



Work participation in ADHD and associations with social characteristics, education, lifetime depression, and ADHD symptom severity

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Received: 1 April 2018 / Accepted: 20 July 2018 / Published online: 5 September 2018
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Abstract

The literature refers to high rates of occupational failure in the population of adults with ADHD. The explanation for this is less known. The aim of the present study was to examine associations between social characteristics and clinical features of adults with ADHD and their occupational outcome. Out of 1050 patients diagnosed with ADHD in a specialized outpatient clinic between 2005 and 2017, 813 (77.4%) agreed to participate in the study. ADHD was diagnosed according to DSM-IV criteria, and ADHD subtypes recorded accordingly. Lifetime depression was diagnosed using the specific module of the Mini International Neuropsychiatric Interview. Occupational status and other social characteristics like marital status and living with children were recorded. Intelligence (IQ) and symptom severity of ADHD (ASRS score) were assessed in subsamples of participants ($n = 526$ and $n = 567$, respectively). In this sample of adults with ADHD (mean age 36.9 years, 48.5% women), 55.3% of the women and 63.7% of the men were working at the time of inclusion. Work participation was associated with being male, being married or cohabitant, or living with children, as well as a life story without major depression. Age, education, ADHD subtype, and ADHD symptom severity were not significantly associated with work participation. Neither was IQ when adjusted for other covariates. Occupational outcome in adults with ADHD appears to be more associated with social characteristics and a history of depression, rather than with IQ, ADHD subtype, or ADHD symptom severity.

Keywords ADHD · Occupational outcome · Gender · Social characteristics · Major depression · IQ · ASRS

Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is a life-span neuropsychiatric disorder with core symptoms of inattention, hyperactivity, and impulsivity (DSM-5 2013). The prevalence of ADHD in the adult population is reported to be 3–5% (Fayyad et al. 2007; Kessler et al. 2006). As stated by the definition of the disorder itself (DSM-IV 2004),

ADHD causes impairment and suffering in several domains of life (Kooij et al. 2010; Thomas et al. 2015). Of individual as well as socioeconomic interest are the adverse consequences for the ability to cope in working life. Longitudinal follow-up studies of children and cross-sectional studies of adults suggest that ADHD increases the risk of unemployment (Erskine et al. 2016; Halmøy et al. 2009; Gjervan et al. 2012; Sobanski et al. 2007) and that employees with ADHD perform poorly, change and quit jobs, and are dismissed more often than people without ADHD (Murphy and Barkley 1996).

Occupational failure may be due to ADHD-specific symptoms themselves, comorbid disorders, educational failure, or other social factors, of which some may be associated with ADHD. There is, however, insufficient knowledge about which factors that are most predictive of unemployment in ADHD patients of working age. For example, ADHD severity in terms of more symptoms of inattention has been shown to be associated with failure in work or education (Fredriksen et al. 2014). Also, a lifetime diagnosis of a comorbid

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psychiatric disorder has been shown to be associated with unemployment (Sobanski et al. 2007). A prospective study of children with ADHD showed that lower self-esteem was associated with lower educational achievement and subsequent lower occupational rank in adulthood (Slomkowski et al. 1995). Retrospectively, adults with ADHD more often report a history of inferior performance and disciplinary problems in their school years compared to controls (Murphy and Barkley 1996), and they have lower education (Ebejer et al. 2012; Küpper et al. 2012; Barkley et al. 2006). However, the relationship between educational level and occupational functioning is less consistent for people with ADHD than for the general population (Biederman et al. 2008). Several studies have related socioeconomic factors to childhood mental health in general and to ADHD in particular (Bøe et al. 2012; Russell et al. 2015), but we are not aware of studies that have investigated their relationship to work participation among individuals with ADHD in adult life.

To our knowledge, there is a lack of studies that include a comprehensive model of factors that may be associated with occupational outcome in individuals with ADHD. Thus, the aim of this study was to estimate the prevalence of work participation in patients with ADHD and to examine whether gender, age, and social characteristics, such as marital status, living with children, living in a city, or level of education, were associated with work participation. Also, we wanted to examine whether IQ, a history of lifetime major depression, ADHD subtype, or symptom severity of ADHD were associated with occupational outcome.

Methods

Participants

The study sample consisted of adult patients who fulfilled the criteria for Attention Deficit Hyperactivity Disorder (ADHD) according to the DSM-IV (2004). All were admitted to a private outpatient clinic in Oslo, Norway, that is specialized in psychiatric examinations, assessment, and treatment of ADHD. Recruitment was conducted in the years from 2005 to 2017. During these years, a total of 1050 patients were found to meet the diagnostic criteria of ADHD and asked to participate in the study. The patients were self-referred (54.5%) or referred by general physicians, specialists, or neuropsychologist (45.5%).

Out of 1050 patients with ADHD, 798 actively consented to participate in the study. Also included, with approval of the Regional Ethics Committee, were 15 patients who had died after the examination. In total, 813 patients were included (77.4%). The study was approved by the Regional Ethics Committee, southeast Norway. Assessments and

handling of data were carried out in accordance with ethical standards and the principles of the Declaration of Helsinki.

Measures

All patients had prior to the clinical psychiatric assessment either been to a neuropsychological examination or had been examined by a special educational teacher with experience and expertise in the use of WAIS-III (Kaufmann 1999) and ADHD. These examinations concluded with clinical evidence of concentration and attention difficulties, and/or cognitive profiles characteristic for ADHD, respectively.

A psychiatric examination was undertaken for all patients included in the study. The clinical diagnosis of ADHD required six out of nine symptoms of inattention or six out of nine symptoms of hyperactivity or impulsivity present for at least six months prior to assessment, causing impairment, according to the diagnostic manuals of DSM-IV (2004). The symptoms must cause significant impairment in social, academic, or occupational functioning. Furthermore, some hyperactive, impulsive, or inattentive symptoms must have been present before the age of seven years. Parents, teachers, or other relevant persons were interviewed about the patients' childhood, when possible, to confirm whether they met the criteria for ADHD in childhood. Patients with ADHD were categorized according to the classification criteria for predominantly inattentive subtype, predominantly hyperactive/impulsive subtype, or combined subtype (DSM-IV 2004).

Work participation was categorized as 'yes' if work was reported as the main source of income. Information about age, sex, marital status, whether the patient was living with children and living in or outside a city was recorded. Educational level was categorized by number of years in education: 12 years or less, 13-15 years, or more than 15 years. Lifetime depression was diagnosed using the specific module of the Mini International Neuropsychiatric Interview (M.I.N.I.), according to Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria (Sheehan et al. 1997, 1998).

IQ was measured in a subsample of 526 participants (64.7%), using the WAIS-III test (Kaufman 1999).

ADHD symptom severity was measured in a subsample of 567 (69.7%) participants, using the Adult ADHD Self-Report Scale (ASRS) Symptom Check List, v1.1 (WHO 2007). The ASRS is a reliable and valid screening instrument for evaluating ADHD in adults (Adler et al. 2006; Silverstein et al. 2017). This 18-item version yields a score ranging from 0 to 72 points.

Statistical analyses

We performed Chi-square tests or t-tests to compare sociodemographic characteristics between participants and non-participants, and between men and women. We used logistic regression analyses to examine associations between work participation as the dependent variable and social characteristics, level of education, lifetime depression, IQ, ADHD subtype, and ADHD symptom severity as independent variables. All tests were two-tailed, and differences were considered significant if $p < 0.05$. All statistical analyses were done using the software package SPSS version 22.

Results

Out of 1050 patients with ADHD, 813 (77.4%) participated in the study. Participants had a slightly higher educational level, and more of them were living with children, compared to non-participants. Otherwise, participants and non-participants were quite similar (data not shown).

Table 1 shows participants' gender, age, social characteristics, education, work participation, lifetime depression, and whether hyperactivity was part of the ADHD symptomatology. Altogether, 59.7% of the participants were working, more men than women. More women than men were living with children. Most participants (85.4%) had the combined subtype of ADHD (ADHD-C), and the remaining the predominantly inattentive subtype, as none of the included

Table 1 Description of 813 adult patients diagnosed with ADHD in a psychiatric clinic specialized in examination and treatment of ADHD. When others not specified, figures are given as numbers (percentage)

	Women 394	Men 419	All patients: 813
Age in years: mean (SD)	37.4 (10.9)	36.5 (11.4)	36.9 (11.2)
Age range (in years)	18–69	18–67	18–69
Married/cohabitant	166 (42.1)	181 (43.2)	347 (42.7)
Living with children	195 (49.5)***	155 (37.0)	350 (43.1)
Living in a city	230 (58.4)	259 (61.8)	489 (60.1)
Years of education: ≤ 12	208 (52.8)	232 (55.4)	440 (54.1)
13–15	150 (38.1)	152 (36.3)	302 (37.2)
> 15	36 (9.1)	35 (8.3)	71 (8.7)
Working	218 (55.3)*	267 (63.7)	485 (59.7)
Depression lifetime	135 (34.3)	132 (31.5)	267 (32.8)
Clinical subtypes of ADHD			
Combined	341 (86.5)	353 (84.2)	694 (85.4)
Predominantly inattentive	53 (13.5)	66 (15.8)	119 (14.6)
Predominantly hyperactive/impulsive	0	0	0

* $p < 0.05$, ** $p < 0.01$; *** $p < 0.001$ (woman compared with men)

Table 2 Odds ratios for work participation in a clinical sample of 813 adult patients with ADHD (logistic regression)

	Crude/unadjusted		Adjusted	
	OR (95% CI)	<i>p</i> value	OR (95% CI)	<i>p</i> value
Sex (female vs. male)	0.71 (0.53–0.93)	0.015	0.55 (0.40–0.75)	<0.001
Age (increase pr. 10 years)	1.21 (0.97–1.53)	0.098	1.15 (0.99–1.32)	0.067
Marriage/Cohabitant (yes vs. no)	2.98 (2.21–4.03)	<0.001	1.65 (1.16–2.36)	0.006
Living with children (yes vs. no)	4.20 (3.07–5.74)	<0.001	3.61 (2.49–5.23)	<0.001
Living in a city (yes vs. no)	0.96 (0.72–1.28)	0.802	1.32 (0.95–1.83)	0.096
Education: ≤ 12 years (ref)	–	–	–	–
13–15 years	1.47 (1.09–2.00)	0.011	1.33 (0.96–1.84)	0.091
> 15 years	2.28 (1.31–3.98)	0.004	2.10 (1.15–3.84)	0.016
Lifetime depression (yes vs. no)	0.60 (0.45–0.81)	0.001	0.62 (0.45–0.86)	0.004
Combined subtype of ADHD versus predominantly inattentive subtype ^a	1.13 (0.76–1.67)	0.55	1.12 (0.72–1.74)	0.61

^aNone of the included patients had the predominantly hyperactive/impulsive subtype of ADHD

patients was found to have the predominantly hyperactive/impulsive subtype.

Table 2 shows how sociodemographics and clinical features were related to occupational outcome. Work participation was associated with male gender, being married or cohabitant, living with children, level of education, and having a life story without episodes of major depression. Age, urban living, or ADHD subtype were not significantly associated with work participation.

In a subsample of 526 adult patients with IQ data, 322 (61.2%) were working, 145 women (58.0%) and 177 men (64.1%). Mean IQ was 101.3 for woman and 104.0 for men ($p=0.024$). IQ was significantly associated with work participation when unadjusted (OR, increase per ten IQ points: 1.16, 95% CI 1.02–1.31, $p=0.026$) but not when adjusted for other covariates (OR 1.04, 95% CI 0.89–1.23, $p=0.62$). IQ had no confounding effects in models of multiple logistic regression (data not shown). There were no significant differences between the subsamples with and without measures on IQ regarding gender, age, or any of the registered social characteristics.

In another subsample of 567 patients with data on ASRS, mean ASRS score was 52.4 (SD: 9.34) for women and 50.1 (SD: 9.33) for men ($p=0.003$). Symptom severity level of ADHD was not associated with work participation, neither unadjusted (OR 0.99, 95% CI 0.98–1.01, $p=0.39$) nor adjusted for other covariates (OR 0.99, 95% CI 0.97–1.02, $p=0.61$). Symptom severity level of ADHD had no confounding effects in models of multiple logistic regression (data not shown). There were no significant differences between the subsamples with and without data on ASRS regarding gender, age, or any of the social characteristics.

Discussion

In this study, we examined the prevalence and correlates of being in work in a clinical sample of adults with ADHD. Of the 813 included patients, 59.7% were working at the time of assessment. Work participation was associated with male gender, being married or cohabitant, living with children, higher levels of education, and having a life story without episodes of major depression. IQ was significantly associated with work participation in unadjusted analysis, but not when adjusted for other covariates. Age, ADHD subtype, or total ADHD symptom severity were not significantly associated with work participation.

The nearly 60% work participation in our study was higher than reported in other clinical samples of Norwegian adults with ADHD (Halmøy et al. 2009; Gjervan et al. 2012; Fredriksen et al. 2014). Higher working rates in our study may reflect that patients attending a private ADHD

clinic have higher social status and better finances than the average of patients referred to the public health service and that being in work can be both a cause and a consequence of socioeconomic differences. Higher working rates in our study may also reflect a time trend of increased awareness of ADHD in adults, which leads to more well-functioning patients receiving an ADHD diagnosis.

Nevertheless, work participation in our study was lower than the 70–80% working rates in the general Norwegian population reported by Statistics Norway (SSB 2016). This is in line with the nature and definition of the ADHD diagnosis itself, a disorder causing impairment in several domains of life (Kooij et al. 2010; Murphy and Barkley 1996). A higher working rate in men (63.7%) compared to women (59.7%) is in accordance with other studies of adult ADHD (Fredriksen et al. 2014; Halmøy et al. 2009) and may reflect gender differences in the general population (SSB 2016).

Correlates of work participation

Our findings indicate that social relationships such as being married or cohabiting, or living with children, can involve stability or support that may promote work participation. This is in line with previous findings that perceived support and positive attitude of family and social environment are important predictors of work outcome (Holwerda et al. 2013). Alternatively, being in work may increase income and social status and provide greater opportunities for a successful family life, or there may be some social or individual characteristics that facilitate both family and work participation. For example, adults with ADHD experience more family instability over time than adults without ADHD (Murphy and Barkley 1996; Jaber et al. 2015), suggesting that some ADHD-related features can lead to lower participation in both work and family life.

Unlike other studies of clinical ADHD populations (Ebejer et al. 2012; Küpper et al. 2012; Barkley et al. 2006), we found higher levels of education than in the general population (SSB 2016). Again, this may be due to the high socioeconomic status in patients attending a private ADHD clinic. The current evidence implies that ADHD gives an educational and vocational disadvantage through life (Mannuzza et al. 1993; Barkley et al. 2006). Accordingly, we found that education was related to work participation in the within-sample analyses, which confirms a relationship between education and work ability (Monteiro et al. 2006).

Some authors have suggested that educational attainment may represent a proxy for IQ because individuals with higher IQ stay longer within education (Batty et al. 2007). In our study, however, the relationship between education and work participation was independent of IQ, and IQ was poorly related to work participation when adjusted for other covariates. Although the assessment of IQ was limited to a

subsample, our findings indicate that there may be other factors than intelligence that are more important for educational attainment in people with ADHD and that level of intelligence is not essential for work participation. The findings that neither ADHD subtypes nor ADHD symptom severity was associated with work participation were quite surprising, considering evidence-based knowledge that ADHD provides lower work performance (Mannuzza et al. 1993; Shifrin et al. 2010; Brook et al. 2013). Fulfilling education and getting or keeping a job may be affected by the symptoms of ADHD, due to lack of concentration or disturbance by hyperactivity and impulsivity (Barkley et al. 2006; Fredriksen et al. 2014). ADHD is a dimensional diagnosis, ranging from mild to severe (Swanson et al. 2012), which makes it likely to imagine a dose–response relationship between symptom severity and work ability. However, it is possible that having ADHD or not is of greater importance to whether people are working than are the differences in symptom severity within a clinical ADHD population.

Methodological considerations

The study has some methodological issues that should be noted. First, the cross-sectional design limits the interpretation of causal relationships. Second, patients attended to a private ADHD clinic may not be representative for people with ADHD in general. For example, our participants had higher rates of work participation than other clinical samples of Norwegian adults with ADHD (Halmøy et al. 2009; Gjervan et al. 2012; Fredriksen et al. 2014). However, we believe that differences in the sample selection may primarily affect the frequency estimates of work participation and its correlates and to a lesser extent family and social relationships (Nohr and Olsen 2013; Rothman et al. 2013). Third, we restricted our examination of lifetime comorbid disorders to major depression. The clinical interview M.I.N.I. is limited to retrospective information about four disorders during lifetime: major depression, bipolar disorder, panic disorder, and psychosis. We chose to use data on lifetime depression since depression is by far the most common of these disorders in our adult ADHD population (Anker et al. 2018; Solberg et al. 2018). Nevertheless, we lack information about other common disorders in the past, such as social phobia and substance use disorders.

Strengths of the study include a naturalistic design and inclusion of patients that were admitted to examination or treatment of adult ADHD. The number of participants and rate of consent were high, and patients were recruited from a large area and over a longer period of time. There were no exclusion criteria; anyone who met the ADHD criteria was asked to participate in the study.

Implications

Work increases status, social power, and economic independence (Ross and Mirowsky 1995) and is an important aspect of mental health (WHO 2012). An overall goal should be to help people with ADHD to get jobs and continue to work. A key question is whether treatment targeting primarily symptom reduction of ADHD in adults can facilitate work performance (Kessler et al. 2005). The lack of correlation between total ADHD severity score and work participation in our study does not indicate this, despite that successful treatment of adult ADHD is known to be associated with substantial gains in cognition and behavior (Schweitzer et al. 2004; Turner et al. 2004).

However, ADHD may have causal effects on work participation that are mediated by more proximate causes such as social skills, education, or comorbid mental disorders. Such correlates, although they most likely have been affected by ADHD, were stronger associated with work participation than the total ADHD symptom severity or the clinical subtypes of ADHD. These observations call for appropriate follow-up and treatment of ADHD from childhood through adolescence and adulthood in order to facilitate education, social affiliation, and prevention of comorbid psychiatric disorders. Interventions focusing on positive resources may be even as important as symptom reduction in itself.

The prevalence of life time depression in our sample was well above what is expected in the general population (Kessler et al. 1994), and comorbid depression seems to be an important target of prevention and intervention. It is worth mentioning in this regard that adults who have been more extensively treated for their ADHD have been proven to be more resilient to depression (Oddo et al. 2018).

Acknowledgements We especially want to thank Christina Bjercke for performing 526 WAIS tests.

Authors contributions EA and TH designed the study. EA collected and analyzed the data. EA, AH, and TH participated actively in the writing of the manuscript and approved the final draft.

Funding This work was supported by the Norwegian Medical Association and Stiftelsen K.G. Jebsen.

Compliance with ethical standards

Conflict of interest The authors report no conflicts of interest.

Data availability statement Data are from a private psychiatric outward in Oslo. Public availability would compromise privacy of the respondents. According to the approval from the Norwegian Regional Committees for Medical and Health Research Ethics, the data are to be stored properly and in line with the Norwegian Law of Privacy Protection. However, anonymized data are freely available to interested researchers upon request, pending ethical approval from our ethics committee.

Interested researchers can contact project leader Espen Anker (espen.anker@online.no) with requests for the data underlying our findings.

Ethics approval Regional Committees for Medical Research Ethics—South East Norway—REC—approved this study.

Patient consent Patient consent was obtained.

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