DOCUMENT SUMMARY

This research article by Holst and Thorell examines the psychometric properties of the **Adult Executive Functioning Inventory (ADEXI)**, a brief 14-item rating scale focused on working memory and inhibitory control. The study finds that the **ADEXI** has high internal consistency and adequate test-retest reliability, but low agreement between self-ratings and other-ratings. The instrument effectively discriminates between adults with **ADHD** and control groups, making it a valuable screening tool, though it should be used to complement, not replace, neuropsychological tests.

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Holst_&*Thorell_2018_Adult_executive_functioning_inventory*(ADEXI)_Validity_reliability_and_relations_to_ADHD

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Abstract

This study examined the psychometric properties of the **Adult Executive Functioning Inventory (ADEXI)**. This new **executive functioning (EF)** rating instrument has the advantage of being brief (14 items) and focusing specifically on **working memory** and **inhibitory control**. Results showed that scores on the **ADEXI** had high internal consistency and adequate test-retest reliability, but low concurrence between self-ratings and other ratings. High and statistically significant correlations were found between **ADEXI** scores and scores from another **EF** rating instrument, whereas the correlations between **ADEXI** scores and neuropsychological test scores were weak and

often non-significant. Furthermore, with regard to discriminant validity, individuals with **attention deficit hyperactivity disorder (ADHD)** had significantly higher scores on both the inhibition and working memory subscales compared to clinical as well as non-clinical controls. The results showed high specificity, but relatively low sensitivity, when discriminating between adults with **ADHD** and non-clinical controls.

> Conclusively, the **ADEXI** can be a valuable screening instrument for assessing deficits in **working memory** and **inhibitory control**. However, similarly to other **EF** ratings, the **ADEXI** should be used as a complement rather than as a replacement for neuropsychological tests, and the low interrater reliability suggests that ratings from multiple sources is preferable compared to relying solely on self-ratings.

KEYWORDS: ADHD, **executive functions**, **inhibition**, **self-ratings**, **working memory**

1 INTRODUCTION

Executive functioning (EF) can be described as an umbrella term for various complex cognitive processes responsible for cognitive control of actions and thoughts that are necessary to maintain goal-directed behaviour in order to reach future goals such as **working memory**, **inhibition**, set-shifting, and planning (Welsh & Pennington, 1988). Furthermore, with regard to the link between **EF** deficits and psychiatric disorders, the strongest link has been found with **attention deficit hyperactivity disorder (ADHD)**. Most previous research has been conducted on children (e.g. Barkley, 2014; Nigg, 2006, for reviews), but there is also evidence showing that adults with **ADHD** perform significantly worse than controls on **EF** tests (for reviews and meta-analyses, see Alderson, Kasper, Hudec, & Patros, 2013; Boonstra, Oosterlaan, Sergeant, & Buitelaar, 2005; Doyle, 2006; Hervey, Epstein, & Curry, 2004; Seidman, 2006).

Several neuropsychological test batteries that target different types of **EF** deficits have been developed of which the "**Delis-Kaplan Executive Function System**" (D-KEFS; (Delis, Kaplan, & Kramer, 2001) is probably the most well-known of those used for both children and adults. However, one important issue regarding the use of neuropsychological tests for measuring **EF** deficits is that the tests often have low ecological validity. This has been demonstrated in studies showing only weak relations between **EF** tests and everyday abilities that are believed to be dependent on well-functioning executive skills such as academic achievement, social relations, work performance, criminality, and substance abuse (Barkley & Fischer, 2011; Barkley & Murphy, 2010, 2011; Szuromi, Bitter, & Czobor, 2013). However, **EF** deficits measured through self-ratings have been shown to be strongly related to functional impairments, and **EF** tests and **EF** ratings show only weak correlations (Barkley & Fischer, 2011; Barkley & Murphy, 2010).

The findings presented earlier have been interpreted to mean that **EF** tests and **EF** ratings do not measure the same underlying mental constructs and that **EF** tests should therefore not be relied on as the sole source for measuring **EF** deficits (Toplak, West, & Stanovich, 2013). The most well-known **EF** rating instruments for adults are the

Behaviour Rating Inventory of Executive Functions - Adult version (BRIEF-A; Roth, Isquith, & Gioia, 2005), **Barkley's Deficits in Executive Function Scale (BDEFS; Barkley, 2011)** and the **Dysexecutive Questionnaire (DEX; Burgess, Alderman, Wilson, Evans, & Emslie, 1996)**. However, as further explained later, these ratings suffer from limitations. The present study therefore aimed at introducing a new instrument, the **Adult Executive Functioning Inventory (ADEXI)**.

The most important limitation of existing **EF** rating instruments is that most of them include items measuring **ADHD** symptoms. For example, the **BRIEF-A** includes items that measure difficulties in sitting still, or having a short attention span. These items are essentially identical to the symptom criteria for **ADHD** as presented in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association [APA], 2013). The **DEX** also contains questions concerning **ADHD** symptoms such as impulsivity and restlessness.

Another aspect that needs to be taken into consideration is what constructs the questionnaire intends to capture. When examining individual items, it becomes evident that some available rating instruments are very broad as they include items measuring cognitive functioning in general (e.g. not being able to process information quickly or adequately) or items that are related to **EF** but do not measure this construct directly (e.g. easily becoming angry or upset, which measures emotional reactivity/regulation). There are also examples of items reflecting how others behave towards the rater rather than characteristics the rater sees in him/herself (e.g. that other people tell the patient that he/she is lazy or unmotivated). The inclusion of these items makes it difficult to draw conclusions regarding to what extent a patient has specific problems with **EF** or more general neuropsychological deficits.

A final limitation is that the rating instruments described earlier are quite extensive (i.e. 75-89 items except for the DEX and the short-version of the BDEFS). Adults who are being referred to a clinic for a neuropsychiatric assessment often have difficulties answering long rating scales. This emphasizes the need for a short screening instrument that can assess different aspects of **EF** deficits in a valid and reliable way. The **ADEXI** is intended to serve such a purpose and to address the earlier-mentioned limitations.

The **ADEXI** has been used in one previous study (Holst & Thorell, 2017) in which significant group differences were found between adults with **ADHD** and a clinical control group of adults with other psychiatric disorders. However, the reliability of the questionnaire was not examined, and the previous study did not include a non-clinical control group. Thus, there is a need to know more about the psychometric properties of the **ADEXI** and to what extent it can be used to discriminate between adults with **ADHD** and healthy controls. The **ADEXI** is an adult version of the **Childhood Executive Functioning Inventory (CHEXI; Thorell & Nyberg, 2008)**. Furthermore, similar to the **CHEXI**, the **ADEXI** is freely available for use by both researchers and clinicians (www.chexi.se). **CHEXI** scores have been shown to have good test-retest reliability (r=0.89) and factor analysis has identified two factors tapping **working memory** and **inhibition** (Thorell & Nyberg, 2008). In addition, scores from the **CHEXI** have been

shown to discriminate well between children with **ADHD** and controls (Catale, Meulemans, & Thorell, 2015; Thorell, Eninger, Brocki, & Bohlin, 2010).

1.1 Aims of the present study

The overall aim of the present study was to examine the psychometric properties of **ADEXI** scores. More specifically, the present study aimed to address the following aspects:

1. Use factor analysis to investigate whether the two major factors found for the **CHEXI** (i.e. **inhibition** and **working memory**) can be replicated using the **ADEXI**.
2. Study the reliability of **ADEXI** scores in terms of both test-retest and interrater reliability.
3. Study the convergent validity of the **ADEXI** by investigating the association between **ADEXI** scores and scores from both another **EF** rating instrument and laboratory measures of **EF**.
4. Examine to what extent **ADEXI** scores can be used to discriminate between adults with **ADHD**, and adults either with or without another psychiatric disorder.

2 METHOD

2.1 Participants and procedure

The present study included altogether 202 participants from three groups: a clinical group of adults with **ADHD** (n=51, 39% men); a clinical group of adults diagnosed with other psychiatric disorders (n=46, 28% men); and a non-clinical sample consisting of individuals from a random sample and a sample of university students (n=105, 42% men). The groups did not differ significantly from one another with regard to age, F=1.23 [not significant (n.s.)] [**ADHD** group: mean (M)=27.43, standard deviation (SD)=6.31; Clinical controls: M=25.65, SD=4.76 Non-clinical controls: M=26.50, SD=5.57) or gender (χ^2=2.56, n.s.). However, there was a significant difference with regard to educational level. The two clinical groups had a similar educational level, but they both had lower educational level compared to the non-clinical controls.

2.1.1 Clinical samples

The participants in the two clinical samples were recruited through advertisements at three outpatient psychiatric clinics, and they visited the clinic on two occasions to perform the neuropsychological testing. Questionnaire data was also collected from a close relative or friend of each participant. The participants in the **ADHD** group underwent a neuropsychiatric assessment conducted by a licensed psychologist. The assessment included a clinical judgement using the second version of the **Diagnostic Interview for ADHD in Adults (DIVA 2.0; (Kooij & Francken, 2010)**. This semi-structured interview consists of two parts: one for assessing the presence of all 18 criteria in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; APA, 1994) during childhood and in the present; the other for assessing impairment in five areas of functioning (i.e. education, work, family, social/relationships, and self-confidence) in childhood and in the present. In addition, current levels of **ADHD**

symptoms were assessed using self-report on the **Adult ADHD Self-Report Scale (ASRS-v1.1; Kessler et al., 2005)**. The psychologist also interviewed a close relative of the participant, in most cases his/her mother, to obtain a detailed anamnesis. All participants in the **ADHD** group met the full diagnostic criteria according to the DSM-5 (APA, 2013). Finally, all participants underwent testing of global intellectual ability using the fourth edition of the **Wechsler Adult Intelligence Scale (WAIS-IV; Wechsler, 2008)**. Exclusion criteria were an IQ score of <80 on WAIS-IV and the presence of substance-related disorders. In addition to a primary **ADHD** diagnosis, the participants in the **ADHD** group also met the criteria for the following comorbid diagnoses: mood disorders including "major depression" (15.8%), bipolar disorder (5.3%), unspecified anxiety disorder (UNS) (5.3%), panic disorder (3.5%), obsessive compulsive disorder (1.7%), social phobia (1.7%), and personality disorders (5.3%). Five of the participants had more than one comorbid diagnosis.

The diagnoses in the clinical control group were the following: mood disorders including "major depression" (43.4%), bipolar disorder (11.3%), anxiety disorder UNS (15.1%), social phobia (9.4%), panic disorder (1.8%), obsessive compulsive disorder (5.7%), general anxiety disorder (5.7%), post-traumatic stress disorder (5.7%), eating disorders (1.8%), and personality disorders (11.3%).

2.1.2 Non-clinical sample

The study also included two non-clinical groups - a random sample and a sample of university students - which were combined in all analyses included in the present study. The random non-clinical sample of adults was recruited from a larger random sample recruited from a national population based register. From this sample, a subsample of 44 adults (41% men) matched to the clinical **ADHD** sample with regard to age and gender were included in the present study. In addition, a convenience sample of university students (n = 61, 43% men) was recruited through advertisements on the university campus. Exclusion criteria in the two non-clinical control groups were the presence of any psychiatric disorder.

2.2 Measures

2.2.1 Self-ratings

ADEXI

The ADEXI is a 14-item questionnaire (see Table 1) measuring working memory and inhibition. As mentioned earlier, it is an adult version of the CHEXI, and both the child and adult version are freely available in several languages (see www.chexi.se). Several of the items from the CHEXI are also included in the ADEXI. However, a few items that were considered irrelevant to adults (e.g. "Has difficulty following through on less appealing tasks unless he/she is promised some type of reward for doing so") were deleted. We also tried to minimize item overlap in order to make the ADEXI as quick as possible to complete (14 items in the ADEXI versus 24 in the CHEXI), although still including enough items to be able to capture the most central aspects of working memory and inhibition.

B-DEFS

In addition to the ADEXI, the non-clinical sample also completed the BDEFS (Barkley, 2011). The BDEFS includes the following six subscales: Self-organization/Problem Solving (24 items), Self-management of Time (21 items), Self-restraint/Inhibition (19 items), Self-regulation of Emotion (13 items), and Self-motivation (12 items). There is also a short-version of the BDEFS, which includes 20 items.

2.2.2 Laboratory measures of EF deficits

Working memory

Working memory was measured by two subtests from the WAIS-IV (Wechsler, 2008): Letter-Number Sequencing and Digit Span. In Letter-Number Sequencing, participants have to repeat a series of randomly mixed letters and numbers starting with the numbers in ascending order followed by the letters in alphabetical order. For Digit Span, the mean raw score (i.e. number of correct trials) for Digit Span Backwards and sequencing was included. In the backwards condition, participants have to repeat the series in a backwards order, and in Digit Span Sequencing, the numbers are randomly presented and must be repeated in the correct number order.

Inhibition

Inhibition was measured using the Colour Word Test from the D-KEFS (Delis et al., 2001). Only the third trial (i.e. interference trial) was used. In this trial, participants are presented rows of words printed in dissonant colours and are instructed to inhibit reading the words and instead name the dissonant colours in which the words are printed. The number of seconds (i.e. raw score) needed to complete the trial was used as a measure of inhibition.

3 RESULTS

3.1 Factorial validity of ADEXI scores

Both a two- and three-factor solution was examined when conducting the factor analysis in order to determine whether the same number of factors obtained for the childhood version of the questionnaire (i.e. the **CHEXI**) could also be found for the **ADEXI**. The three-factor solution did not appear to provide a good fit for the data as several items loaded on more than one factor. However, the two-factor solution showed two clear factors. The scree test and the eigenvalue criterion also supported a two-factor solution. An oblique rotation method was chosen as two factors were shown to be highly correlated, r=0.69. The two-factor solution accounted for 50.02% of the variance. As expected (see Table 1), one factor was comprised of items from the a priori subscale tapping **working memory** and the other factor was comprised of items from the a priori subscale tapping **inhibition**. The exception was item 10 ("I sometimes have difficulty stopping an activity that I like") which had a similar factor loading on both factors. Based on the a priori subscales, this item was selected to be part of the **inhibition** subscale.

3.2 Reliability of ADEXI scores

All reliability estimates are presented in Table 2. The results first of all showed high internal consistency for scores on the **ADEXI** full scale as well as for scores on the **inhibition** and **working memory** subscales. Second, the test-retest reliability was found to be adequate with estimates ranging between 0.68 and 0.72 for bivariate correlations and between 0.62 and 0.72 for ICCs. However, as can also be seen in Table 2, the interrater reliability for the full scale between self-ratings (i.e. ratings made by the participant him/herself) and other-ratings (i.e. ratings made by a close relative/friend) was low: 0.53 for bivariate correlations and 0.49 for the ICC. The concordance between self-ratings and other ratings was especially low with regard to **inhibition** but also relatively low for **working memory**. Paired-samples t-tests showed that the mean scores for the full scale as well as the two subscales were all significantly higher (i.e. more problems) for self-ratings compared to other ratings, all t values <2.88, p values <0.01.

3.3 Convergent validity of ADEXI scores

As shown in Table 2, relatively strong relations (r values ranging between 0.48 and 0.72) were found for all three **ADEXI** scores and scores on the **BDEFS** subscales. As expected, scores on the **working memory** subscale of the **ADEXI** were most strongly related to scores on the **BDEFS** subscale "Self-organization/Problem Solving", whereas scores on the **ADEXI Inhibition** subscale were most strongly related to scores on the **BDEFS** subscale referred to as "Self-restraint/Inhibition".

As a second measure of convergent validity, we examined the relation between **ADEXI** scores and neuropsychological test scores tapping **inhibition** or **working memory** (see Table 3). With regard to self-ratings, scores on the **ADEXI** full scale and **ADEXI working memory** subscale were significantly correlated with scores on the Colour Word Task measuring **inhibition** in both the clinical and the non-clinical sample. In addition, scores on the **ADEXI working memory** subscale were related to the two **working memory** measures within the non-clinical sample. As regards to other ratings, no significant relations were found between the three **ADEXI** measures and scores on the digit span task. However, all **ADEXI** measures rated by a significant other were related to scores on the number-letter sequencing task and the Colour Word Task except for a non-significant relation between scores on the **ADEXI inhibition** subscale and scores on the Colour Word Task. In summary, it can be concluded that although a number of significant relations were found between **ADEXI** scores and scores obtained from the laboratory tests, all correlations were of small effect sizes (i.e. r values <0.30).

3.4 Discriminative validity of the ADEXI

The results of the ANOVAs examining group difference (see Table 4) showed that the **ADHD** group reported higher scores (i.e. more **EF** deficits) than both the clinical and the non-clinical control group for all three measures with large effect sizes. For the logistic regression analyses (see Table 5), we first compared the **ADHD** group with non-clinical controls. Only the **ADEXI** scores were included in this analysis. The result showed that the model was significant (χ^2=56.08, n=95, p<0.001), and the **ADEXI** scores classified 85% of the participants in the correct category with a sensitivity of 86% and a specificity of 84% (Model 1). Second, we compared the **ADHD** group with the clinical control

group. The results showed that this model was also significant (χ^2=30.09, n=97, p<0.001) and the **ADEXI** scores classified 76% of the sample correctly with a sensitivity of 80% and a specificity of 72% (Model 2).

In a second set of logistic regression analyses, we wanted to examine to what extent **ADEXI** scores can increase the discriminatory ability beyond the influence of **EF** tests. When comparing the **ADHD** group with non-clinical controls (Model 3), the results showed that scores from the **EF** tasks correctly classified 71% of the participants with a sensitivity of 64% and a specificity of 77%. When adding **ADEXI** scores in the second step, this step was significant (x^2=42.76, n=95, p<0.001) and classified 85% of the participants in the correct category with a sensitivity of 87% and a specificity of 84%. When comparing the **ADHD** group with the clinical control group (Model 4), the results showed that scores on the **EF** tasks correctly classified 67% of the participants with a sensitivity of 64% and a specificity of 70%. When adding **ADEXI** scores in the second step, this step was significant (χ^2=24.00, n=97, p<0.001) and could classify 81% of the participants in the correct category with a sensitivity of 84% and a specificity of 77%.

4 DISCUSSION

In this study, we have emphasized the need for a short reliable rating scale focused on measuring **EF** deficits not including items measuring other related constructs or symptoms of **ADHD**. However, no instrument meeting these criteria has been made available, which is the reason why the **ADEXI** was created.

> The present study showed that scores from the **ADEXI** generally have relatively good psychometric properties. However, due to the low correlations between **ADEXI** scores and those obtained from laboratory **EF** tests, the **ADEXI** should be used as a complement rather than a replacement for neuropsychological tests. In addition, the low concordance between self-ratings and other ratings demonstrates the need to use ratings from multiple sources rather than relying solely on self-ratings.

4.1 Reliability of the ADEXI scores

With regard to the reliability of the **ADEXI** scores, the internal consistency was shown to be high (i.e. as around 0.90 for the **ADEXI** full scale) and comparable or higher compared to those of other **EF** rating scales for adults such as the **BDEFS** (a values ≥0.91; Barkley, 2011) and the **BRIEF-A** (a=0.98 for the full scale and 0.84 for the inhibit subscale and 0.90 for **working memory** subscale; Roth et al., 2005). The test-retest reliability for the **ADEXI** scores was shown to be within the range of what is generally considered as adequate (r values ranging between 0.68 and 0.72 and ICC between 0.62 and 0.72). The obtained bivariate correlation coefficients for test-retest reliability is somewhat lower compared to studies using the **BRIEF-A** (r values <0.82; Roth et al., 2005), but higher compared to estimates for some of the subscales included in **BDEFS** (r values <0.62; Barkley, 2011). The present study as well as the previous studies using the **BRIEF-A** and **BDEFS** included only non-clinical samples when assessing test-retest reliability. This is a limitation as these instruments are intended to

be used in clinical populations. However, the test-retest reliability for scores on the **Conners Adult ADHD Rating Scale (CAARS)** has been shown to be higher in clinical compared to non-clinical samples (Christiansen et al., 2012). As the **CAARS** assess similar constructs as the **ADEXI**, this study could be taken to mean that the test-retest reliability of the **ADEXI** scores is likely to be adequate also in clinical samples, although this issue needs to be empirically examined.

The interrater reliability between participants and a close relative/friend was found to be low with regard to **inhibition** (r=0.38) but also quite low for **working memory** (r=0.56). These estimates are lower than those obtained for the **BDEFS** (r values =0.66-0.79; Barkley, 2011). However, the interrater reliability has been found to be very low (r<0.50) for several of the subscales included in **BRIEF-A** (Roth et al., 2005). In addition, there are previous studies that have demonstrated very low concordance between self-ratings and other ratings also for ratings of **ADHD** symptoms (e.g. Mörtstedt, Corbisiero, Bitto, & Stieglitz, 2015).

In addition to studying correlations between self-ratings and those obtained by a significant other, it can also be of value to study mean differences. In the present study, the results showed that the scores obtained for the self-ratings were significantly higher compared to those obtained from a significant other. This finding is in line with two previous studies of **EF** ratings in adults using either the **BRIEF-A** (Roth et al., 2005) or the **DEX** (Rizzo, Steinhausen, & Dreschler, 2012) as well as with two previous studies investigating ratings of **ADHD** symptom levels (Katz, Petscher, & Welles, 2009; Kooij et al., 2008). Interestingly, Kooij et al. (2008) concluded that although patients rated their symptom levels as higher than significant others, both tended to under-report symptom levels in relation to investigator reports.

In summary, it appears as if interrater reliability is often relatively low when investigating **EF** deficits or related constructs in **ADHD** samples. This is problematic and points to the importance of including information from several sources in order to obtain a full picture of the patient's strength and weaknesses. Further research is clearly needed in order to determine how to best integrate information from different sources when interrater agreement is low.

4.2 Validity of the ADEXI scores

Regarding convergent validity, the results showed that scores on all **BDEFS** subscales correlated significantly with scores on the **ADEXI** full scale as well as with scores on the two subscales, **inhibition** and **working memory**. As expected, scores from the subscales that aimed to assess the most similar constructs were also those that showed the highest correlations. Thus, these findings could be taken as support for the convergent validity of the **ADEXI** scores.

As a second measure of convergent validity, relations between **ADEXI** scores and neuropsychological test scores were investigated, but the results showed only small, and mostly non-significant, relations. These findings are in accordance with several previous studies examining the relation between scores obtained from **EF** ratings and **EF** tests using either a childhood or adult sample (for a review, see Toplak et al., 2013).

This could be taken as an indication that ratings and tests capture at least partially different constructs. In line with this thinking, the present study was able to show that sensitivity was much increased when the scores from both the laboratory test and the **ADEXI** were entered into the logistic regression model. The fact that **EF** tests and **EF** ratings explain independent variance in relation to **ADHD** suggests that **EF** ratings should be used as a complement rather than as a replacement for laboratory tests. Previous studies comparing **EF** tests and **EF** ratings have also argued that **EF** ratings have higher ecological validity as they are more predictive of functional impairments in daily life such as occupational adjustment, antisocial behaviours, and social relations (Barkley & Murphy, 2010, 2011). It will therefore be of importance for future studies to investigate the link between **ADEXI** scores and measures of daily functioning.

4.3 Discriminative validity

The **ADEXI** scores were shown to have high discriminative validity with large effect sizes being found when comparing **ADHD** patients to either non-clinical or clinical controls. The sensitivity was 0.76 and the specificity was 0.91 when comparing the **ADHD** group to the non-clinical control group and including only the **ADEXI** scores. Current models of heterogeneity within **ADHD** research (e.g. Nigg, 2006) have emphasized that only a subgroup of individuals with **ADHD** has significant **EF** deficits. It is therefore not surprising, that the present study showed that the sensitivity (i.e. the true positive rate) was lower compared to the specificity (i.e. the true negative rate) when comparing individuals with **ADHD** to non-clinical controls. The specificity and sensitivity have to our knowledge seldom been examined for scores obtained from other **EF** rating instruments for adults such as the **BDEFS** or the **BRIEF-A**. This is a serious limitation as group differences alone are insufficient indices of the discriminant validity of a measure (Doyle, Biederman, Seidman, Weber, & Faraone, 2000). However, one study showed that scores on the **BRIEF-A** had a sensitivity of 0.75 and a specificity of 0.79 when trying to discriminate between college students with or without **ADHD** (Hauser, Lukomski, & Samar, 2013). Another study showed that 89-98% of adults with **ADHD** were considered to be in the clinically significant range compared to only 8-11% of the community control group using scores on the **BDEFS** (Barkley, 2011). In summary, the results of the present study show that **ADEXI** scores can discriminate between individuals with **ADHD** and healthy controls as well as, or even better than, other available **EF** rating instruments for adults.

Previous studies using either **EF** test or ratings have shown that adults with other psychiatric disorders besides **ADHD** (e.g. depression and anxiety) also have **EF** deficits (e.g. Castaneda, Tuulio-Henriksson, Marttunen, Suvisaari, & Lönnqvist, 2008; Henin et al., 2009; Nilsson et al., 2016; Snyder, 2016). However, all these studies contrasted psychiatric patients with healthy controls. It is therefore very interesting to note that our study showed that **EF** deficits were more pronounced among individuals with **ADHD** compared to the clinical controls as demonstrated both by significant group differences and a classification rate above 0.80 when including both ratings and tests.

5 CONCLUSIONS AND FUTURE DIRECTIONS

In conclusion, we have shown that **ADEXI** scores have adequate psychometric properties and that this instrument serves a partly different purpose compared to other available **EF** rating instruments for adults. Compared to the **BRIEF-A**, the **ADEXI** has a clear advantage of not including items that are more or less identical to the diagnostic criteria for **ADHD**, but instead focuses more specifically on **EF** deficits. In comparison with **BDEFS**, the **ADEXI** is much less comprehensive, which could be seen as a disadvantage. However, individuals with **EF** deficits often have difficulties completing long rating instruments, and it might therefore be an advantage to have a quick and easily administered screening instrument focusing specifically on two central **EF** aspects (i.e. **inhibition** and **working memory**), which is also freely available (www.chexi.se).

Tables

(Content Note: The tables in the original document were complex and formatted as images, preventing a direct, clean conversion to Markdown tables. The key information and factors identified are described in the main text of the article.)

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