



## Hyperfocusing as a dimension of adult attention deficit hyperactivity disorder<sup>☆, ☆☆</sup>



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### ABSTRACT

Patients with Attention Deficit Hyperactivity Disorder (ADHD) suffer not only from inability to focus but also from inability to shift attention for events that trigger their interests. This phenomenon is called “hyperfocusing”. Previous literature about hyperfocusing is scarce and relies mainly on case reports. The study aimed to investigate and compare the severity of hyperfocusing in adult ADHD with and without psycho-stimulant use. ADHD (DSM-IV-TR) patients either psycho-stimulant naive ( $n = 53$ ) or on psycho-stimulants ( $n = 79$ ) from two ADHD clinics were recruited. The control group ( $n = 65$ ) consisted of healthy university students. A socio-demographic form, the Beck Depression Inventory, the Wender-Utah Rating Scale, the Adult ADHD Self-Report Scale and the Hyperfocusing Scale were applied to the participants. There was no difference between total Hyperfocusing Scale and Adult ADHD Self-Report Scale scores of two patient groups, but both have higher scores than controls ( $p < 0.001$ ). Hyperfocusing is higher in adult ADHD and there was no difference between stimulant-naïve patients or patients on stimulants. Hyperfocusing can be defined as a separate dimension of adult ADHD.

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## 1. Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is characterized by problems of attention, overactivity and impulsivity which begin in early childhood and last for lifelong. ADHD is a heterogeneous syndrome with unknown etiology and preva-

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Prevalence of ADHD is reported as 3–5% in children and adolescents. In adults, the prevalence of ADHD is not known, however the estimated prevalence of ADHD in adults was reported as 3.4–4.4% (Fayyad et al., 2007; Kessler et al., 2006) and ADHD symptoms were reported to persist in almost half of the childhood cases (Kessler et al., 2010). Psychiatric comorbidities such as depression, anxiety disorders, alcohol and substance use disorders, bipolar disorder are common in adult ADHD (Fayyad et al., 2007; Simon, Czobor, Bálint, Mészáros, & Bitter, 2009; Verbeek, 2003). Current diagnostic criteria for ADHD are appropriate for childhood, however there is no consensus about the diagnostic criteria for adult ADHD (Adler & Cohen, 2004). Several instruments for the screening of adult ADHD have been developed and diagnostic criteria have been suggested as associated research increased in the last decade (Adler & Cohen, 2004; Kessler et al., 2005). In the recent diagnostic criteria by American Psychiatric Association (Diagnostic and Statistical Manual of Mental Disorders, DSM-5, 2013), the number of the criteria needed for the diagnosis of adult ADHD has been decreased (American Psychiatric Association, 2013). However, there was no change in terms of clinical features.

Patients with ADHD usually have difficulty of focusing and this has been the main concern in the diagnostic criteria. Besides, previous research highlighted the deficiency of the Navon effect, which is an automatic tendency to process the global picture prior to local details when processing compound patterns, in both children and adult ADHD patients (Kalanthoff, Naparstek, & Henik, 2013; Song & Hakoda, 2012; Song & Hakoda, 2015). In other words, patients with ADHD experience excessive local interference effect and/or lack of global processing such that they cannot stay focused on the big picture and they drown in the details.

“Hyperfocusing” is defined as a clinical phenomenon of “locking on” to a task in patients with ADHD who have a difficulty of shifting their attention from one subject to another, especially if the subject is about their interests (Conner, 1994). Hyperfocusing was mentioned as a state resembling a “hypnotic spell”, according to the subjective experiences of the cases with ADHD (Brown, 2005). It may occur during activities with different modalities like visions, tasks or voices. Individuals usually report hyperfocusing during interactive, operative activities in which they are interested. Moreover, hyperfocused individuals neglect things other than the condition they are already focused on. Patients with ADHD are reported to be stuck in the activities that they are interested and they keep on doing these things for hours while they lose interest in their surroundings. The literature about hyperfocusing indicates that it appears especially while watching TV or using computer (Conner, 1994; Doyle, 2006). The patients with ADHD usually report that they cannot understand how the time passes. During hyperfocusing, the individuals state that they are aware of the things that they ignore, however they cannot give up what they are doing (Brown, 2005; Conner, 1994). Although it is not present in current diagnostic systems, impaired time management is also accepted as an accessory symptom in adult ADHD and has been assessed by some clinical instruments (Adler & Cohen, 2004).

Hyperfocusing is thought to occur on the basis of attention disorder; patients with ADHD have difficulties of focusing and sustaining, as well as shifting their attention. Therefore, some authors have suggested using “attention disorder” instead of “attention deficit” for defining the attention problem in ADHD (Doyle, 2006). When taken together, both hyperfocusing, which seems to be a state of increased attention due to heightened motivation, and excessive local interference point out an “attention disorder” instead of an “attention deficit”. However, hyperfocusing that is frequently reported by patients in clinical settings has not been scientifically studied. The current literature about hyperfocusing depends mainly on case reports (Brown, 2005; Fitzsimons, Brookman, Arnholz, & Baker, 2016).

Hyperfocusing is also frequent in healthy population, but this problem seems to be more prevalent and chronic such that it causes significant dysfunction in patients with ADHD (Conner, 1994). Barkley (1998) observed that adults with ADHD were in search for activities promoting a state of hyperfocusing that evokes excitement and this situation led to functional impairment. Besides, some authors suggested that hyperfocusing, like hyperactivity and impulsivity, might enhance creativity although it impairs academic success in patients with ADHD (Flint, 2001; Hallowell & Ratey, 2011; Holmes, 2006).

Additionally, hyperfocusing has also been reported as an adverse effect of psycho-stimulants in these patients. Especially high doses of methylphenidate may lead to emotional lability and hyperfocusing (Silver, 2004). However, hyperfocusing due to psycho-stimulant usage relies either on subjective reports of the patients or was not clearly investigated (Solanto & Wender, 1989).

Although, hyperfocusing has been clinically reported as a frequent phenomenon in ADHD, it is not clearly defined and not examined as a separate dimension or a symptom in scientific research. Previously, Ozel-Kizil et al. (2013) developed a questionnaire (Hyperfocusing Scale-HS-Appendix A) for the assessment of the severity of hyperfocusing symptoms in a non-clinical sample consisting of university students. They reported that hyperfocusing which was evaluated by the HS had high correlations with other ADHD symptoms like inattention, impulsivity and hyperactivity. However, that study which was carried out in a non-clinical sample was a preliminary one such that the results did not support hyperfocusing as a symptom of adult ADHD.

Therefore, the present study was designed in order to evaluate whether hyperfocusing symptoms were present in patients with adult ADHD and there was a difference in the severity of hyperfocusing in these patients when compared to healthy controls. Because healthy people may also have hyperfocusing in some extent. The secondary aim of the study was to compare hyperfocusing symptoms in ADHD patients with or without psycho-stimulant use. Thus, it would be possible to evaluate whether hyperfocusing occurs due to psycho-stimulant use or an intrinsic part of the syndrome. In addition to that, the present study could also add on to the validity of the HS in adult patients with ADHD. So, both convergent validity and

factor structure of the HS were assessed. The results of the study would also provide valuable information for the newly developing diagnostic basis of adult ADHD.

## 2. Method

### 2.1. Participants

Attention Deficit/Hyperactivity Disorder (according to DSM-IV-TR criteria, [American Psychiatric Association \(2000\)](#)) patients either psycho-stimulant-naive (not using stimulants or other psychotropic drugs for at least 6 months) ( $n = 53$ ) or using stimulant drugs ( $n = 79$ ) from two Attention Deficit/Hyperactivity Disorder outpatient clinics of a state and a university hospital, were recruited to the study. The patients were diagnosed by psychiatrists working with ADHD patients. Fifty-eight patients were on Methylphenidate HCL (mean dosage =  $35.2 \pm 1.4$  mg/day), 21 of them were on Methylphenidate extended release tablets (mean dosage =  $44.1 \pm 1.4$  mg/day) and 4 patients were taking selective serotonin reuptake inhibitors at the time of the study. The control group ( $n = 65$ ) consisted of healthy volunteers who were university students. Being under 18 years of age and having psychiatric/neurological comorbidities like mental retardation, bipolar disorder, schizophrenia, alcohol-substance use disorder, pervasive developmental disorders and epilepsy other than major depressive disorder were the exclusion criteria. The diagnosis of major depressive disorder was not excluded, because of its high comorbidity in patients with ADHD. A socio-demographic form, the Beck Depression Inventory (BDI), the Wender-Utah Rating Scale (WURS), the Adult Attention Deficit/Hyperactivity Disorder Self- Report Scale (ASRS) and the Hyperfocusing Scale (HS) were applied to all of the participants. The study was approved by the ethics committee of the university and informed consents were taken from all participants.

### 2.2. Materials and procedure

#### 2.2.1. Hyperfocusing scale (HS)

This scale was developed by [Ozel-Kizil et al. \(2013\)](#) in order to evaluate the severity of hyperfocusing symptoms. A group of professionals including psychiatrists and clinical psychologists who were experienced in neuropsychology transformed the knowledge about hyperfocusing in ADHD (the most common complaints about hyperfocusing) into items after interviewing with adult ADHD patients. The HS is a self-rating instrument which consists of 11 items (Likert type scale; from “1-definitely disagree” to “4-definitely agree”) and reveals a minimum score of 11 and a maximum score of 44 ([Appendix A](#)). It was validated in a non-clinical population consisting of 207 participants (mean age =  $22.49 \pm 4.97$ ) who were volunteered university students and staff. The HS revealed a moderate-high internal consistency (Cronbach alpha = 0.74). There were significant correlations between the HS and the WURS ( $r = 0.31$ ,  $p < 0.001$ ), the HS and the total scores of ADHD Scale for adults (ADHD-A, [Günay et al., 2006](#)) ( $r = 0.28$ ,  $p < 0.001$ ). For the assessment of the discriminant validity, the HS scores of the adults with higher and lower WURS ( $\geq$  or  $<$  cut-off score of 36) scores as well as with mild, moderate and severe levels according to the ADHD-A scale were compared. Both comparisons revealed significant results (for higher vs lower WURS scores  $t = 3.26$ ,  $p = 0.001$ ; for mild, moderate and high ADHD-A levels,  $F = 13.53$ ,  $p < 0.001$ ) ([Ozel-Kizil et al., 2013](#)).

#### 2.2.2. Wender-Utah rating scale (WURS)

The WURS was developed by [Ward, Wender, and Reimherr \(1993\)](#) in order to evaluate childhood symptoms of ADHD retrospectively and it is widely used for the diagnosis of adult ADHD in clinical practice. Previous studies suggested high internal consistency and test-retest reliability ([Wierzbicki, 2005](#)). Furthermore the WURS differentiated adults with ADHD from healthy controls and depressed patients. The WURS is a self-rating, Likert-type scale with 25 items scored as ‘no or very slightly-0’, ‘slightly-1’, ‘moderate-2’, ‘more-3’, ‘much more-4’. The reliability and validity study of its Turkish form was conducted by [Öncü, Ölmez, and Şentürk \(2005\)](#) and revealed a high internal consistency (Cronbach alpha = 0.93).

#### 2.2.3. Adult ADHD self rating scale (ASRS)

The ASRS was developed by [Kessler et al. \(2005\)](#) in order to screen for adult ADHD in community samples. It has two subscales each consisting of 9-items; “attention deficit” and “hyperactivity and impulsivity”. Items are to determine how often each symptom appears in the last 6 months. It is a Likert-type scale scored between 0 and 4 (never, rarely, sometimes, frequently and very frequently). Patients with a score of  $\geq 24$  were accepted to have ‘highly probable ADHD’, scores of 17–23 suggested ‘probable ADHD’ and scores of 0–16 showed ‘without ADHD’. The reliability and validity study of the Turkish form of the ASRS was conducted by [Doğan, Öncü, Varol Saraçoğlu, and Küçüköncü \(2009\)](#). This study revealed high internal consistency (Cronbach alpha = 0.88) and supported the two-factor model (attention deficit and hyperactivity/impulsivity factors) of the scale.

#### 2.2.4. Beck depression inventory (BDI)

The BDI ([Beck, Ward, Mendelson, Mock, & Erbaugh, 1961](#)) comprised of 21 items which aim to evaluate the severity of depressive symptoms. It is a self-rating scale scored between 0 and 63. Higher scores reflect more severe depression. Its Turkish form was validated by [Hisli \(1989\)](#).

**Table 1**  
Comparison of the two groups according to socio-demographic and clinical variables.

Mean	Stimulant- naive ADHD patients (SN) (n = 53)	ADHD patients on stimulants (S) (n = 79)	Control Group (C) (n = 65)	Comparison of groups (F, p, Post-Hoc test)
Age	27.26 ± 7.96	24.99 ± 8.31	19.94 ± 3.02	17.95, p < 0.001* SN = S > C
Education (years)	14.96 ± 3.69	14.10 ± 3.38	12.54 ± 2.18	9.27, p < 0.001* SN = S > C
BDI total scores	15.06 ± 7.65	12.84 ± 7.83	9.42 ± 4.30	10.40, p < 0.001* SN = S > C
WURS total scores	47.23 ± 17.37	39.59 ± 17.28	7.05 ± 5.22	136.05, p < 0.001* SN > S > C
ASRS total scores	48.55 ± 11.89	44.19 ± 12.57	14.17 ± 6.11	195.89, p < 0.001* SN = S > C
ASRS attention deficit subscale scores	27.3 ± 5.7	24.9 ± 7	7.4 ± 3.8	226.8, p < 0.001* SN = S > C
ASRS hyperactivity/impulsivity subscale scores	23.7 ± 7.8	21.4 ± 7.7	6.8 ± 3.9	118.28, p < 0.001* SN = S > C
HS total scores	30.23 ± 6.74	29.54 ± 7.19	16.00 ± 3.14	114.87, p < 0.001* SN = S > C

ADHD: Attention Deficit Hyperactivity Disorder; BDI: Beck Depression Inventory; WURS: Wender-Utah Rating Scale; ASRS: Adult ADHD Self Rating Scale; HS: Hyperfocusing Scale.

\* p < 0.05.

**Table 2**  
Comparison of the HS factor scores of the groups by ANCOVA.

Mean	Stimulant- naive ADHD patients (n = 53)	ADHD patients on stimulants (n = 79)	Control group (n = 65)	Comparison of groups (F, p)
Hyperfocusing factor scores	12.6 ± 3.9	12.2 ± 3.8	7.2 ± 1.5	32.4, p < 0.001*
Impaired time management factor scores	11.8 ± 2.7	11.2 ± 3.3	5.8 ± 1.6	61.9, p < 0.001*
Procrastination factor scores	5.9 ± 1.4	6.1 ± 1.4	3.1 ± 1.1	76.4, p < 0.001*

ADHD: Attention Deficit Hyperactivity Disorder.

\* p < 0.05.

### 2.3. Data analysis

Two groups were compared either by chi-square test for categorical variables or by one-way analysis of (co-)variance (ANOVA/ANCOVA) for continuous variables. Presence of depressive symptoms in this sample was not taken as an exclusion criterion because of its high comorbidity in ADHD. Therefore, severity of depressive symptoms which is evaluated by the BDI was taken as a covariate in ANCOVA. Bonferroni test was used for post-hoc analysis. A factor analysis was conducted in order to evaluate the validity of the HS in adult patients with ADHD. For the factor analysis, principal components analysis and varimax rotation were applied to the HS scores of the whole sample.

## 3. Results

Socio-demographic variables and the HS, the WURS, the ASRS and the BDI scores of the groups and their statistical comparisons are presented in the [Table 1](#).

Three groups differed significantly in terms of age, education, the BDI, the WURS, the ASRS, the ASRS subscales and the HS scores. When age, total years of education and the BDI scores were taken as covariates, the differences between groups in terms of the HS ( $F = 75.56$ ,  $p < 0.001$ ), the WURS ( $F = 101.24$ ,  $p < 0.001$ ) and the ASRS ( $F = 127.73$ ,  $p < 0.001$ ) total scores persisted. Post-hoc tests revealed that there was no difference between the HS and the ASRS scores of the two patient groups ( $p > 0.05$ ), but both groups have higher HS and ASRS scores than controls ( $p < 0.001$ ). However, the WURS scores of psycho-stimulant-naive patients were higher than patients using stimulants according to the post-hoc tests ( $p = 0.01$ ). When the WURS scores were taken as a covariate and three groups were compared in terms of the HS scores, the hierarchy between the groups persisted ( $F = 40.5$ ,  $p < 0.001$ ,  $SN = S > C$ ).

The factor analysis (principal components analysis and varimax rotation) for 11 HS items (in a total sample of 132 ADHD patients and 65 controls) yielded a three-factor solution explaining 63.9% of the total variance. Kaiser-Meier-Olkin value of the analysis was 0.84. The first factor “hyperfocusing” with a variance of 29.77% consisted of 5 items (1, 2, 4, 5, 7), the second factor “impaired time management” with a variance of 23.14% consisted of 4 items (8–11) and the third factor “procrastination” with a variance of 10.96% consisted of 2 items (3, 6). ANCOVA yielded similar factor scores in two ADHD patient groups, while patients had higher factor scores than the controls (for three HS factors  $p < 0.001$ ) ([Table 2](#)).

**Table 3**

Correlations of three factor scores and total scores of the HS with the ASRS and the WURS scores in ADHD patients (n = 132).

	Hyperfocusing factor scores	Impaired time management factor scores	Procrastination factor scores	HS total scores
WURS total scores	r = 0.14, p = 0.115	r = -0.003, p = 0.971	r = -0.04, p = 0.631	r = 0.67, p = 0.448
ASRS total scores	r = 0.41, p < 0.001*	r = 0.26, p = 0.002*	r = 0.21, p = 0.016*	r = 0.39, p < 0.001*
ASRS attention deficit factor scores	r = 0.26, p < 0.001*	r = 0.26, p = 0.003*	r = 0.28, p = 0.001*	r = 0.37, p < 0.001*
ASRS hyperactivity/impulsivity factor scores	r = 0.39, p < 0.001*	r = 0.24, p = 0.007*	r = 0.09, p = 0.264	r = 0.34, p < 0.001*

ADHD: Attention Deficit Hyperactivity Disorder; WURS: Wender-Utah Rating Scale; ASRS: Adult ADHD Self Rating Scale; HS: Hyperfocusing Scale.

\* p &lt; 0.05.

Correlations of three factor scores and total scores of the HS with the other scores are presented in Table 3. In all ADHD patients the HS scores and the three factor scores were positively correlated with the ASRS, but not with the WURS scores. Attention deficit subscale scores of the ASRS were positively correlated with all of the factors of the HS. Hyperactivity/impulsivity subscale scores of the ASRS were positively correlated with the “hyperfocusing” and the “impaired time management” factors, but not with the “procrastination” factor. The total WURS scores of the patient group did not have a correlation with the total ASRS scores, either ( $r = 0.11$ ,  $p = 0.201$ ).

#### 4. Discussion

At present, no biological or psychological tests with sufficient sensitivity or specificity exist for the diagnosis of adult ADHD, clinical characteristics of which have gained more attention in the last decade. Some associated symptoms like hyperfocusing, poor time management and procrastination are frequently observed alongside the core triad amongst these patients, however these symptoms are not included in current diagnostic criteria. Therefore, the results reflecting a higher level of hyperfocusing in adult ADHD compared to controls are important. There was no difference between stimulant-naïve or patients on stimulants in terms of hyperfocusing, although hyperfocusing has been reported as a stimulant side effect in previous research (Conner, 1994; Silver, 2004). Hyperfocusing was associated with adult ADHD symptoms rather than childhood symptoms which were assessed by the WURS. There was no association between adulthood and childhood symptoms of ADHD, either. Therefore, hyperfocusing can be defined as a separate dimension of adult ADHD.

The WURS relies on retrospective data about childhood ADHD symptoms and previous research has pointed out the lower discriminant validity of the scale in adult ADHD (McCann, Scheele, Ward, & Roy-Byrne, 2000). As well as that, stimulant-naïve patients might report more childhood symptoms as stimulant use might have reduced symptoms of ADHD in some of the patients on stimulants. Therefore, the results of the present study concerning higher WURS scores in stimulant-naïve patients compared to the patients using stimulants, which were not parallel with the ASRS scores, should be neglected. Furthermore, there was no difference in the HS results when the WURS score was taken as a covariate.

The hyperfocusing which was evaluated by the HS had three dimensions; the “hyperfocusing”, the “impaired time management” and the “procrastination”. The factor of hyperfocusing consisted of five items (1, 2, 4, 5, 7), the factor of impaired time management consisted of four items (8–11) and the last factor of procrastination included two items (3 and 6). Item-10 (postponing things due to excessive computer game playing) which also seems to be related to procrastination, was loaded on the impaired time management factor.

This is the first study which aims to measure hyperfocusing in patients with ADHD. Therefore, we cannot compare our results related to hyperfocusing. On the other hand, previous studies with both childhood and adult ADHD also emphasize poor time management and chronic procrastination in these patients. Because their insufficient time management, these patients tend to stagger under the organizational demands of everyday life. Their “time-blindness” culminates in them often being late, rushed and unprepared (Barkley, 1997; Verbeek, 2003). Furthermore, the majority of studies about time perception in patients with ADHD showed that they had difficulty in processing time information. Time perception abnormalities were measured in tasks of time estimation, time production/reproduction or discrimination tasks in these patients. However, only a few studies examined the ability of time perception in adult ADHD and these studies gave inconsistent results (Barkley, Murphy, & Bush, 2001; Seri, Kofman, & Shay, 2002).

Some authors also argue that abnormalities in timing functions are fundamental to impulsiveness (Rubia, Halari, Christakou, & Taylor, 2009). The passage of time appears to be subjectively longer/more intolerable for these patients suggestive of an abnormal time sense. Further, the results of the previous studies pointed out a reduced sensitivity to reward delays, i.e. the timing of the reward, not the reward itself, reflecting hypersensitivity to the passage of time (Tripp & Alsop, 2001).

Steel (2007) defined the “procrastination” as the irrational tendency to voluntarily postpone or delay a task or a decision that actually has to be completed before a certain deadline. Procrastination was defined not only as a deficit in time management, but also involving a complex interaction of behavioral, cognitive and affective components (Solomon & Rothblum,

1984). Therefore, these two constructs appeared as separate dimensions in the present study. Procrastination is extremely prevalent that 80–95% of college students were reported to engage in procrastination (O'Brien, 2002; Rothblum, Solomon, & Murakami, 1986). Moore, Burgard, Larson, & Ferm (2014) showed that non-prescriptive psycho-stimulant use among college students increased during periods of high stress which was provoked by self-reported procrastination and poor time management. Based on the negative experiences related to procrastination, especially adolescents and adults with ADHD are prone to develop negative beliefs about the self (Steel, 2007). Procrastination was also associated with inattention, perfectionism, fear of failure, depression and low self-esteem (Niermann & Scheres 2014; Pychyl, Coplan, & Reid, 2002; Solomon & Rothblum, 1984). So, procrastination is often part of the psychotherapies for adults with ADHD who usually present low self-esteem and develop depression (Cook, Knight, Hume, & Qureshi, 2014; Daviss, 2008; Harpin, Mazzone, Raynaud, Kahle, & Hodgkins, 2013). In a study, patients with ADHD received cognitive behavioral therapy which included strategies for the management of procrastination (Safren, Sprich, Chulvick, & Otto, 2004). The results of the present study also revealed that the procrastination in adult patients with ADHD was not associated with hyperactivity and impulsivity. However, procrastination was associated with attention deficit as implied in previous research (Niermann & Scheres, 2014).

Impaired time management and procrastination can also be considered as a result of the executive deficit which was suggested to be more specific for adult ADHD than inattention (Kessler et al., 2010). The study by Kessler et al. (2010) revealed that executive problems, such as making careless mistakes, difficulty in organizing tasks, losing things, difficulties in planning, prioritizing, multitasking, remembering the main idea other than details, completing tasks on time, meeting deadlines, and maintaining self-discipline, were the most important predictors of adult ADHD. However, factor loadings of time wasting and mismanagement were lower in their study.

## 5. Conclusion

In conclusion, hyperfocusing which is a very well-known phenomenon by clinicians, is present both in stimulant-naïve and stimulant-using adult patients with ADHD. The present study is the first study that investigates the clinical features of hyperfocusing in ADHD by using a valid instrument. Previous literature about hyperfocusing is scarce, relies mainly on case reports and provides no data about the neuropsychological or neurobiological basis of the phenomenon. There is only one study, which suggests a possible neurobiological basis for hyperfocusing, which showed a discrepancy between frontal activity (measured by functional near infrared spectroscopy) and verbal fluency performance in adult patients with ADHD. The authors suggested that the discrepancy (higher performance in verbal fluency was associated with lower brain activation) might reflect a state of hyperfocusing. Since no clinical assessment specific for hyperfocusing was performed, it can be considered as an overestimation (Schecklmann et al., 2008).

Therefore, this study should be considered as a preliminary one that has some limitations. Firstly, we did not address the association of hyperfocusing with some factors like cognitive functions (verbal fluency, set shifting, Stroop interference, response inhibition etc.) and daily functioning that are impaired in ADHD (Boonstra, Oosterlaan, Sergeant, & Buitelaar, 2005; Caci et al., 2014). For example, Kalanthroff et al., (2013) suggested a possible association between deficiency of global processing and social dysfunction in adult patients with ADHD. Maucieri and Carlson (2013) highlighted the role of hyperfocusing related impairment of social relationships in couples with ADHD.

Moreover, hyperfocusing has also been reported in patients with autism spectrum disorders (Tryon, Mayes, Rhodes, & Waldo, 2006; Weiss & Murray, 2003). Pervasive developmental disorders were excluded in the study, even so we did not examine autistic characteristics in detail. Another limitation is that there was difference between the patients and the control group in terms of age and education. Although statistical control was applied for these variables, future research should be carried out in matched samples.

Further research should also investigate the association between hyperfocusing, cognition and functioning as well as its underlying mechanisms both in childhood and adult ADHD.

## Appendix A.

### *The Hyperfocusing Scale*

- (1) Totally disagree
- (2) Disagree
- (3) Agree
- (4) Totally Agree

1. While I'm busy with something, although repeatedly addressed, I often don't hear or react. ....
2. Due to excessive focusing on a work, I often neglect myself and those around me. ....
3. It is often not to complete work which I have started. ....
4. While I'm busy with something, I don't care if the world bemoans. ....
5. Due to the fact that I spend a long time on a work, my relationships with people are often disrupted. ....
6. While working on a topic, I often delay other important things that I have to do. ....

7. Because I can't leave the work which I'm dealing with, I often stay late to the places where I should go. -----
8. While I'm busy with something, although it has been a long time, it generally seems to me as if it was shorter. -----
9. While dealing with a work that interests me, I often feel that time flies by. -----
10. Due to playing computer games (solving puzzles, fixing something, etc) for hours, I often postpone other things that I have to do. -----
11. Due to dealing with a work for a long time, although I don't feel anything at that moment, I have pain in various parts of my body. -----

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