.001****
Stroop TBAG test-total time scores (mean- seconds ± SD)	137.46 ± 7.20	116.52 ± 7.35	<.001****
Stroop TBAG test- total error scores (mean ± SD)	3.23 ± 1.26	1.29 ± 0.94	<.001****
Stroop TBAG test- total correction scores (mean ± SD)	2.92 ± 1.11	1.04 ± 0.87	<.001****

*The chi-square test and Fisher's exact test (as appropriate) for categorical variables and the Mann-Whitney *U* test for continuous variables were used to test group differences. **Bold font** indicates statistical significance: $p < .05$. ** $p < .05$; *** $p < .01$; **** $p < .001$. Abbreviations: ADHD: attention-deficit/hyperactivity disorder, CDS: cognitive disengagement syndrome, HC: healthy controls, OCD: obsessive-compulsive disorder, SD: standard deviation.

et al., 2018; Shin et al., 2014; van den Heuvel et al., 2010). It seems that individuals with OCD and CDS often present similar neuropsychological profiles. For example, both disorders tend to show lower performance on executive function tasks such as working memory, planning, and response inhibition, compared to non-psychiatric controls (Camprodon-Rosanas et al., 2019; Creque & Willcutt, 2021; Flannery et al., 2017; Geller et al., 2018; Jacobson et al., 2018; Mueller et al., 2014; Shin et al., 2014). In many studies evaluating neuropsychological functioning, it was determined that children with CDS act more slowly, and process and respond to stimuli for longer times. In addition, it has been found that CDS greatly compromises task performance by slowing down task-related processes and CDS symptoms were associated with poor processing speed (Barkley, 2013; Burns & Becker, 2021; Camprodon-Rosanas et al., 2017; Creque & Willcutt, 2021; Flannery et al., 2017; Jacobson et al., 2018). Similarly, there are many studies showing that OCD affects neuropsychological performance and leads to neurocognitive impairment, various cognitive deficits related to frontostriatal functions, and processing speed weakness (Geller et al., 2018; Shin et al., 2014; van den Heuvel et al., 2010). Previous studies have found that OCD patients have various deficits in attention processing and executive functions and it has been reported that executive functions are inhibited, and attention and cognitive flexibility functions are impaired in individuals with OCD and it is associated with lower general cognitive functionality (Geller et al., 2018; Shin et al., 2014; van den Heuvel et al., 2010). In addition to these findings in the literature, we also found that patients with OCD accompanied by elevated CDS symptoms had a higher frequency of OCD symptoms and showed poor performance on cognitive testing compared to the patients with low levels of SCT symptomatology. Our results also showed that in patients with OCD and elevated CDS symptoms concomitantly, there were more neurocognitive weakness and attention deficits. Thus, our findings provide important data to the literature by showing that increased CDS symptoms in OCD cause more severe attention deficit and greater cognitive impairment.

In addition, CDS and OCD may also share a similar neurobiological basis such as frontostriatal pathophysiology suggesting common etiology, given that ADHD and OCD have similar neuropsychological impairments in executive functions, and these disorders frequently co-occur (Vloet et al., 2006). Another explanation for the high frequency of elevated CDS symptoms detected in this study may be that OCD may lead to phenotypic expressions similar to CDS symptomatology. For example, a long time and intense mental pursuits spent on obsessions and compulsions in patients with OCD may reduce the capacity for basic cognitive processes, impact time management and concentration, cause a slower reaction/movement and getting lost in thoughts, which are also seen in CDS (Fitzgerald et al., 2021; Shin et al., 2014; Stern et al., 2017). Furthermore, given the potential associations of both OCD and CDS with mind-wandering (Becker & Barkley, 2021; Fredrick et al., 2020; Seli et al., 2017; Wang et al., 2021), similar behavioral symptoms (e.g., not paying attention to the surrounding environment) may be seen in both conditions as a reflection of different internal states that are difficult to differentiate. That is, in both cases, people may be internally focused because they are mind-wandering, worrying, ruminating, etc. Further, these different internal states could produce the same types of impairments on neurocognitive tests, including the Stroop. All of this may lead to individuals with OCD artificially being elevated on CDS symptoms, or vice versa. However, research is still needed to understand to what extent these different internally focused processes are at play among individuals with elevated CDS symptoms and OCD.

Besides, given that most of the patients with elevated CDS symptoms in our sample also had ADHD, the coexistence of elevated CDS symptoms and OCD we detected in our study may possibly represent the comorbidity between OCD and ADHD. From a neurodevelopmental point of view, impaired neuronal maturation processes or insufficient neuromaturational processes in ADHD and pediatric OCD (Abramovitch et al., 2015) may also cause an increased frequency of OCD-CDS

association, considering the relatively low mean age of the sample in our study. However, since there is not enough data on the onset of symptoms for CDS symptoms in our study, depending on the results of our study, it is difficult to interpret whether the CDS symptoms are the result of OCD and other associated clinical manifestations, or whether there is really a coexisting condition. There is a need for more research to clarify the relationship between CDS and OCD.

One of the important findings of our study was that there was a significant relationship between high levels of SCT symptomatology and the clinical features of OCD, including poor insight, the presence of hoarding symptoms, and mental compulsions. This result can be explained by the fact that these clinical features are associated with the severity of the symptoms, treatment compliance problems, and loss of functionality in clinical practice (Samuels et al., 2014; Sharma et al., 2021). Furthermore, the presence of mental compulsions and lack of insight may cause patients to spend most of their time with problems regarding OCD, which may result in decreased attention capacity, deficiency in time management skills, and ultimately more functional impairment. This may cause the patient to seem more lethargic and slow. Significantly higher OCD symptoms and poor performance on cognitive testing in those with elevated CDS symptoms may also be associated with this result.

Limitations and conclusion

When considered together, the results of the current study provide the first evidence that the high levels of SCT symptomatology in pediatric OCD and the elevated CDS symptoms are substantially related to the increased OCD symptoms. Therefore, our data offer an important step towards revealing the relationship between CDS and OCD in children. Additional strengths of the study include the use of a semi-structured clinical interview. However, this study has some limitations. First, we used only the attention-related Stroop-TBAG test in the evaluation of the neuropsychological profile, other neuropsychological tests were not applied. Second, the age range of our sample was relatively narrow. This limited us to analyze the relationships between CDS and age, age of onset of OCD symptoms, and disease duration. Third, we did not evaluate patients who had not taken any medication. Again, tic disorders were entirely excluded from the analysis, which may have weakened the findings, because tic disorders could be part of what increases the likelihood of coexistence between OCD and CDS. Finally, the cross-sectional nature of the study design and our small sample size did not allow us to establish cause-effect relationships and make causal attributions. Our findings need to be confirmed by further studies using other neuropsychological tests, involving a wider age range and treatment process. The lack of information on CDS-OCD coexistence needs to be addressed by further research. In addition, it would be extremely valuable to re-evaluate the co-occurrence of OCD and CDS after remission from OCD. Thus, it will be possible to prove and clarify whether OCD temporarily causes CDS symptoms or whether CDS and OCD are concomitant conditions.

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Author contributions

Study design and method: AUC, IU. Data collection: AUC, IU, GT. Analysis of data: AUC, IU, CMI. Preparation of original draft: AUC. Review: IU.

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Data availability

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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References

- Abramovitch, A., Dar, R., Mittelman, A., & Wilhelm, S. (2015). Comorbidity between attention deficit/hyperactivity disorder and obsessive-compulsive disorder across the lifespan: A systematic and critical review. *Harvard Review of Psychiatry*, 23(4), 245–262. <https://doi.org/10.1097/HRP.0000000000000050>
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (fifth ed.). American Psychiatric Association.
- Barkley, R. A. (2013). Distinguishing sluggish cognitive tempo from ADHD in children and adolescents: Executive functioning, impairment, and comorbidity. *Journal of Clinical Child and Adolescent Psychology: The Official Journal for the Society of Clinical Child and Adolescent Psychology, American Psychological Association, Division*, 42(2), 161–173. <https://doi.org/10.1080/15374416.2012.734259>
- Becker, S. P., & Barkley, R. A. (2021). Field of daydreams? Integrating mind wandering in the study of sluggish cognitive tempo and ADHD. *JCPP Advances*, 1(1), Article e12002. <https://doi.org/10.1111/jcv2.12002>
- Becker, S. P., Burns, G. L., Smith, Z. R., & Langberg, J. M. (2020). Sluggish cognitive tempo in adolescents with and without ADHD: Differentiation from adolescent-reported ADHD inattention and unique associations with internalizing domains. *Journal of Abnormal Child Psychology*, 48(3), 391–406. <https://doi.org/10.1007/s10802-01900603-9>
- Becker, S. P., Leopold, D. R., Burns, G. L., Jarrett, M. A., Langberg, J. M., Marshall, S. A., McBurnett, K., Waschbusch, D. A., & Willcutt, E. G. (2016). The internal, external, and diagnostic validity of sluggish cognitive tempo: A meta-analysis and critical review. *Journal of the American Academy of Child and Adolescent Psychiatry*, 55(3), 163–178. <https://doi.org/10.1016/j.jaac.2015.12.006>
- Becker, S. P., Willcutt, E. G., Leopold, D. R., Fredrick, J. W., Smith, Z. R., Jacobson, L. A., Burns, G. L., Mayes, S. D., Waschbusch, D. A., Froehlich, T. E., McBurnett, K., Servera, M., & Barkley, R. A. (2022). Report of a work group on sluggish cognitive tempo: Key research directions and a consensus change in terminology to cognitive disengagement syndrome. *Journal of the American Academy of Child & Adolescent Psychiatry*, 8567(22), 1246–1251. <https://doi.org/10.1016/j.jaac.2022.07.821>
- Brem, S., Grünblatt, E., Drechsler, R., Riederer, P., & Walitza, S. (2014). The neurobiological link between OCD and ADHD. *Attention Deficit and Hyperactivity Disorders*, 6(3), 175–202. <https://doi.org/10.1007/s12402-014-0146-x>
- Burns, G. L., & Becker, S. P. (2021). Sluggish cognitive tempo and ADHD symptoms in a nationally representative sample of U.S. children: Differentiation using categorical and dimensional approaches. *Journal of Clinical Child and Adolescent Psychology: The Official Journal for the Society of Clinical*

- Child and Adolescent Psychology*, American Psychological Association, Division, 50(2), 267–280. <https://doi.org/10.1080/15374416.2019.1678165>
- Burns, G. L., Becker, S. P., Geiser, C., Leopold, D. R., & Willcutt, E. G. (2020). Are sluggish cognitive tempo, ADHD, and oppositional defiant disorder trait- or state-like constructs from prekindergarten to fourth grade? *Journal of Clinical Child and Adolescent Psychology: The Official Journal for the Society of Clinical Child and Adolescent Psychology*, American Psychological Association, Division, 49(4), 460–468. <https://doi.org/10.1080/15374416.2019.1567348>
- Cabarkapa, S., King, J. A., Dowling, N., & Ng, C. H. (2019). Co-morbid obsessive compulsive disorder and attention deficit hyperactivity disorder: Neurobiological commonalities and treatment implications. *Frontiers in Psychiatry*, 10, 557. <https://doi.org/10.3389/fpsy.2019.00557>
- Camprodon-Rosanas, E., Pujol, J., Martínez-Vilavella, G., Blanco-Hinojo, L., Medrano-Martorell, S., Batlle, S., Forns, J., Ribas-Fitó, N., Dolz, M., & Sunyer, J. (2019). Brain structure and function in school-aged children with sluggish cognitive tempo symptoms. *Journal of the American Academy of Child and Adolescent Psychiatry*, 58(2), 256–266. <https://doi.org/10.1016/j.jaac.2018.09.441>
- Camprodon-Rosanas, E., Ribas-Fitó, N., Batlle-Vila, S., Persavento, C., Alvarez-Pedrerol, M., Sunyer, J., & Forns, J. (2017). Sluggish cognitive tempo: Socio demographic, behavioral, and clinical characteristics in a population of Catalan school children. *Journal of Attention Disorders*, 21(8), 632–641. <https://doi.org/10.1177/1087054716652477>
- Christoff, K., Irving, Z. C., FoxFox, K. C. R., Spreng, R. N., & Andrews-Hanna, J. R. (2016). Mind-wandering as spontaneous thought: A dynamic framework. *Nature Reviews. Neuroscience*, 17(11), 718–731. <https://doi.org/10.1038/nrn.2016.113>
- Cole, S. N., & Tubbs, P. M. C. (2022). Predictors of obsessive-compulsive symptomology: Mind wandering about the past and future. *Psychological Research*, 86(5), 1518–1534. <https://doi.org/10.1007/s00426-021-01585-4>
- Creque, C. A., & Willcutt, E. G. (2021). Sluggish cognitive tempo and neuropsychological functioning. *Research on Child and Adolescent Psychopathology*, 49(8), 1001–1013. <https://doi.org/10.1007/s10802-021-00810-3>
- Erol, N., & Savasir, I. (1988). *Maudsley obsessive-compulsive question list 24th national psychiatric and neurological sciences congress scientific program abstracts book*. Turkish Psychological Association. (pp. 107–114).
- Firat, S., Unsel Bolat, G., Gul, H., Baytunca, M. B., Kardas, B., Aysev, A., & Ercan, E. S. (2018). Barkley child attention scale validity and reliability study. *Dusunen Adam: The Journal of Psychiatry and Neurological Sciences*, 31(3), 284–293. <https://doi.org/10.5350/DAJPN2018310306>
- Fitzgerald, K. D., Schroder, H. S., & Marsh, R. (2021). Cognitive control in pediatric obsessive-compulsive and anxiety disorders: Brain-behavioral targets for early intervention. *Biological Psychiatry*, 89(7), 697–706. <https://doi.org/10.1016/j.biopsych.2020.11.012>
- Flannery, A. J., Luebbe, A. M., & Becker, S. P. (2017). Sluggish cognitive tempo is associated with poorer study skills, more executive functioning deficits, and greater impairment in college students. *Journal of Clinical Psychology*, 73(9), 1091–1113. <https://doi.org/10.1002/jclp.22406>
- Fredrick, J. W., Kofler, M. J., Jarrett, M. A., Burns, G. L., Luebbe, A. M., Garner, A. A., Harmon, S. L., & Becker, S. P. (2020). Sluggish cognitive tempo and ADHD symptoms in relation to task-unrelated thought: Examining unique links with mind-wandering and rumination. *Journal of Psychiatric Research*, 123, 95–101. <https://doi.org/10.1016/j.jpsychires.2020.01.016>
- Geller, D. A., Abramovitch, A., Mittelman, A., Stark, A., Ramsey, K., Cooperman, A., Baer, L., & Stewart, S. E. (2018). Neurocognitive function in paediatric obsessive-compulsive disorder. *The World Journal of Biological Psychiatry: The Official Journal of the World Federation of Societies of Biological Psychiatry*, 19(2), 142–151. <https://doi.org/10.1080/15622975.2017.1282173>

- Hodgson, R. J., & Rachman, S. (1977). Obsessional-compulsive complaints. *Behaviour Research and Therapy*, 15(5), 389–395. [https://doi.org/10.1016/0005-7967\(77\)90042-0](https://doi.org/10.1016/0005-7967(77)90042-0)
- Jacobson, L. A., Geist, M., & Mahone, E. M. (2018). Sluggish cognitive tempo, processing speed, and internalizing symptoms: The moderating effect of age. *Journal of Abnormal Child Psychology*, 46(1), 127–135. <https://doi.org/10.1007/s10802-017-0281-x>
- Karakaş, S., Erdoğan, E., Soysal, Ş., Ulusoy, T., Yüceyurt Ulusoy, İ., & Alkan, S. (1999). Stroop test TBAG form: Standardisation for Turkish culture, reliability and validity. *Journal of Clinical Psychiatry*, 2(2), 75–88. <https://klinikpsikiyatri.org/eng/jvi.aspx?pdire=KPD&plng=eng&un=KPD-65171&look4>
- Kaufman, J., Birmaher, B., Axelson, D., Perepletchikova, F., Brent, D., & Ryan, N. (2016). *Schedule for affective disorders and schizophrenia for school-aged children: present and lifetime version (K-SADS-PL) DSM-5 working draft*. Yale University Child and Adolescent Research and Education.
- Mueller, A. K., Tucha, L., Koerts, J., Groen, Y., Lange, K. W., & Tucha, O. (2014). Sluggish cognitive tempo and its neurocognitive, social and emotive correlates: A systematic review of the current literature. *Journal of Molecular Psychiatry*, 2(1), 5. <https://doi.org/10.1186/2049-9256-2-5>
- Ruscio, A. M., Stein, D. J., Chiu, W. T., & Kessler, R. C. (2010). The epidemiology of obsessive-compulsive disorder in the national comorbidity survey replication. *Molecular Psychiatry*, 15(1), 53–63. <https://doi.org/10.1038/mp.2008.94>
- Saad, L. O., do Rosario, M. C., Cesar, R. C., Batistuzzo, M. C., Hoexter, M. Q., Manfro, G. G., Shavitt, R. G., Leckman, J. F., Miguel, E. C., & Alvarenga, P. G. (2017). The child behavior checklist-obsessive-compulsive subscale detects severe psychopathology and behavioral problems among school-aged children. *Journal of Child and Adolescent Psychopharmacology*, 27(4), 342–348. <https://doi.org/10.1089/cap.2016.0125>
- Samuels, J., Grados, M. A., Riddle, M. A., Bienvenu, O. J., Goes, F. S., Cullen, B., Wang, Y., Greenberg, B. D., Fyer, A. J., McCracken, J. T., Geller, D., Murphy, D. L., Knowles, J. A., Rasmussen, S. A., McLaughlin, N. C., Piacentini, J., Pauls, D. L., Stewart, S. E., Shugart, Y. Y., & Nestadt, G. (2014). Hoarding in children and adolescents with obsessive-compulsive disorder. *Journal of Obsessive-Compulsive and Related Disorders*, 3(4), 325–331. <https://doi.org/10.1016/j.jocrd.2014.08.001>
- Seli, P., Risko, E. F., Purdon, C., & Smilek, D. (2017). Intrusive thoughts: Linking spontaneous mind wandering and OCD symptomatology. *Psychological Research*, 81(2), 392–398. <https://doi.org/10.1007/s00426-016-0756-3>
- Servera, M., Sáez, B., Burns, G. L., & Becker, S. P. (2018). Clinical differentiation of sluggish cognitive tempo and attention-deficit/hyperactivity disorder in children. *Journal of Abnormal Psychology*, 127(8), 818–829. <https://doi.org/10.1037/abn0000375>
- Sharma, E., Tripathi, A., Grover, S., Avasthi, A., Dan, A., Sharma, M., Goyal, N., Manohari, S. M., & ReddyReddy, Y. C. J. (2021). Association of insight, avoidance behavior, indecisiveness, and inflated responsibility with other clinical characteristics in children and adolescents with obsessive-compulsive disorder. *Revista Brasileira de Psiquiatria (Sao Paulo, Brazil: 1999)*, 43(2), 160–167. <https://doi.org/10.1590/1516-4446-2020-0952>
- Shin, N. Y., Lee, T. Y., Kim, E., & Kwon, J. S. (2014). Cognitive functioning in obsessive compulsive disorder: A meta-analysis. *Psychological Medicine*, 44(6), 1121–1130. <https://doi.org/10.1017/S0033291713001803>
- Stern, E. R., Muratore, A. F., Taylor, S. F., Abelson, J. L., Hof, P. R., & Goodman, W. K. (2017). Switching between internally and externally focused attention in obsessive compulsive disorder: Abnormal visual cortex activation and connectivity. *Psychiatry Research. Neuroimaging*, 265, 87–97. <https://doi.org/10.1016/j.psychresns.2016.08.006>
- Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology*, 18(6), 643–662. <https://doi.org/10.1037/h0054651>

- Ünal, F., Öktem, F., Çetin Çuhadaroğlu, F., Çengel Kültür, S. E., Akdemir, D., Foto Özdemir, D., Çak, H. T., Ünal, D., Tıraş, K., Aslan, C., Kalaycı, B. M., Aydos, B. S., Kütük, F., Taşyürek, E., Karaokur, R., Karabucak, B., Karakök, B., Karaer, Y., & Artık, A. (2019). Reliability and validity of the schedule for affective disorders and Schizophrenia for school-age children—present and lifetime version, DSM-5 November 2016—Turkish adaptation (K-SADS-PL-DSM-5-T). *Turk Psikiyatri Derg*, 30(1), 42–50. <http://dx.doi.org/10.5080/u23408>
- van den Heuvel, O. A., van der Werf, Y. D., Verhoef, K. M. W., de Wit, S., Berendse, H. W., Wolters, E. C., Veltman, D. J., & Groenewegen, H. J. (2010). Frontal-striatal abnormalities underlying behaviours in the compulsive-impulsive spectrum. *Journal of the Neurological Sciences*, 289(1-2), 55–59. <https://doi.org/10.1016/j.jns.2009.08.043>
- Vloet, T. D., Neufang, S., Herpertz-Dahlmann, B., & Konrad, K. (2006). Bildgebungsbefunde bei Kindern und Jugendlichen mit ADHS, Tic-Störungen und Zwangserkrankungen [neuroimaging data of ADHD, tic-disorder and obsessive-compulsive-disorder in children and adolescents]. *Zeitschrift Fur Kinder- und Jugendpsychiatrie und Psychotherapie*, 34(5), 343–355. <https://doi.org/10.1024/1422-4917.34.5.343>
- Wang, P., Cao, W., Chen, T., Gao, J., Liu, Y., Yang, X., Meng, F., Sun, J., & Li, Z. (2021). Mediating role of rumination and negative affect in the effect of mind-wandering on symptoms in patients with obsessive-compulsive disorder. *Frontiers in Psychiatry*, 12, 755159. <https://doi.org/10.3389/fpsy.2021.755159>

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