Treatment Dropout and Missed Appointments Among Adults With Attention-Deficit/Hyperactivity Disorder:

Associations With Patient- and Disorder-Related Factors

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ABSTRACT

Objective: Knowledge of factors associated with treatment dropout and missed appointments in adults with attention-deficit/hyperactivity disorder (ADHD) is very limited. On the basis of proposed hypotheses that past behavior patterns are more predictive of current behaviors of treatment dropout and missed appointments than are sociodemographic and clinical characteristics, we examined the associations of sociodemographic variables, clinical variables, risk-taking behavior, educational and occupational instability, and behaviors during mandatory schooling with the primary outcome measures of treatment dropout and missed appointments.

Method: In a naturalistic cohort study of 151 adult outpatients with ADHD initiating assessment in a Danish ADHD unit from September 1, 2010, to September 1, 2011, the Adult ADHD Self-Report Scale v1.1 symptom checklist (ASRS) and a thorough clinical interview were used to assess ADHD according to *DSM-IV-TR* criteria. Stepwise logistic regression analysis was used to estimate reported associations.

Results: A total of 27% of patients dropped out of treatment and a total of 42% had ≥ 3 missed appointments during treatment. Mood and anxiety disorders significantly lowered the odds of treatment dropout (odds ratio [OR] = 0.18; 95% confidence interval [CI], 0.05–0.65), whereas having started but not completed 2 or more educational programs apart from mandatory schooling significantly increased the odds of dropout (OR = 3.01; 95% CI, 1.32–6.89). Variables significantly associated with most missed appointments were low educational level (OR = 2.19; 95% CI, 1.12–4.31), 3 or more employments of less than 3 months' duration (OR = 2.86; 95% CI, 1.30–6.28), and having skipped class often/very often during mandatory schooling (OR = 2.65; 95% CI, 1.29–5.43). Additionally, the predominantly inattentive ADHD (ADHD-I) subtype lowered the odds of missed appointments (OR = 0.17; 95% CI, 0.05–0.62).

Conclusion: Our results suggest that past behavior in terms of highest dropout rates in the educational and occupational systems and highest rates of skipping class during mandatory schooling is equally associated with current behavior of treatment dropout and missed appointments as are sociodemographic and clinical factors.

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Attention-deficit/hyperactivity disorder (ADHD) is well known as a neurodevelopmental disorder with childhood onset and long-term persistence.[1–5] Although meta-analyses have shown that medical treatment effectively reduces ADHD symptoms,[6,7] dropout rates of adults in randomized controlled trials (RCTs) of methylphenidate and atomoxetine have been reported to be from 0% to 26.6%[8] and almost 50%,[7] respectively. Randomized controlled trials traditionally provide numerous supports for participation, which is usually not the case in naturalistic studies. Hence, there is reason to believe that dropout rates in naturalistic studies would vary from those in RCTs. However, there is a lack of naturalistic studies examining dropout and nonadherence among adults with ADHD and factors associated with these behaviors.[8–11] Only 2 naturalistic follow-up studies[8,11] were retrieved by the authors, and both of them reported dropout from medical treatment; 1 study[8] reported a dropout rate of 26.6%, and the other[11] reported a dropout rate of 20% at 6- to 9-month follow-up and 50% after ≥ 2 years. Similar rates are reported from naturalistic studies of anxiety disorders,[12,13] personality disorders,[14] and mixed diagnoses in outpatient mental health care,[15] with dropout rates varying from 20% to 47%.[12–15] We found no naturalistic studies of adherence to treatment sessions with combined medication and psychosocial treatment among adults with ADHD.

Identifying the factors associated with treatment dropout is important to optimize treatment of adult ADHD.[8] Factors related to missed appointments should also be examined, as nonattendance to treatment sessions is associated with high societal costs and possible lack of treatment effect.[16–20] Treatment dropout and missed appointments are best conceptualized as multidimensional phenomena with multifaceted causes.[9,21–23] Based on previous findings in psychiatric populations, it has been argued that past behavior patterns, rather than sociodemographic and clinical characteristics, are significant predictors of current behaviors, eg, in terms of treatment dropout or missed appointments in the health care system.[22] Consequently, the aim of the present study of a naturalistic sample of clinically referred adult patients with ADHD was to examine the associations of treatment dropout and missed appointments with (1) sociodemographic variables, (2) clinical variables

Clinical Points

- In the adult patient with attention-deficit/hyperactivity disorder (ADHD), past behaviors should be addressed and assessed during the initial contact along with sociodemographic and clinical characteristics in order to identify patients with higher risk of dropping out of treatment and missing appointments.
- To prevent treatment dropout and missed appointments, an intervention that aims to clarify the relationship between past and current behaviors of treatment dropout and missed appointments should be targeted at patients, their relatives, and social workers. This intervention should be initiated at the beginning of treatment along with the immediate medical treatment of ADHD symptoms.

(ADHD-subtype and comorbidity), and (3) past behavior patterns in terms of risk-taking behavior, educational and occupational instability, and behaviors during primary/lower secondary school.

METHOD

Setting and Participants

We present a cohort study of patients consecutively referred to the adult ADHD unit at Regional Psychiatric Services West, Herning, Central Denmark Region, which is a secondary clinic for the assessment and treatment of adult patients suspected to have ADHD. The patients were referred from general practitioners (78%) and specialized psychiatric authorities (22%). The referring authorities made an initial evaluation, concluding that the patients might suffer from ADHD. The final diagnostic assessment of ADHD and comorbid disorders as well as treatment of ADHD was offered at the ADHD unit. Attention-deficit/hyperactivity disorder symptoms and psychiatric comorbidity in this sample are presented elsewhere.[24]

A total of 199 patients, 127 men (64%) and 72 women (36%) with a mean age of 30.3 years (SD = 9.9), who initiated assessment in the ADHD unit from September 1, 2010, to September 1, 2011, were eligible for the study. A total of 99.5% were ethnic Danes. Subsequently, 44 patients were excluded, due either to discontinuing assessment (n = 10) or to not meeting the ADHD criteria as assessed by the ADHD unit (n = 34). A total of 155 patients met the diagnostic criteria for ADHD. However, 4 patients were excluded due to somatic diseases requiring treatment (n = 1), serving a prison sentence (n = 1), or a final assessment conclusion that no further treatment was required (n = 2). Thus, 151 patients, 97 men (64%) and 54 women (36%) with a mean age of 29.6 years (SD = 9.5) constituted the study sample.

In the study sample, 126 patients could be subtyped with ADHD combined type (ADHD-C), ADHD predominantly inattentive type (ADHD-I), or ADHD predominantly hyperactive-impulsive type (ADHD-HI) based on the Adult ADHD Self-Report Scale v1.1 symptom checklist (ASRS).[25] A total of 25 patients could not be subtyped as they only met subthreshold criteria according to the ASRS (n = 5) or due to missing ASRS data (n = 20). No differences in gender ($P = .38$), age ($P = .73$), treatment dropout ($P = .14$), or number of missed appointments ($P = .28$) were found between the subtyped and nonsubtyped patients.

Ethics

This study was registered (ClinicalTrials.gov identifier: NCT02226445) and approved by the Danish Data Protection Agency. Since the study was noninvasive, it did not require ethical approval. Access to the patients' psychiatric records was approved by the Danish Health and Medicines Authority, and the study was conducted in accordance with the Helsinki Declaration.

Diagnostic Assessment

Due to the naturalistic setting, all of our data constitute only the information from patient records. All diagnostic assessments were based on a thorough clinical interview by an experienced psychiatrist (E.P.) in collaboration with an experienced psychiatric nurse or a clinical psychologist during a median of 3 sessions (2 [25th percentile] to 3 [75th percentile]) and a median of 19 days (8 [25th percentile] to 38 [75th percentile]). Since no standardized diagnostic interview in Danish and no national Danish guidelines were available at the time of data collection, the assessment of ADHD followed international guidelines[26] and included systematic questioning regarding present and childhood ADHD symptoms and developmental, medical, and psychiatric history. A semistructured protocol covering social factors, early development, educational/employment status and history, risk-taking behaviors, and behaviors during primary school was used. Current ADHD symptoms were rated according to the ASRS.[25] Parent/relative interviews and collection of school documents and medical records were made whenever possible to document childhood symptoms and impairment before the age of 7 years as well as cross-situational impairment.

Treatment

The ADHD unit offered outpatient assessment, medical treatment (methylphenidate [34%] and/or atomoxetine [85%] and dexamphetamine [0.7%]), and supportive counseling. All patients were prescribed medication and were offered nonstandardized psychosocial treatment, ie, a combination of medication and counseling. The counseling included psychoeducation (ie, information about ADHD etiology and symptoms plus management of symptoms and functional impairments) as well as counseling regarding self-esteem and emotional, family, and social rehabilitation problems. Whenever relevant, group consultations with patients and their relatives were offered on an ad hoc basis. Medication titration was supervised by an experienced psychiatrist (E.P.) and performed in accordance with international guidelines.[26] The consultations were conducted by experienced psychiatric nurses or clinical psychologists. Appointments were offered as long as the patients showed up for treatment, adhered to the medication prescribed (based on self-report), and profited from and needed the treatment

as jointly evaluated by weekly staff conferences and by the patient.

Measures

The diagnosis of ADHD was registered according to the coding system in the *International Classification of Diseases,* 10th revision, Diagnostic Criteria for Research (*ICD-10-DCR*)[27] as this is the diagnostic system formally used in Denmark. However, we followed the less strict criteria in the *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition, Text Revision (*DSM-IV-TR*)[28] regarding comorbidity and pervasiveness of symptoms. Additionally, we considered ADHD-I and ADHD-HI described in the *DSM-IV-TR*[28] as sufficient for establishing these diagnoses and that of ADHD-C. The Danish version[29] of the World Health Organization's rating scale for adult ADHD, the ASRS,[25] was applied to measure current ADHD symptoms. This scale (measured on a 0–4 Likert scale) consists of 9 items covering the *DSM-IV-TR* symptoms of inattention and 9 items covering the symptoms of hyperactivity and impulsivity. We considered the answers "often" and "very often" as clinically significant for 11 screening questions (A4–A6, B1, B2, B4, B5, B7–B9, B11), and "sometimes," "often," and "very often" as significant for the remaining 7 questions (A1–A3, B3, B6, B10, B12).[25] The *DSM-IV-TR* subtyping was based on a summation of all clinically significant symptoms and followed the *DSM-IV-TR* criteria.

Comorbid disorders were assessed using the Present State Examination.[30] Personality disorders were assessed by the Structured Clinical Interview for *DSM-IV* Axis II Personality Disorders (SCID-II)[31] (n = 4), the *ICD-10* International Personality Disorder Examination (IPDE)[32] (n = 10), or a clinical reconfirmation in the ADHD unit of a previously established clinical diagnosis (n = 7). Pervasive developmental disorders were assessed using the Ritvo Autism Asperger Diagnostic Scale-Revised (RAADS-R).[33] All comorbid disorders were coded using the *ICD-10-DCR*. Data concerning comorbidity were transformed into binary variables (see Table 2). Furthermore, the category emotional disorder was made to encompass patients with anxiety disorders (F40–48.9) and mood disorders (F30–39) (see Table 2).

The variables concerning sociodemographic characteristics, risk-taking behavior, educational/occupational instability, and school behaviors were obtained using a semistructured protocol designed for the study and were based on self-report and on reports from relatives. The purpose was to achieve a systematic collection of psychiatric record information. The protocol was completed by the ADHD unit staff in accordance with the record information.

The outcome variable treatment dropout was dichotomized into "treatment completed as planned (not dropouts)" versus "treatment not completed as planned (dropouts)." Hence, dropout cases were characterized by premature terminations defined as terminations on the patients' initiative without any prior clinical or agreed resolution and with nonexhausted treatment possibilities as judged by the staff.

Table 1. Sociodemographic and Clinical Characteristics at Assessment

Variable[a]	n (%)
Gender	
Male	97 (64)
Female	54 (36)
Age	
< 25 y	59 (39)
≥ 25 y	92 (61)
Municipality[b]	
Rural (≤ 50,000 inhabitants)	31 (21)
Urban (> 50,000 inhabitants)	118 (79)
Civil status[b]	
Married/cohabiting	73 (49)
In a relationship/not cohabiting, single	76 (51)
Children[c]	
No	87 (59)
Yes	61 (41)
Highest educational level[c]	
Primary/lower secondary school only	74 (50)
Vocational education	46 (31)
Higher education	28 (19)
Current occupational status[c]	
Self-supporting	51 (34)
Not self-supporting[d]	97 (66)
Annual gross income[e]	
≥ kr300,000 (US $42,653)	15 (10)
kr200,000–kr299,999 (US $28,439–$42,635)	27 (19)
< kr200,000 (US $28,439)	101 (71)
Organic disorders	2 (1)
Substance-related disorders[f]	
Alcohol	8 (5)
Substances other than alcohol	33 (22)
Psychotic disorders	4 (3)
Mood disorders (including disorders in remission)[f]	
Bipolar disorder	2 (1)
Depressive episode	8 (5)
Recurrent depressive disorder	19 (13)
Anxiety disorders (including phobias)	8 (5)
Personality disorders[f]	
EUPD impulsive type, EUPD borderline type, dissocial, histrionic, other (narcissistic)	14 (9)
Obsessive-compulsive, avoidant, dependent	4 (3)
Mixed, unspecified	5 (3)
Mental retardation	2 (1)
Pervasive developmental disorders	9 (6)

[a]Unless otherwise noted, N = 151.
[b]Information from 149 patients.
[c]Information from 148 patients.
[d]The category "not self-supporting" includes patients on social security, on long-term sickness leave, in social training programs, in flexible jobs, and on disability pension and students on special terms.
[e]Information from 143 patients.
[f]Patients can have more than 1 diagnosis within this category.
Abbreviation: EUPD = emotionally unstable personality disorder.

Decisions of defining cases as dropouts were made by the staff. The outcome variable missed appointments (≥ 3) was based on the staff's registrations of missed appointments and dichotomized into < 3 and ≥ 3 missed appointments.

Educational level and occupational status were dichotomized into 2 categories (see Tables 1 and 2). Data regarding risk-taking behavior (see Table 3) were dichotomized into 0–2 risk-taking behaviors and 3–5 risk-taking behaviors. The following behaviors were considered risk-taking: having been involved in violent crime, having been involved in property crime, having had one's driving license suspended at least once, and having exercised high-risk sexual behavior with the risk of catching a sexually

Table 2. Associations of Sociodemographic and Clinical Variables With Treatment Dropout and Missed Appointments in Adults With ADHD

		Treatment Dropout		Missed Appointments (≥ 3)	
Variable[a]	n (%)	OR_{crude} (95% CI)	OR_{adj} (95% CI)[b]	OR_{crude} (95% CI)	OR_{adj} (95% CI)[c]
Gender					
Male	97 (64)	1	1	1	1
Female	54 (36)	0.67 (0.31–1.45)	1.02 (0.41–2.55)	1.19 (0.61–2.33)	1.50 (0.72–3.09)
Age					
< 25 y	59 (39)	1	1	1	1
≥ 25 y	92 (61)	0.76 (0.37–1.57)	0.69 (0.30–1.60)	0.76 (0.39–1.48)	0.89 (0.44–1.82)
Educational level[d]					
Higher education	74 (50)	1	1	1	1
Primary/lower secondary only	74 (50)	1.78 (0.84–3.76)	1.52 (0.64–3.56)	2.20 (1.13–4.28)*	2.19 (1.12–4.31)*
Occupational status[d]					
Self-supporting	51 (34)	1	1	1	1
Not self-supporting	97 (66)	0.87 (0.40–1.87)	1.02 (0.43–2.40)	1.52 (0.76–3.06)	1.44 (0.70–2.96)
Annual gross income[e]					
≥ kr200,000 (US $28,439)	42 (29)	1	1	1	1
< kr200,000 (US $28,439)	101 (71)	2.11 (0.84–5.28)	1.87 (0.69–5.08)	1.61 (0.76–3.41)	1.38 (0.62–3.05)
Comorbidity					
No	64 (42)	1	1	1	1
Yes	87 (58)	0.61 (0.30–1.26)	0.93 (0.39–2.24)	1.21 (0.63–2.33)	0.89 (0.40–1.95)
Substance-related disorders					
No	112 (74)	1	1	1	1
Yes	39 (26)	1.27 (0.57–2.83)	1.18 (0.49–2.87)	1.94 (0.93–4.06)	1.92 (0.91–4.06)
Emotional disorder					
No	115 (76)	1	1	1	1
Yes	36 (24)	0.26 (0.09–0.80)*	0.18 (0.05–0.65)*	1.16 (0.54–2.46)	1.18 (0.54–2.57)
Personality disorders					
No	130 (86)	1	1	1	1
Yes	21 (14)	1.09 (0.39–3.02)	1.22 (0.37–4.03)	0.84 (0.33–2.16)	0.91 (0.35–2.40)
ADHD subtype[f]					
ADHD combined type	100 (79)	1	1	1	1
ADHD predominantly inattentive type	22 (18)	0.88 (0.30–2.64)	0.53 (0.15–1.82)	0.17 (0.05–0.61)*	0.17 (0.05–0.62)*
ADHD predominantly hyperactive-impulsive type	4 (3)	…	…	…	…

[a]Unless otherwise noted, N = 151.
[b]Adjusted for emotional disorder, uncompleted educational programs apart from mandatory schooling, and risk-taking behavior.
[c]Adjusted for educational level and substance-related disorders.
[d]Information from 148 patients.
[e]Information from 143 patients. US dollars calculated based on a 0.14265 exchange rate.
[f]Information from 126 patients.
*$P < .05$.
Abbreviations: ADHD = attention-deficit/hyperactivity disorder, CI = confidence interval, OR = odds ratio.
Symbol: … = No results are shown for the ADHD predominantly hyperactive-impulsive type as too few patients were included in this group.

transmitted disease or of unwanted pregnancy at least 15 times. Data regarding educational and occupational instability (see Table 3) were covered by the variables uncompleted educational programs apart from mandatory schooling (dichotomized as < 2 educational programs and ≥ 2 educational programs), total number of employments (dichotomized as < 9 employments and ≥ 9 employments), and employments of less than 3 months' duration (dichotomized as < 3 employments and ≥ 3 employments).

Data concerning behaviors during primary/lower secondary school (see Table 3) were dichotomized into never/rarely/sometimes and often/very often.

Statistics

The associations of independent and dependent variables were estimated by logistic regression analyses. In the first analysis, crude odds ratios (ORs) were estimated for all independent variables (Tables 2 and 3). This was followed by a forward stepwise logistic regression analysis by which all independent variables were mutually adjusted. In the stepwise selection procedure, the chosen *P* value threshold for statistical significance was < .20.[34] The significant variables identified by this procedure were subsequently controlled for in the adjusted logistic regression analysis.

Due to missing values, complete information in all independent variables included in the adjusted analyses was available for only 126 patients (83%). The results presented are from the analysis with the largest study population (N = 151). Thus, categories with missing values are included in the analyses, but no results are shown for the missing categories. No results are shown for the ADHD-HI subtype as too few patients are included in this group.

All point estimates are presented with 95% confidence intervals (CIs), and a *P* value (2-sided) < .05 was considered statistically significant. We used STATA 11.2 IC (Stata Corp, College Station, Texas) for all statistical analyses.

Table 3. Associations of Risk-Taking Behavior, Educational/Occupational Instability, and Social Behaviors During Mandatory School With Treatment Dropout and Missed Appointments in Adults With ADHD

		Treatment Dropout		Missed Appointments (≥ 3)	
Variable[a]	n (%)	OR_{crude} (95% CI)	OR_{adj} (95% CI)[b]	OR_{crude} (95% CI)	OR_{adj} (95% CI)[c]
Uncompleted educational programs apart from mandatory schooling					
< 2 educational programs	83 (57)	1	1	1	1
≥ 2 educational programs	63 (43)	2.64 (1.22–5.73)*	3.01 (1.32–6.89)*	1.82 (0.94–3.55)	1.50 (0.74–3.04)
Total number of employments[d]					
< 9 employments	100 (69)	1	1	1	1
≥ 9 employments	44 (31)	0.70 (0.30–1.64)	0.64 (0.25–1.63)	1.31 (0.64–2.68)	1.75 (0.79–3.88)
Employments of less than 3 months' duration[d]					
< 3 employments	100 (69)	1	1	1	1
≥ 3 employments	44 (31)	1.19 (0.53–2.66)	0.85 (0.35–2.03)	2.57 (1.24–5.31)*	2.86 (1.30–6.28)*
Risk-taking behavior[e]					
0–2 behaviors	86 (61)	1	1	1	1
3–5 behaviors	54 (39)	2.01 (0.91–4.43)	1.97 (0.85–4.60)	1.82 (0.91–3.62)	1.78 (0.88–3.63)
Conflicts with teachers during primary/lower secondary school[f]					
Never/rarely/sometimes	57 (39)	1	1	1	1
Often/very often	88 (61)	1.66 (0.74–3.71)	1.35 (0.56–3.27)	1.69 (0.85–3.35)	1.42 (0.70–2.90)
Conflicts with school friends during primary/lower secondary school[d]					
Never/rarely/sometimes	80 (56)	1	1	1	1
Often/very often	64 (44)	1.16 (0.54–2.48)	1.21 (0.53–2.79)	1.57 (0.80–3.05)	1.73 (0.87–3.47)
Skipping class[d]					
Never/rarely/sometimes	79 (55)	1	1	1	1
Often/very often	65 (45)	1.40 (0.65–3.00)	1.18 (0.51–2.70)	3.23 (1.62–6.42)*	2.65 (1.29–5.43)*
Dismissed from class[g]					
Never/rarely/sometimes	81 (57)	1	1	1	1
Often/very often	61 (43)	1.16 (0.54–2.50)	0.95 (0.40–2.22)	1.76 (0.89–3.45)	1.35 (0.65–2.80)

[a]Unless otherwise noted, N = 146.
[b]Adjusted for emotional disorder, uncompleted educational programs apart from mandatory schooling, and risk-taking behavior.
[c]Adjusted for educational level and substance-related disorders.
[d]Information from 144 patients.
[e]Information from 140 patients.
[f]Information from 145 patients.
[g]Information from 142 patients.
*$P < .05$.
Abbreviations: ADHD = attention-deficit/hyperactivity disorder, CI = confidence interval, OR = odds ratio.

RESULTS

Sociodemographic and Clinical Characteristics at Assessment

Our sample comprised 64% men, 61% ≥ 25 years, and 79% who lived in urban municipalities (Table 1). Approximately half of the patients were married/cohabiting, and 59% had no children. Fifty percent had completed no further education than mandatory schooling, 66% were not self-supporting, and 71% had an annual gross income of < kr200,000 (US $28,439). The most frequent comorbid psychiatric disorders were substance-related disorders (27%), emotional disorder (24%), and personality disorders (14%).

Treatment Dropout

In our sample, 27% dropped out; 54% of the dropouts also had ≥ 3 missed appointments. For the entire sample, the median number of appointments attended was 10 (5 [25th percentile] to 14 [75th percentile]), and the median duration of treatment in months was 6.5 (4.2 [25th percentile] to 9.4 [75th percentile). In the treatment dropout group, median time in months from treatment start to treatment dropout was 4.5 (2.1 [25th percentile] to 7.4 [75th percentile]). The confounder variables identified by the stepwise selection procedure were emotional disorder (OR = 0.18; 95% CI, 0.05–0.65), uncompleted educational programs apart from mandatory schooling (OR = 3.77; 95% CI, 1.76–8.06), and risk-taking behavior (OR = 2.74; 95% CI, 1.42–5.28). According to the crude analysis, patients with emotional disorder had significantly lower odds of treatment dropout (Table 2). Compared to this result, the groups with substance-related disorders and personality disorders had increased odds of treatment dropout, although not significantly. Having 2 or more uncompleted educational programs (Table 3) also significantly increased the odds of treatment dropout. None of the crude estimates changed after adjustment.

Missed Appointments

A total of 42% of the sample had ≥ 3 missed appointments during treatment, and 35% in this group ultimately dropped out of treatment. A mean of 77% of planned appointments were attended, and the mean number of missed appointments for the entire sample was 2.5 (SD = 2.5). The median number of missed appointments was 1 (0 [25th percentile] to 2 [75th percentile]) during the first half of the treatment and 2 (1 [25th percentile to 3 [75th percentile]) during the last half. The difference between the median number of missed appointments during the first and second half of the treatment was significant ($P = .0002$). Hence, more appointments were missed in the last half of the treatment.

The confounders identified by the stepwise selection procedure were educational level (OR = 0.87; 95% CI, 1.00–3.47) and substance-related disorders (OR = 1.92; 95% CI, 0.91–4.06). In the crude analysis, the variables significantly associated with having ≥ 3 missed appointments were lower educational level, ADHD-C subtype, 3 or more employments of less than 3 months' duration, and having skipped class often/very often during primary/lower secondary school (Table 3). Adjusting for the confounders did not change these estimates.

DISCUSSION

Our study examined predictors of treatment dropout and missed appointments among adults with ADHD in a secondary Danish clinic. The patients were offered assessment and a combination of medical and nonmanualized psychosocial treatment. A relatively frequent usage of atomoxetine was seen, reflecting the recommendations from The Danish Health and Medicines Authority[35] that the use of central stimulants is contraindicated in cases of several psychiatric and somatic comorbidities. It is possible that this frequent usage of atomoxetine had an impact on the outcome variables, treatment dropout and missed appointments, in our study. Although atomoxetine has the benefits of needing only once-daily dosing to be effective and of having limited potential for abuse,[36] atomoxetine has also been shown to increase dropout rates in adult RCTs compared to methylphenidate.[7,8] Additionally, it has been shown that atomoxetine has lower effect sizes than methylphenidate and that it takes 1 to 2 weeks of atomoxetine treatment for full effect to emerge.[36] Hence, it is possible that the rates of treatment dropout and missed appointments in our study would have been lower, if the high use of atomoxetine had been replaced by a higher use of methylphenidate.

We included sociodemographic and clinical variables and variables of past behaviors in our analyses. The latter have not previously been examined in a similar sample. Three studies known to the authors have examined factors associated with treatment dropout in adult ADHD samples. One of them found that low educational level was significantly associated with treatment dropout.[9] The other 2, however, found no sociodemographic associations, but found that the presence of social phobia[8] and anxiety/depression[11] was significantly associated with treatment dropout. In our study, no sociodemographic variables were associated with treatment dropout, and, contrary to previous results,[8,11] we found that patients with emotional disorder, which included anxiety and mood disorders, had significantly lower odds of treatment dropout.

Hence, the currently available data regarding factors associated with treatment dropout in clinical, adult ADHD samples are consistent with the conclusions from numerous studies examining treatment dropout among patients with a variety of psychiatric conditions; the relationship between treatment dropout and sociodemographic and clinical variables is complex, and the findings are far from consistent.[18,22,37] However, it seems to be a trend that low educational level and disorders such as substance-related disorders and personality disorders increase the likelihood of treatment dropout among psychiatric outpatients generally.[15,18,37,38] Our results did not support this tendency regarding ADHD, because even though there was a trend that low educational level, substance-related disorders, and personality disorders increased the odds for treatment dropout, it was nonsignificant. Across studies,[18] terms like *nonpersistence*,[9] *disengagement*,[18] *discontinuation*,[15] *interruption*,[22] and *dropout*[22,37,39,40] are used interchangeably and without strict definitions. Developing a standardized and well-conceptualized definition of dropout seems of major importance for future studies of treatment dropout among adults with ADHD to promote generalizability across studies.

Our results documented that missed appointments was a frequently occurring phenomenon, which has also been documented in general psychiatric outpatients.[16,17] The concept of adherence has been suggested to be broader than merely following medication instructions.[23] In the literature concerning adherence to medication in adults with ADHD, the specific ADHD symptomatology, with disorganization and forgetfulness as central components, has been suggested to possibly explain low medication adherence rates.[21,41] Our results showed that ADHD symptomatology in terms of subtype classification influenced adherence to treatment appointments. Thus, the patients with ADHD-C had significantly higher odds of missed appointments than the patients with ADHD-I and ADHD-HI. In line with these findings, 2 previous studies[42,43] have shown that patients with the ADHD-C subtype are more impaired in terms of comorbid oppositional defiant disorder as well as in terms of higher rates of school and social problems. Consequently, it can be hypothesized that the functional impairments related to the ADHD-C subtype might be contributing to the ability to adhere to treatment appointments, but indeed, more research would be needed to further clarify these interrelationships. Additionally, the patients with a clinical profile of current substance-related disorders in our sample also had increased odds of missed appointments, although the difference was not significant. This is in accordance with the findings of a previous study comparing missed appointments across a variety of psychiatric specialties.[17]

We found that highest dropout rates in the educational system (≥ 2 uncompleted educational programs apart from mandatory schooling) were significantly associated with treatment dropout, and past instability in terms of most short-termed employments (< 3 months) and highest rates of skipping class during mandatory schooling were significantly associated with missed appointments. Past behavior patterns have been suggested to constitute the most reliable predictors of continuing or interrupting current treatment.[22] The underlying theory is that a behavior becomes habitual instead of intentional when the behavior has been performed several times across stable contexts.[44–46] It can be questioned, however, whether the contexts in our study are stable and

comparable; we examined the current behaviors of treatment dropout and missed appointments during treatment in the health care system, whereas the past behaviors were related to the educational and occupational systems. Differences in these systems may be crucial to the individual's decision processes and related behaviors. Nevertheless, it has been suggested that "contexts are stable to the extent that they present the same contextual cues integral to performing the response and to the extent that they are similarly conducive to fulfilling an actor's goals."[46p1282] Some contextual cues can be said to be similar in the 2 systems; an authority gives instructions that the individual is supposed to follow, and thus demands are made on the individual to act in specific ways, eg, show up at specific hours or demonstrate that they have learned or followed instructions.

Taken together, our results suggest that past behaviors are just as associated with current behaviors of treatment dropout and misses appointments as are sociodemographic and clinical factors. Hence, we found that the predictors of treatment dropout were the absence of an emotional disorder as well as having 2 or more uncompleted educational programs apart from mandatory schooling. The predictors of missed appointments were lower educational level, ADHD-C subtype, 3 or more employments of less than 3 months' duration, and having been skipping class often/very often during primary/lower secondary school. Why our results showed different predictors of treatment dropout and missed appointments can only be hypothesized; the behavior of missed appointments might be classified as less critical than treatment dropout, since dropout has more long-term consequences in terms of not receiving the treatment. In accordance with this assertion, the nonclinical predictors of missed appointments could also be classified as less critical behaviors than the behavior associated with treatment dropout. Importantly also, ADHD subtype was decisive regarding missed appointments but not treatment dropout, which could be expected since missing appointments probably depends on distraction and impulsivity. These findings underline the importance of assessing past behaviors and ADHD symptom levels during the initial contacts as well in order to identify patients with higher risk of treatment dropout and missed appointments. Once high-risk patients are identified, an immediate action should be taken to bring down ADHD symptom levels in these patients in order to prevent missed appointments. Furthermore, the relationship between the patients' past behaviors and risks of repeating these behaviors in the present context in terms of treatment dropout or missed appointments should be a focus in a psychosocial intervention targeted at patients at risk as well as their relatives and social workers.

Strengths and Limitations

Our study is, to the best of our knowledge, one of the first to examine a breadth of factors associated with treatment dropout and missed appointments during treatment of adults with ADHD within a naturalistic setting. The noninvasive, naturalistic design prevented a systematic pattern of nonparticipation and thereby also selection bias. Consequently, the ecological validity of our study should be high, and our results should be considered generalizable to other clinical samples in secondary health care, at least in a European context. However, our results are not predictive of the larger ADHD population.

Our study has several limitations. The use of data from a naturalistic setting hindered the use of a standardized diagnostic interview for the assessment of ADHD. However, the ASRS was filled in during the clinical interview and based on a thorough interview of symptoms and impairments in everyday situations. Further limitations consist in the diagnoses being ultimately provided by a single diagnostician (E.P.), the assessment of personality disorders being conducted with 2 different instruments, and some of the personality disorder diagnoses being clinical confirmations of previously established diagnoses. These diagnostic limitations may have resulted in some inaccuracies in the diagnostics and limits the generalizability of the findings. Also due to the naturalistic setting, no standardized set of criteria for discontinuation was applicable.

As much of our data derives from a semistructured protocol designed for the study, comparisons with other study results are hindered. Additionally, our data on past behaviors relied on self-reported information, which may have resulted in recall bias. Finally, our sample was relatively small, and the use of a stepwise regression model may have caused the confounding variables to have emerged by chance. Our results should therefore be considered in the light of these limitations.

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