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Examining cognitive disengagement syndrome in a psychiatric outpatient sample: Psychometric support and associations with internalizing symptoms and sleep problems

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Abstract

Objective: The internal (structural) and external validity of a self-report measure of cognitive disengagement syndrome (CDS, formerly sluggish cognitive tempo) relative to a self-report measure of attention-deficit/hyperactivity disorder-inattention (ADHD-IN) was evaluated with adults from university outpatient psychiatric clinics in Turkey.

Methods: A total of 274 outpatients (75.9% women; ages 18–64 years; M_{age} = 31.06; SD_{age} = 10.84; 50.4% anxiety disorders; 41.6% depressive disorders; 2.9% ADHD; 1.5% sleep disorders; 0.7% eating disorders; 2.9% no mental disorder) completed self-report measures of CDS, ADHD-IN, ADHD-hyperactivity/impulsivity (HI), sleep problems, depression, and stress.

Results: All 15 CDS symptoms measured by the Adult Concentration Inventory (ACI) showed convergent (moderate to high loadings on the CDS factor) and discriminant (loading close to zero on the ADHD-IN factor) validity. CDS also showed stronger first-order and unique associations

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than ADHD-IN with sleep problems, depression, anxiety, and stress, whereas ADHD-IN showed stronger first-order and unique associations than CDS with ADHD-HI.

Conclusion: This is the first study to provide support for the scores from this 15 item self-report measure of CDS by the ACI in a clinical sample of adults, with findings consistent with previous studies examining parent and teacher rating scale measures with the same 15 CDS symptoms. These findings provide additional support for usefulness of these 15 CDS symptoms as measured by the ACI to study CDS across various cultures.

KEYWORDS

ADHD, Adult Concentration Inventory, cognitive disengagement syndrome, sluggish cognitive tempo

1 | INTRODUCTION

Cognitive disengagement syndrome (CDS, formerly sluggish cognitive tempo) includes behaviors such as excessive daydreaming, mind-wandering, spacing out, mental confusion/fogginess, slowed behavior/thinking, and drowsiness (Becker et al., 2023). A significant issue for research on CDS has been the identification of a common symptom set for research on CDS.

A common symptom set for CDS is a critical requirement for advancing understanding of CDS. Two reviews of CDS studies from 1985 to 2019 identified 15 CDS symptoms with strong psychometric properties (Becker, 2021; Becker et al., 2016). These 15 CDS symptoms comprise the CDS subscale of the parent and teacher Child and Adolescent Behavior Inventory (CABI; Burns et al., 2021, 2022). Parent and teacher ratings of these 15 CDS symptoms showed strong convergent (high loadings on the CDS factor) and discriminant (higher loadings on the CDS factor than the attention-deficit/hyperactivity disorder-inattention factor) validity in studies of children in Iran (Sadeghi-Bahmani et al., 2022), South Korea (Jung et al., 2021), Spain (Sáez et al., 2019; Servera et al., 2018), Turkey (Başay et al., 2021), and the United States (Becker et al., 2020; Burns & Becker, 2022). These studies also found a CDS factor defined by these 15 symptoms was also uniquely related to clinical external correlates (e.g., depressive symptoms) relative to an ADHD-inattention factor.

1.1 | Assessing CDS with the Adult Concentration Inventory (ACI)

Although the scores from the parent and teacher CABI CDS rating scale have shown strong internal (structural) and external validity in a series of studies with children and adolescents from five different countries, the results have been more complex with the self-report measure of these 15 CDS symptoms. Specifically, the same item set was used in creating the ACI, an adult self-report measure of CDS symptoms. An initial study conducted with 3172 college students found that 10 of the items demonstrated both convergent validity (primary loading on the CDS factor) and discriminant validity (low loadings on ADHD-IN and internalizing factors) (Becker, Burns, et al., 2018). A second study examined the internal validity of the ACI in a community-based sample of 286 parents of adolescents with and without ADHD and found 10 of the ACI items again demonstrated convergent/validity (Fredrick, Burns, et al., 2022), with 8 of the 10 items showing

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convergent/discriminant validity across both studies. Most recently, Sadeghi-Bahmani et al. (2023) examined the internal validity of the ACI in a community-based sample of adults in Iran and found 7 of the 15 CDS items showing convergent and discriminant validity.

These three studies also examined the external validity of CDS measured by ACI. Above and beyond ADHD-IN symptoms, CDS symptoms were uniquely associated with increased internalizing symptoms and daily life executive functioning deficits (Becker, Burns, et al., 2018; Fredrick, Burns, et al., 2022; Sadeghi-Bahmani et al., 2023), in addition to greater emotion dysregulation, loneliness, functional impairment (Becker, Burns, et al., 2018), and poorer sleep functioning (Fredrick, Burns, et al., 2022). Other studies conducted in college student samples have found CDS symptoms assessed with the ACI to be uniquely associated with suicidal ideation (Becker, Holdaway, et al., 2018), social anxiety (Fredrick, Burns, et al., 2020), rumination (Fredrick, Kofler, et al., 2020), and specific personality traits (e.g., higher neuroticism and lower extraversion) (Becker, Schmitt, et al., 2018).

As noted by Fredrick, Burns et al. (2022), additional studies are clearly needed to further determine and confirm the internal and external validity of the ACI for assessing CDS in adults. Further, the three existing studies examining the internal validity of the ACI focused on college students and community-based samples of adults. It is important to examine the internal (structural) validity of the ACI, as well as relations with clinical correlates, in adults experiencing psychopathology, though no study has yet examined the ACI in adults obtaining mental health assessment or care. Finally, aside from the recent study examining the ACI in a community-based sample in Iran (Sadeghi-Bahmani et al., 2023), all other existing ACI studies were conducted with adults in the United States, leaving the transcultural validity of the ACI entirely unexamined (Becker, 2021). Given these considerations, the current study examines the internal and external validity in a sample of patients recruited from outpatient psychiatric clinics in Turkey.

1.2 | Examining CDS in Turkey

There are some studies on CDS symptoms in children and adolescents in Turkey (Başay et al., 2021; Ekinci et al., 2021; Gozpinar et al., 2022), but there are only three studies in adults. One of these studies was a psychometric study on the scores from the Barkley Adult SCT Scale (Gül & Gül, 2022), one investigated the relationship between CDS and burn-out symptoms in psychiatrists (Gül et al., 2017), and the third evaluated the association between childhood CDS, substance use disorder, substance-induced psychosis, and childhood ADHD (Gül, 2019). Evaluation of the transcultural validity of CDS symptoms in the adult population would contribute to further to the validity of CDS. In addition, none of the existing studies examining CDS in Turkey have used the ACI, despite its promise given its origins in meta-analytic findings (Becker et al., 2016). For these reasons, there is a need for further investigation of CDS symptoms in adults, especially in clinical samples.

1.3 | Objectives

The purpose of this study was to evaluate for the first time the construct validity of scores from the 15-item ACI self-report scale for assessing CDS with Turkish adults seeking psychiatry care. The first objective was to determine the internal (structural) validity of the 15 CDS symptoms with the 9 ADHD-IN symptoms. The identification of CDS symptoms with good internal validity relative to ADHD-IN symptoms on the self-report measures would then allow for the determination of the external correlates of the CDS and ADHD-IN symptom dimensions. It was also important to continue to evaluate the self-report measure of CDS in different sample types (i.e., clinical sample) and different countries (i.e., Turkey).

The second and third objectives evaluated the external validity of the CDS and ADHD-IN with measures of sleep problems, ADHD-hyperactivity/impulsivity (HI), depression, anxiety, and stress. It was expected that CDS would have stronger correlations and unique associations than ADHD-IN with sleep problems, depression, and anxiety (Becker, Burns, et al., 2018; Becker, Langberg, et al., 2014, Becker, Luebbe, 2014; Fredrick, Burns, et al., 2022), though Sadeghi-Bahmani

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et al. (2023) found this only for depression and not anxiety symptoms. In contrast, it was expected that ADHD-IN would have stronger correlations and unique associations than CDS with ADHD-HI. It was expected that both CDS and ADHD-IN would be associated with stress (Combs et al., 2012; Sadeghi-Bahmani et al., 2023), though no predictions were made about their differential correlations and unique associations. However, to the extent that stress correlates with anxiety and depression, then the findings for stress might be similar to the findings for depression and anxiety.

2 | MATERIALS AND METHOD

2.1 | Participants and procedures

The participants were recruited from outpatient clinics of Pamukkale University Faculty of Medicine, Department of Psychiatry in Turkey. Participants were 274 adults aged 18–64 years (M_{age} = 31.06, SD_{age} = 10.84), 75.9% of the participants were female, and 58.4% were single. The participants were evaluated with a diagnostic interview according to DSM-5 criteria. Evaluations were performed by experienced psychiatrists. Patients with a diagnosis of psychosis, bipolar disorder, intellectual disability, dementia, or delirium were excluded from the study. Among the 274 participants, 43.8% had an anxiety disorder, 6.6% obsessive-compulsive disorder, 41.6% a depressive disorder, 2.9% ADHD, 1.5% sleeping disorders, 0.7% eating disorders, and 2.9% no mental disorder. These mental disorders were the primary diagnosis. Most participants reported attaining a high school degree (45.3%), while the remaining reported attaining college/university or graduate degree (39.1%) and primary school degree (15.7%). A family history of a mental disorder was reported by 42.3% of the participants. The protocol of the study was approved by the Pamukkale University Ethical Committee. Participants provided written informed consent for their participation in the study.

2.2 | Translation procedures

The ACI was translated to Turkish independently by three psychiatrists and two lecturers from the Department of Foreign Languages. These translations were then reviewed by two researchers to form the final Turkish version. Two lectures from the Department of Foreign Languages translated this Turkish version to English (back-translation). The English version was then reviewed by the authors of the scale. The final version of the Turkish ACI was a good reflection of the English ACI.

2.3 | Measures

2.3.1 | ACI

The ACI is a self-report measure of 15 CDS symptoms (Becker, Burns, et al., 2018). Table 1 shows the 15 items on the ACI. Each item is rated on a 5-point scale (0 = *not at all*, 1 = *sometimes*, 2 = *often*, 3 = *very often*). The ACI was developed following a meta-analysis that included over 19,000 individuals (Becker et al., 2016). For the current study, Cronbach's α = .93.

2.3.2 | Adult ADHD Self-Report Scale (ASRS; Kessler et al., 2005)

The ASRS is a self-report measure of the 18 DSM-IV/5 ADHD symptoms. Each symptom is rated on a 5-point scale (0 = *never*, 1 = *rarely*, 2 = *sometimes*, 3 = *often*, 4 = *very often*). Scores on the Turkish version of ASRS demonstrated

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TABLE 1 Standardized primary and secondary factor loadings (SEs) of cognitive disengagement syndrome and ADHD inattention symptoms on cognitive disengagement syndrome and ADHD-inattention factors.

Cognitive disengagement syndrome symptoms	CDS factor	ADHD-IN factor
1. I am slow at doing things	.46 (.07)	.02 (.08)^{ns}
2. My mind feels like it is in a fog	.75 (.06)	.09 (.08)^{ns}
3. I stare off into space	.77 (.07)	.02 (.08)^{ns}
4. I feel sleepy or drowsy during the day	.77 (.06)	−.08 (.08)^{ns}
5. I lose my train of thought	.75 (.06)	.10 (.08)^{ns}
6. I am not very active	.63 (.08)	−.10 (.09)^{ns}
7. I get lost in my own thoughts	.72 (.06)	.12 (.08)^{ns}
8. I get tired easily	.74 (.08)	−.07 (.09)^{ns}
9. I forget what I was going to say	.75 (.05)	.00 (.05)^{ns}
10. I feel confused	.75 (.05)	.00 (.05)^{ns}
11. I zone or space out	.69 (.07)	.12 (.08)^{ns}
12. My mind gets mixed up	.94 (.05)	−.04 (.07)^{ns}
13. My thinking seems slow or slowed down	.79 (.05)	−.01 (.06)^{ns}
14. I daydream	.61 (.07)	.03 (.09)^{ns}
15. I have a hard time putting my thoughts into words	.72 (.06)	.01 (.07)^{ns}
ADHD-inattention symptoms		
1. Trouble wrapping up the final details of a project, once the challenging parts have been done	.10 (.09)^{ns}	.70 (.08)
2. Difficulty getting things in order when have to do a task that requires organization?	.11 (.10)^{ns}	.74 (.07)
3. Problems remembering appointments or obligations	.27 (.09)	.49 (.07)
4. Avoid or delay getting started when have a task that requires a lot of thought	.33 (.08)	.47 (.08)
5. Make careless mistakes when have to work on a boring or difficult project	−.13 (.09)^{ns}	.83 (.07)
6. Difficulty keeping attention when doing boring or repetitive work	−.01 (.01)	.73 (.03)
7. Difficulty concentrating on what people say, even when they are speaking directly	.37 (.09)	.37 (.08)
8. Misplace or have difficulty finding things at home or at work	.29 (.09)	.39 (.08)
9. Distracted by activity or noise around	.19 (.08)	.38 (.08)

Note: $N = 274$. All loadings significant at $p < .05$ unless indicated as nonsignificant (ns).

Abbreviations: ADHD, attention-deficit/hyperactivity disorder; CDS, cognitive disengagement syndrome; IN, inattention.

good reliability and validity (Doğan et al., 2009). Cronbach's α for the ADHD-IN and ADHD-HI scores were .85 and .80, respectively, in the present study.

2.3.3 | Pittsburg Sleep Quality Index (PSQI; Buysse et al., 1989)

The PSQI is a 19-item self-reported questionnaire consisting of seven parts, including personal sleep quality, sleep delay, sleep duration, everyday sleep activity, sleep disturbances, use of sleep medications, and daytime

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dysfunction. The total score ranges from 0 to 21, with higher scores indicating worse sleep quality. Scores on the Turkish version of the PSQI have demonstrated good reliability and validity (Agargun et al., 1996). The current study used the total score on the PSQI, Cronbach's α = .84.

2.3.4 | Depression Anxiety Stress Scale (DASS-21; Lovibond & Lovibond, 1995)

The Turkish version of the DASS-21 self-report scale was used to measure depression (seven items; e.g., *I felt down hearted and blue*), anxiety (seven items; e.g., *I experienced trembling in my hands*) and stress (seven items; e.g., *I found it difficult to relax*) (Sarıcam, 2018). Each item was rated on a 4-point scale (0 = *never*, 1 = *sometimes*, 3 = *often*, 4 = *almost always*). Scores from the depression, anxiety, and stress scales have shown positive psychometrics in earlier research (Antony et al., 1998; Lovibond & Lovibond, 1995). Scores on the Turkish version of the scale have also demonstrated positive psychometric properties (Lovibond & Lovibond, 1995; Sarıcam, 2018). For the current sample, Cronbach's α's for the depression, anxiety, and stress scales were .81, .86, and .87, respectively.

2.4 | Analytic strategy

The Mplus statistical software was used for the analyses (Version 8.8, Muthén & Muthén, 1998–2017). The self-report items were treated as categorical indicators with the robust weighted least squares estimator used for the analyses (WLSMV). Global model fit was evaluated with the comparative fit index (CFI, acceptable fit ≥0.90, close fit ≥0.95), root-mean-square error of approximation (RMSEA, acceptable fit ≤0.08, close fit <0.05), and the standardized root-mean-square residual (SRMR, acceptable fit ≤0.08, close fit ≤0.05; Little, 2013).

The first analysis applied an a priori CDS and ADHD-IN two-factor model to the 15 CDS items and the 9 ADHD-IN items. Items were allowed to have cross-loadings (Asparouhov & Muthén, 2009). The purpose of this analysis was to identify CDS items with high loadings on the CDS factor (convergent validity) *and* higher loadings on the CDS factor than the ADHD-IN factor (discriminant validity).

The second analysis determined the correlations of the CDS and ADHD-IN factors with sleep problems, ADHD-HI, depression, anxiety, and stress. For this model, the CDS items were allowed to cross-load on the ADHD-IN factor and the ADHD-IN items to cross-load on the CDS factor. The other five variables were treated as manifest variables given the size of the sample. The purpose of this analysis was to determine the correlations of the CDS and ADHD-IN with sleep problems, ADHD-HI, depression, anxiety, and stress. The Mplus model constraint procedure was used to test for significant differences in the associations of the CDS and ADHD-IN factors with the other measures.

The third analysis regressed the sleep, ADHD-HI, depression, anxiety, and stress manifest variables on the CDS and ADHD-IN factors. This analysis allowed the CDS symptoms to cross-load on the ADHD-IN factor and the ADHD-IN symptoms to cross-load on the CDS factor (Asparouhov & Muthén, 2009). The purpose of this analysis was to determine the unique associations of the CDS and ADHD-IN factors with the ADHD-HI, depression, anxiety, and stress measures. The Mplus model constraint procedure was used to determine if the partial unstandardized regression coefficients from the regression of ADHD-HI, depression, anxiety, and stress manifest variables on the CDS and ADHD-IN factors differed in strength.

3 | RESULTS

3.1 | Internal validity of CDS and ADHD-IN symptoms

Table 1 shows the results from the application of the a priori CDS and ADHD-IN two-factor model. This two-factor model had acceptable fit, χ^2 (229) = 632, p < .001, CFI = 0.95, RMSEA = 0.08 (0.073, 0.088), and SRMR = 0.05. Each

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of the 15 CDS symptoms had moderate to strong loadings on the CDS factor ($M = 0.72$, SD = 0.10) with loadings close to zero on the ADHD-IN factor ($M = 0.01$; SD = 0.07). All of the 15 CDS symptoms were thus used to define the CDS construct for the subsequent analyses. Eight of the nine ADHD-IN symptoms had stronger loadings on the ADHD-IN factor ($M = 0.57$, SD = 0.18) than the CDS factor ($M = 0.16$, SD = 0.16). All of the nine ADHD-IN symptoms were kept, however, to define the ADHD-IN factor given the well-established symptom set for defining and diagnosing ADHD (Willcutt et al., 2012). The correlation of the CDS and ADHD-IN factors was 0.68 (SE = 0.06). The CDS and ADHD-IN factors thus had 54% of their true score variance independent of the other factor.

3.2 | Correlations of CDS and ADHD-IN factors with sleep problems, ADHD-HI, depression, anxiety, and stress variables

Table 2 shows the correlations of the CDS and ADHD-IN factors with the sleep problems ADHD-HI, depression, anxiety, and stress manifest variables. This model yielded an acceptable fit, χ^2 (339), 811, $p < .001$, CFI = 0.93, RMSEA = 0.07 (0.065, 0.078), and SRMR = 0.05. Higher scores on the CDS and ADHD-IN factors were associated with higher scores on these measures ($ps < .001$). The CDS factor, however, had a stronger correlation than the ADHD-IN factor with sleep problems, depression, anxiety, and stress ($ps < .001$), whereas the ADHD-IN factor had a stronger correlation than the CDS factor with ADHD-HI ($p < .001$).

3.3 | Unique associations of CDS and ADHD-IN factors with sleep problems, ADHD-HI, depression, anxiety, and stress variables

Table 3 shows the partial standardized regression coefficients from the regression of the sleep problems, ADHD-HI, depression, anxiety, and stress manifest variables on the CDS and ADHD-IN factors. The fit of this model was the same as the previous model. First, the unique association of the CDS factor with sleep problems, depression, anxiety, and stress was significant ($ps < .001$) with the ADHD-IN factor not having unique associations with these variables ($ps > .10$). In contrast, the unique association of the ADHD-IN factor with ADHD-HI was significant ($p < .001$) with the CDS factor not having a unique association with this variable ($p > .10$). Second, the CDS factor had a stronger unique association than the ADHD-IN factor with sleep problems, depression, anxiety, and stress ($ps < .001$), whereas the ADHD-IN factor had a stronger unique association than the CDS factor with ADHD-HI ($p < .001$). In addition, the significant and nonsignificant results for these analyses remained the same after controlling for age, gender, marital status, education, and income.

TABLE 2 Correlations (SEs) of CDS and ADHD-IN factors with other factors.

External correlates	CDS	ADHD-IN
Sleep quality	.48 (.05)[a]	.30 (.06)[b]
ADHD-HI	.42 (.05)[a]	.64 (.04)[b]
Depression	.71 (.03)[a]	.49 (.06)[b]
Anxiety	.66 (.04)[a]	.46 (.06)[b]
Stress	.63 (.04)[a]	.42 (.06)[a]

Note: $N = 274$. All correlations were significant at $p < .001$. Correlations for the same external correlate with different superscripts differ at $p < .001$.

Abbreviations: ADHD, attention-deficit/hyperactivity disorder; CDS, cognitive disengagement syndrome; HI, hyperactivity/impulsivity; IN, inattention.

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TABLE 3 Partial standardized regression coefficients (SEs) for the association of CDS and ADHD-IN factors with other symptom factors.

External correlates	CDS	ADHD-IN
Sleep quality	.51 (.07)[a]	−.03 (.08)[b]
ADHD-HI	−.01 (.08)[a]	.65 (.07)[b]
Depression	.68 (.07)[a]	.04 (.08)[b]
Anxiety	.62 (.07)[a]	.05 (.08)[b]
Stress	.62 (.07)[a]	.01 (.08)[a]

Note: $N = 274$. All partial standardized regression coefficients were significant at $p < .001$. Regression coefficients for the same external correlate with different superscripts differ at $p < .001$. The significance tests were performed on the partial unstandardized regression coefficients. The results also remained the same controlling for age, gender, marital status, education, and income.

Abbreviations: ADHD, attention-deficit/hyperactivity disorder; CDS, cognitive disengagement syndrome; HI, hyperactivity/impulsivity; IN, inattention.

4 | DISCUSSION

Identifying a cross-culturally valid CDS symptom set and determining a valid and reliable scale to evaluate these symptoms is significant to understand CDS and to conduct studies in this area. The current study is the first to evaluate the self-report measure of CDS in a clinical sample of adults, and also the first to examine ACI in adults from Turkey, and found support for the internal (structural) and external validity of the ACI for assessing CDS symptoms in a psychiatric outpatient sample of adults.

4.1 | Structural validity of the ACI

The current study is the first study that demonstrates each of the 15 CDS symptoms as measured by the ACI showed good substantial loadings on the CDS factor as well as higher loadings on the CDS than ADHD-IN factor. These results are the first to provide support for the structural validity of the ACI in a psychiatric outpatient sample of adults, adding to previous research in college students or community samples using the ACI to assess CDS symptoms (Becker, Burns, et al., 2018; Fredrick et al., 2019, 2021; Sadeghi-Bahmani et al., 2023). Becker, Burns, et al. (2018) found 10 of 15 ACI items to be distinct from ADHD-IN items in undergraduate students from United States and Fredrick, Burns et al. (2022) also found 10 of 15 ACI items to be distinct from ADHD-IN items in a community sample of adults, whereas Sadeghi-Bahmani et al. (2023) found support for seven of the 15 ACI items in a sample of adults in Iran. There have thus been some inconsistent findings in the three previous studies examining the structural validity of the ACI, though there are a few similarities and differences between the current study and these studies. The validity of some CDS items in college students but their absence in the initial community-based study of adults (Fredrick, Burns, et al., 2022) was interpreted by the authors as these CDS symptoms may change with development. Although there are suggestions that CDS symptoms do not generally disappear as individuals age, it is unclear whether the severity of CDS symptoms appears to increase with age or because their negative effects on functioning become more pronounced (Becker et al., 2023). A few CDS symptoms are seemed to have different validity in different cultures or in different populations of the same culture, nevertheless these results substantially demonstrate that these 15-item CDS symptom set shows a transcultural validity that is differentiated from

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ADHD in a clinical sample of Turkish adults. Thus, future research may demonstrate the internal validity and broader range of cultural contexts in larger clinical samples with ratings on the 15-item CDS scale.

4.2 | External validity of the ACI

Some evidence has been found for other objectives of the study as well. Support occurred for the external validity of the CDS relative to ADHD-IN. In the current study, CDS symptoms measured by ACI had stronger correlations and unique associations than ADHD-IN with anxiety, depression, sleep problems, and stress whereas ADHD-IN had stronger correlations and unique associations than CDS with ADHD-HI. In the psychometric evaluation study conducted for Turkish children of the same scale, it was found that CDS symptoms had a significantly stronger association than ADHD-IN with anxiety and depression whereas ADHD-IN had a significantly stronger association than CDS symptoms with ADHD-HI (Başay et al., 2021). Also, it has been shown that CDS symptoms have unique relations with increased anxiety and depression in college students (Becker, Burns, et al., 2018; Becker, Langberg et al., 2014; Sadeghi-Bahmani et al., 2023 findings specific to depression and not anxiety) and community samples (Takeda et al., 2019), and adults with ADHD (Leikauf & Solanto, 2017). Regarding the well-established link between CDS and depression, including in our study, it is possible that CDS symptoms may relate or contribute to task-unrelated thought such as rumination (Fredrick & Becker, 2021; Fredrick, Kofler, et al., 2020) and, in turn, depressive symptoms (Fredrick, Lanberg, et al., 2022; Greene et al., 2020).

CDS symptoms were found to be more strongly associated than ADHD-IN with sleep problems. Similar findings were found for some sleep domains such as sleep quality (Becker, Luebbe, et al., 2014), shorter sleep duration, greater daytime sleepiness (Fredrick, Burns, et al., 2022; Langberg et al., 2014) and greater diurnal preference for eveningness (Lunsford-Avery et al., 2021) in previous studies.

This study adds to the growing evidence supporting the CDS construct. CDS originated from research that examined the dimensional aspects of attention-deficit disorder (ADHD), whether with and without hyperactivity (Becker, Marshall, et al., 2014). Recent studies have revealed a distinction between CDS symptoms and ADHD-inattentive symptoms (ADHD-IN) (Becker, 2021). CDS symptoms have also found to associate with increased levels of anxiety and depression; however, it is important to note that CDS symptoms are also distinct from depression and anxiety symptoms (Becker et al., 2023). In studies examining the consistency of CDS symptoms, it was observed that they exhibited trait-like characteristics rather than state-like (Burns et al., 2020). In studies assessing the relationship between CDS symptoms and age, there may be a modest association between CDS symptoms with increasing age (Becker et al., 2023). In the very few studies examining potential etiologies, it was observed that genetic (Moruzzi et al., 2014) and prenatal factors (East et al., 2023; Graham et al., 2013) may play a role, and CDS symptoms may be associated with low socioeconomic status and low educational level in the family (Barkley, 2013). The lack of rigorous research in numerous domains, as well as the potential multidimensional nature of CDS symptoms, makes it difficult to determine whether CDS is best conceptualized as a transdiagnostic factor, a diagnostic specifier, or a distinct psychiatric diagnosis.

4.3 | Limitations

The relatively small sample size in this study and the lack of using a structured clinical interview for the diagnosis of the patients are among the limitations of the study. If a structured clinical interview had been conducted in a larger sample, the number of diagnoses could have been greater, comorbid psychiatric disorders could have been more clearly assessed, and the transdiagnostic nature of CDS symptoms could have been evaluated. We also only included self-report rating scales which may contribute to mono-informant biases; additional studies are needed that use a multi-method, multi-informant approach.

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4.4 | Conclusion

This study provides evidence for the internal (structural) and external validity of the scores from a self-report measure of the 15 CDS symptoms with adults from university psychiatric outpatients clinics in Turkey. Each of the 15 CDS symptoms as measured by the ACI showed good convergent validity (substantial loadings on the CDS factor) as well as discriminant validity (higher loadings on the CDS than ADHD-IN factor). CDS as measured by the ACI also showed stronger first-order and unique associations than ADHD-IN with sleep problems, depression, anxiety, and stress, whereas ADHD-IN showed stronger first-order and unique associations than CDS with ADHD-HI. Support was thus obtained for the ACI self-report measure of CDS symptoms in adults from outpatients in Turkey. The results of this study not only show the transcultural validity of 15 CDS symptoms as measured by the ACI, but also show that the Turkish version of ACI can be used as a valid and reliable self-report scale for investigating CDS symptoms.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

Ethical approval was granted by the Ethics Committee of Pamukkale University Faculty of Medicine (Date: 26.04.2022, No: 60116787-020-201208). This study was performed in line with the principles of the Declaration of Helsinki. Informed consent was obtained from all individual participants included in the study.

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