Neurodevelopmental disorders and comorbidity in young adults attending a psychiatric outpatient clinic

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A R T I C L E   I N F O

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A B S T R A C T

“Missed” cases with neurodevelopmental disorders (NDDs) within adult psychiatry services have attracted increasing attention in the last decade. Key questions have been what the prevalence of NDDs (particularly attention-deficit/hyperactivity disorder/ADHD and autism spectrum disorder/ASD) is, and what the clinical and gender characteristics of those with NDD in adult psychiatry are. All first-time attenders at an adult psychiatry clinic serving 18–25 years old were invited to take part in the study regardless of cause of concern. Participation in the study included diagnostic in-depth evaluation performed by experienced adult psychiatrists. Clinical diagnoses (DSM-IV-TR and DSM-5 criteria) were based on all available information (clinical psychiatric interview, clinical observation, and self-rating questionnaires). Almost two thirds (63%) of the study group met criteria for ADHD or ASD. Most of the patients with NDD (particularly the "NDD females") had not been diagnosed in childhood. Twelve percent of the females included had been given an ADHD diagnosis in childhood. In the current study we found that 48% of the females had ADHD. The high male:female NDD ratio reported among children, was not obvious in our NDD group. The results underscore the importance of screening for NDD in adult psychiatric services regardless of referral reason.

1. Introduction

Neurodevelopmental disorders (NDD), including Attention-Deficit/Hyperactivity Disorder (ADHD), Autism Spectrum Disorder (ASD), Tourette syndrome (TS), Intellectual Disability (ID), Speech Language Disorder (SLD) and Developmental Coordination Disorder (DCD), have, by definition, their onset in early life, and are now often identified in childhood. However, over the last decade attention has been drawn to “missed” cases in the adult population, cases that, for whatever reason, have gone undetected throughout childhood and the teenage years (Fusar-Poli et al., 2020). In childhood, the prevalence of ADHD varies worldwide in different studies, ranging from 2.2% to 17%, but mostly around 5% (Skounti et al., 2007). ASD is a life-long condition affecting about 1.5% in the general population (Baxter et al., 2015), but, here too, prevalence rates vary depending on which set of diagnostic criteria has been used. Previous research has shown that NDDs tend to be much more common among boys than girls, but the male:female ratio has varied considerably, particularly when it comes to more recent studies (Skounti et al., 2007; Loomes et al., 2017).

Despite NDDs having been demonstrated to be very common among children and adolescents, there have only been a few prevalence studies in adults (Katzman et al., 2017; Ebejer et al., 2012). This probably has to do with diagnostic tradition; NDDs have not been the first diagnoses that adult psychiatrists have been looking for. Instead, patients have been diagnosed with affective disorders, anxiety and personality disorders, with increased risk that NDDs have not been assessed at all. Considering prevalence studies from child and adolescent psychiatry and the fact that symptoms of NDDs tend to persist into adult age (Faraone et al., 2003) as well as clinical experience, a relatively high rate of NDDs in adult psychiatry as well as in child psychiatry might be expected. Studies of cases with NDD diagnosed in childhood and followed-up into adult age have reported a decline in the rate of fully diagnosable ADHD, i.e. cases that met the full criteria in adulthood, but persistence has been much higher when cases of ADHD in partial remission have been included (Faraone et al., 2006). Persistence of ASD into adulthood tends to be the rule according to prospective long-term follow-up studies (Billstedt et al., 2005; Helles et al., 2015).

Considering the high rate of non-NDD psychiatric comorbidity that
has been demonstrated among NDD patients (both those with ADHD and those with ASD) (Gillberg and Billstedt, 2000, D’Agati et al., 2019; Gillberg et al., 2016; Takara et al., 2014), it would seem to be reasonable to assume that NDD patients, both children and adults, may be an underdiagnosed group among young adults in a psychiatric outpatient clinic.

There has been increasing focus on comorbidity among patients with NDD, and this has led to the introduction of the concept of ESSENCE (Early Symptomatic Syndromes Eliciting Neurodevelopmental Clinical Examinations) (Gillberg, 2010). ESSENCE is an umbrella term for neurodevelopmental deficits that present in early childhood. Its purpose is to alert clinicians and researchers to be aware of the huge variety of “comorbid” problems manifested in any kind of early onset neurodevelopmental problem. As many as 85% of children with ADHD in the general population also meet criteria for at least one other NDD diagnosis (Kadesjö et al., 2001). If a large proportion of adults in follow-up studies develop new comorbid psychiatric symptoms their childhood NDD symptoms remaining in adulthood might be less obvious. Instead, a more “diffuse” presentation, might have emerged with a mixture of comorbid problems across classic childhood NDD syndromes and symptoms considered to be diagnostically related to other psychiatric conditions in adulthood, might, at least partially, explain why NDD diagnoses have been less commonly assigned in adult psychiatry.

The aims of the present study of young adult psychiatric outpatients attending a non-psychosis clinic in Stockholm, Sweden, were to (1) estimate the prevalence, phenotypic characteristics, and global adaptive functioning of cases with NDD, (2) delineate psychiatric comorbidity, and (3) examine possible gender differences.

2. Methods

2.1. Procedure

All 172 18-25-year-old first time attenders at one adult outpatient psychiatric (AOP) clinic between November 2015 and January 2018 (with a break between March and August 2016) were invited to take part in the study, regardless of cause of concern. Patients who primarily did not seek help for NDD as well as those with a preliminary or already established diagnosis of NDD at first visit were invited to take part in a clinical research assessment for these conditions. The patients at the clinic were considered representative of young people seeking help at adult outpatient psychiatric clinics in Stockholm with the exception of patients with psychotic disorder (of whom the majority was referred directly to a specialized psychosis unit, and only rarely attended at the AOP).

The study was approved by the Research Ethics Committee at the University of Gothenburg (No 047–14). Written informed consent was obtained from all participants. It was clearly stated in the letter of consent that there would be no negative consequences if patients declined to take part in the study.

2.2. Patients included

All 172 invited patients accepted participation. The main reasons for referral were (already diagnosed or suspected) 1) ADHD (n = 82, 48%), 2) affective disorder (n = 33, 19%), 3) anxiety disorder (n = 25, 15%), 4) ASD (n = 21, 12%), 5) personality disorder (n = 7, 4%), 6) eating disorder (n = 1, 0.5%), 7) ID (n = 1, 0.5%), 8) tics (n = 1, 0.5%), and 9) fatigue syndrome (n = 1, 0.5%). Two patients (two females) who had agreed to participate only took part in the screening part of the study, and full clinical diagnostic assessment was not possible. The remaining group (n = 170, 99% of all) participated in the complete (n = 160, 94%) or almost complete (n = 10, 6%) study protocol, sufficient to make full assessments and clinical diagnostic decisions. These 170 constituted the study group. The mean age at assessment was 20.8 (SD = 2.4) years, 107 women (mean age = 20.8, SD = 2.4) and 63 men (mean age = 20.9, SD = 2.4) participated in the study. Forty-nine of the patients (25%) had already been formally diagnosed with a psychiatric disorder/NDD in previous contacts with child or adult psychiatric clinics prior to the study (Table 1).

Referrals had been sent to the AOP clinic by primary psychiatric or general practice care (including outpatient child and adolescent psychiatric services/CAP) in 90 cases (53%), by secondary non-psychiatric care units in 71 cases (42%), and by patients themselves in 6 cases (3%). For three cases (2%) information about referral source was missing.

2.3. Clinical examination

The participants were thoroughly clinically assessed concerning psychiatric problems, NDD, and cognitive functioning, using psychiatric interviewing, self-rating scales, and neuropsychological tests. The participants were also asked about their highest educational achievement, their occupation and their living situation. Two psychiatrists, two psychologists, and one nurse performed 168 of the 170 assessments at the AOP. The psychiatrist also made a physical evaluation including neurological status, and examination of heart rate, respiratory sounds, and blood pressure of each participant. Participants were asked if they agreed to give questionnaires to their parent(s). However, parent questionnaire participation was not a prerequisite for inclusion in the study.

Clinical diagnoses were based on all available information, provided at the clinical psychiatric interview, self-rating questionnaires, and the clinical impression of the respondent according to the text revision of the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR, APA 2000) and DSM-5 criteria (APA, 2013). One of the two psychiatrists in the team made the diagnosis. The team included

Table 1 Background characteristics according to gender.

| Background characteristics | Total group | Females n = 107 (%) | Males n = 63 (%) | p-value |
|----------------------------|-------------|---------------------|-----------------|---------|
| Age mean (SD) Range 18–25 years | 20.8 (2.4) | 20.9 (2.4) | 20.8 (2.4) | .822 |
| Reason for referral | | | | |
| ADHD | 93 (55) | 38 (60) | 55 (51) | |
| Affective disorder | 33 (19) | 8 (13) | 25 (23) | |
| Anxiety disorder | 24 (14) | 6 (10) | 18 (17) | |
| Autism spectrum disorder | 21 (12) | 10 (16) | 11 (10) | |
| Personality disorder | 6 (4) | 0 | 6 (6) | |
| Referral body (n = 167) | | | | |
| Own referral | 27 (16) | 8 (13) | 19 (18) | |
| Child and Adolescent Psychiatry Care | 35 (21) | 11 (33.3) | 24 (23) | |
| Other, non-psychiatric care | 99 (59) | 42 (67) | 57 (55) | |
| Previously established diagnoses | | | | |
| ADHD diagnosis | 23 (14) | 13 (21) | 10 (6) | |
| Autism spectrum disorder diagnosis | 7 (6) | 2 (3) | 5 (5) | |
| Comorbid ADHD and Autism spectrum disorder diagnosis | 14 (5) | 3 (5) | 11 (10) | |
| Mean IQ (n = 146) | 99.8 (13.0) | 99.8 (14.1) | 96.7 (12.3) | .262 |
| Borderline intellectual function (IQ 71–85) | 26 (18) | 7 (14) | 19 (21) | .577 |
| Clinical Global Impression scale Mean (SD) | 3.8 (0.65) | 3.6 (0.74) | 3.9 (0.58) | .006 |
| AUDIT above cut off (n = 126, males n = 44, females n = 82) | 41 (33) | 15 (34) | 26 (32) | .843 |
| AUDIT above cut off (n = 132, n = 46, females n = 86) | 19 (14) | 6 (13) | 13 (15) | .801 |

ADHD—Attention Deficit/Hyperactivity Disorder, AUDIT—Alcohol Use Disorders Identification Test, DUDIT—Drug Use Disorders Identification.
two psychiatrists who meet almost all of the participants (n = 168), two participants were diagnostically evaluated by two psychiatrists from another team at the clinic. The first author, who is an experienced psychiatrist, reassessed and finalized all diagnoses before the completion of the study. No diagnoses were changed in the reassessment procedure.

2.4. Instruments

2.4.1. Psychiatric assessment

The Mini International Neuropsychiatric Interview (M.I.N.I.) (Sheehan et al., 1998) was used as a structured broad psychiatric interview. The M.I.N.I. is a widely used diagnostic interview instrument for psychiatric diagnosis according to the DSM. The M.I.N.I. does not yield diagnostic information relating to NDD. A clinical psychologist or an experienced psychiatric nurse in the team performed the M.I.N.I. A psychiatrist afterwards assessed and scored all the MINI-interviews. The majority of the MINI interviews (except for 10 interviews) were performed by a specialist nurse (C.E) who had been specifically trained in the MINI. The remaining interviews were performed by psychiatric nurses trained by C.E. The MINI data was evaluated by experienced adult psychiatrists and no diagnosis were based only on the MINI.

The psychologist in the team also used the Structured Clinical Interview guide for Diagnosis of Axis II disorders (SCID-II, First et al., 1997) in cases with a suspected personality disorder.

Several instruments were included for further evaluation of neurodevelopmental disorders. The Asperger Syndrome Diagnostic Interview (ASDI) (Gillberg et al., 2001) was used for assessment of ASD; it is a combined interview and observation schedule for clinical assessments. ASDI is an investigator-based interview observation consisting of 20 items measuring symptoms of depression. BDI has a total sum score (range 0–100) by summing those 25 items best discriminating between individuals with ADHD and controls. Internal consistency of the WURS has been reported as 0.94 (Kourus et al., 2018). ADHD-RS on the other hand is a rating scale of current ADHD symptoms. ADHD-RS has two subscales, one for inattention (9 items) and one for hyperactivity-impulsivity (9 items).

Two ASD screening instruments were used; the Autism Symptom Self-Report for adolescents and adults (ASSERT) (Poserud et al., 2013) and the Adult Autism Spectrum Quotient (AQ) (Baron-Cohen et al., 2006). ASSERT is a 7-item self-rating questionnaire about social interaction (four items) and about rigid and repetitive behavior and interests (three items), and the AQ is a 50-item questionnaire about ASD symptoms within five different domains associated with ASD; social skills; communication skills; attention to detail; imagination; and attention switching/tolerance of change. The AQ and ASSERT was used to capture ASD symptoms, however, ASD diagnosis was not based solely on the results from these questionnaires.

The Alcohol Use Disorders Identification Test (AUDIT) (Saunders et al., 1993) and the Drug Use Disorders Identification (DUDIT) (Berman et al., 2005) have been developed by WHO in order to screen for alcohol use and drugs. Internal consistency has been reported to be 0.96 for AUDIT (Noorbakhsh et al., 2018) and generally >0.90 for DUDIT (Hildebrand 2015). The cut-off score for AUDIT is >7 and the cut off scores for DUDIT is >6 for males and >2 for female.

2.4.3. Neuropsychological test

The Wechsler Adult Intelligence Scale- Fourth Edition (WAIS-IV) (Wechsler, 2008) was used to assess Full Scale Intelligence (FSIQ). A licensed psychologist administered this test. Other neuropsychological tests were also included in the study but the results from these will be presented elsewhere.

2.4.4. Parent instruments

The Five to Fifteen (FTF) (Kadesjö et al., 2004) is a parent questionnaire for assessment of development and behavior in children aged 5 to 15 years but it has been used in studies of young people above 15 years of age (Lugnegård and Bejerot, 2019). The questionnaire comprises 181 items. All items are scored as 0 for ‘does not apply’, 1 for ‘applies sometimes or to some extent’ or 2 for ‘definitely applies’. The FTF items are divided into 8 domains: motor control, executive functions, perception, memory, language, learning, social skills, and emotional/behavioral problems. A score above the 90th percentile indicates impairment and indicates need for further in-depth examination. The FTF has been used as a retrospective parent assessment of NDD symptoms in adults (Lugnegård and Bejerot 2019).

The Autism – Tics, AD/HD and other Comorbidities Inventory (A-TAC) (Hansson et al., 2005; Mårländ et al., 2017), is a 262-item parent telephone interview for NDD including ASD, ADHD, tic disorders, DCD and specific learning disorders. A-TAC has been reported to have good test-retest and excellent inter-rater reliability and construct validity (Hansson et al., 2005; Mårländ et al., 2017) for NDD diagnoses.

ESSENCE-Q-ADULT is a questionnaire regarding typical neurodevelopmental problems in childhood (https://www.gu.se/en/gnc/gnc-resources/screening-questionnaires/essence-q-adult). The scale is a screening tool to find out about different neurodevelopmental problems. The study group patients completed one of it and parents one separate ESSENCE-Q-ADULT in order to get as objective a measure as possible.

We received parental data regarding 140 participants in the study group.
2.5. Statistical analysis

Analyses were performed using IBM SPSS Statistics, version 26. The statistical significance criterion was set a priori at \( p = .05 \). Non-parametric statistics were used and all significance tests were two-tailed. With a view to increasing comparability/readability, means are presented even in cases where the statistical analysis was made based on medians or ranks.

3. Results

3.1. Demographical background and age at referral

Ninety-five participants (56%) were students, 48 (28%) were employed and the remaining 27 (16%) were unemployed. Highest achieved education in the total study group was lower secondary school (\( n = 9, 5\% \)), upper secondary school but not fully completed (\( n = 86, 51\% \)), completed upper secondary school (\( n = 47, 28\% \)) or post-secondary school (\( n = 28, 16\% \)). The majority of the study group still lived with a parent (\( n = 101, 59\% \)) but 61 participants (36%) lived on their own or has another living condition (\( n = 8, 5\% \)).

More women (\( n = 107, 63\% \)) than men (\( n = 63, 37\% \)) attended the clinic, but no gender difference in age at referral (at about 21 years) was found (Table 1).

The most common reason for referral was ADHD related problems (\( n = 93, 55\% \)), followed by affective (\( n = 33, 19\% \)) and anxiety problems (\( n = 24, 14\% \)).

3.2. Medical syndromes/conditions

One participant was referred to the AOP with depressive symptoms but was diagnosed with hypothyroidism and dropped out of the study after she had been successfully medicated with thyroid hormone. This patient had no NDD diagnosis. One participant had a previous epidermal hematoma. No NDD related problems or psychiatric problems were reported to exist prior to the accident that caused hematoma. Furthermore, one of the participants had previously been diagnosed with Fetal Alcohol Syndrome and had prior to the study also been diagnosed with ADHD and ASD. This patient did not participate in the IQ-test. One had previously been diagnosed with DiGeorge Syndrome and ASD. The patient had a Borderline Intellectual Functioning (BIF).

3.3. Clinical characteristics

Forty-four participants (males \( n = 18, 29\% \) and females \( n = 26, 24\% \)) had a previously established ADHD and/or ASD diagnosis at the time of referral (23 ADHD only, 7 ASD only and 14 ADHD+ASD) and two of these also had an additional Tourette syndrome diagnosis.

The mean FSIQ in the total study group was in the average range (\( M = 97.8, (SD = 13.0), \text{range } 69-124 \)). Twenty-six (18%) had FSIQ within the range of borderline intellectual functioning (BIF) and a further three (2%) had intellectual disability (ID) with FSIQ below 70.

The mean CGI score for the total group was 3.8 (SD = 0.65, range 2-6). This indicates that the clinician rated global impression of this patient group condition is close to what is defined as moderately ill (score 4).

Alcohol abuse as measured on the AUDIT (scoring above agreed cut-off at \( >7 \)) was found in 41 participants (33%) and 27 of those also (66%, \( p \text{-value}=0.086 \)) fulfilled an ADHD diagnosis. Furthermore, 14% scored above cut-off on the DUDIT (scoring above agreed cut-off at \( >6 \) for males and \( >2 \) for females) indicating drug abuse.

3.4. NDD and psychiatric diagnoses

The diagnoses of the young AOP group are presented in Table 2. A total of 67% (7?) had NDD (ADHD, ASD, Tourette syndrome, or ID).

### Table 2

| Diagnosis | Total group N | Male n | Females n | 107% | p-value |
|-----------|---------------|--------|-----------|------|---------|
| ADHD any  | 91 (53)       | 40 (63)| 51 (48)   | .56  |
| ADHD-C   | 51 (30)       | 27 (43)| 24 (22)   |      |
| ADHD-C+ ASD | 11 (6)   | 2 (3)  | 9 (8)     |      |
| ADHD-I   | 22 (13)       | 8 (13)| 14 (13)   |      |
| ADHD-I+ ASD | 7 (4)  | 3 (5)  | 4 (4)     |      |
| Only ASD | 16 (9)        | 5 (8) | 11 (10)   |      |
| No ADHD or ASD | 63 (37) | 18 (29)| 45 (42)   |      |
| Tourette Syndrome | 3 (2) | 2 (3) | 1 (1) |      |
| Affective disorder | 119 (70) | 33 (52)| 86 (80) | <.0001 |
| Anxiety disorder | 89 (52) | 22 (35)| 67 (63) | .001  |
| OCD spectrum | 15 (9) | 3 (5) | 12 (11) | .175  |
| Personality disorder | 28 (16) | 7 (11)| 21 (20) | .199  |
| Eating disorder | 11 (7) | 0 | 11 (10) | .007  |
| Borderline Intellectual functioning | 26 (15)| 7 (11)| 19 (11) | .577  |

ADHD=attention deficit/hyperactivity disorder, ADHD-C= attention deficit/hyperactivity disorder combined type, ADHD-I= attention deficit/hyperactivity disorder-inattentive type, ASD = autism spectrum disorder.

Ninety-one patients (53%) met full criteria for an ADHD diagnosis, 35 of whom (38%) had already been diagnosed with ADHD in CAP or other services in childhood. The majority had ADHD combined type (\( n = 62, 36\% \) of the total study group) and a smaller proportion had ADHD inattentive type (\( n = 29, 17\% \)).

ASD was diagnosed in 34 patients (20%), 18 of whom (53%) also met criteria for ADHD (henceforth referred to as the “ASD+ADHD” group). Seven of the 34 (21%) had been diagnosed with ASD already in childhood.

This means that 63% of all patients had either ADHD, ASD or both. Three patients met criteria for Tourette syndrome, two of whom also had ADHD and ASD.

Affective disorder was diagnosed in 70% (\( n = 119 \)) of the study group. The majority (\( n = 108, 64\% \)) had depressive episode/episodes and a smaller proportion had bipolar disorders (\( n = 9 \)). Fifty-two percent had anxiety disorder. The majority (\( n = 36, 21\% \)) had generalized anxiety disorder but anxiety disorder UNS (\( n = 18, 11\% \)), social phobia (\( n = 17, 10\% \)), panic disorder (\( n = 15, 9\% \)), obsessive compulsive disorder (\( n = 15, 9\% \)), and post-traumatic stress disorder (\( n = 12, 7\% \)) occurred in the study group.

Personality disorders were found in a subgroup (\( n = 28, 16\% \)) with borderline personality disorder (\( n = 19, 11\% \)) and antisocial personality disorder (\( n = 9, 5\% \)) being the most frequent. One patient had schizoid personality disorder and another patient personality disorder UNS. All of the patients meeting criteria for a personality disorder also met criteria for other psychiatric disorders and/or NDD (\( n = 21, 75\% \)). Finally, 11 (7%) of the patients, all women, in the study group fulfilled the criteria for eating disorder (anorexia nervosa (\( n = 5, 3\% \)), bulimia nervosa (\( n = 3, 2\% \)), binge eating disorder (\( n = 2, 1\% \)) and eating disorder – not otherwise specified (\( n = 1, 1\% \)).

3.5. Overlap/comorbidity of psychiatric disorders and NDD

There was a very high rate of overlap between non-NDD psychiatric disorders (affective, anxiety and personality disorders) and NDD (Table 3). The highest rates of overlap were seen between ADHD-C and personality disorders (any) - particularly ADHD-C and borderline personality disorder - and between ADHD-C and BIF.

3.6. Gender differences

No gender difference was found regarding previously established NDD diagnosis overall. However, significantly more men (\( n = 13, 21\% \)) than women (\( n = 10, 6\% \), \( \chi^2 (1, N = 170) = 4.3197, p = .038 \)) had
received an ADHD diagnosis prior to the study. Significant gender differences were found in CGI scores where females had a higher score (M = 3.9, SD=0.58) than males (M = 3.6, SD=0.74, U = 4087, p=.006) indicating that females had more severe problems. Affective disorder (X^2 (1, N = 170) =14.796, p<.001) and anxiety disorder (X^2 (2, N = 170) =10.074, p<.001) were more prevalent in females than in males. In addition, significantly more females than males had borderline personality disorder (X^2 (1, N = 170) =4.729, p=.023) and more females than males had an eating disorder (X^2 (1, N = 170) =6.925, p=.007).

4. Discussion

More than two thirds of this young AOP clientele were diagnosed with a type of NDD. Almost two thirds of this young AOP clientele met criteria for ADHD or ASD (more than half meeting criteria for ADHD). The majority of these “NDD patients” (and particularly the women) had not been diagnosed in childhood. In addition, one third of the study group scored above cut off in the self-rating scale AUDIT, indicating risk use of alcohol, and although not significant, a high rate of those also fulfilled ADHD diagnosis. The NDD group (the vast majority of whom had ADHD, ASD or both) also usually met criteria for either affective, anxiety, OCD spectrum, or personality disorder.

When studying the prevalence of NDD within the more traditional psychiatric diagnoses we found that more than half of those with affective disorders, anxiety disorder, OCD spectrum, or personality disorders had an additional NDD. NDD was not as prevalent in the subgroup of those with eating disorder, however almost 30% in this group met criteria for an “additional” NDD. The results from our study accord well with the results from a recent study by Pehlivandis et al. (2020) showing that adult patients with ADHD had a substantial co-morbidity with traditional psychiatric disorders (most commonly depression). For ADHD, the comorbidity rate with a traditional psychiatric disorder was 73% and for ASD it was 50%. These traditional psychiatric diagnoses (affective disorders, anxiety disorders and/or personality disorders), are the ones most likely to be made in young AOP clientele, unless NDD is specifically considered and assessed for. What happens to all the young patients with these early onset developmental disorders in the transition from child and adolescent psychiatry and adult psychiatry? Is it possible that this group of patients have a certain kind of problems in childhood, but then change symptomatology when they grow up and end up with depression and anxiety instead? Or that adult psychiatrists who untrained or inexperienced in the field of NDD faced with young adult patients try to “fit them in” into diagnostic adult psychiatric diagnostic categories that they are familiar with? Our results support that there is a major comorbidity between NDD diagnosis and traditional adult psychiatric diagnosis. This may make it difficult to discover the underlying condition and might explain why NDD is underdiagnosed among adult patients (Fayyad et al., 2017). They found that 17% of the patients with ADHD in an outpatient setting, did not have any other psychiatric comorbidities. This may increase the risk of missing an underlying NDD condition. Our results confirm that NDD is missed in childhood in some cases, since only a small portion of the referred patients had a previous NDD diagnosis. Karlsdotter et al. (2016) showed in an observational study that only 46% of the patients with ADHD in an outpatient setting had a previous diagnosis. However, we found that the prevalence of ADHD was much higher compared to Karlsdotter et al. who reported ADHD prevalence in adult psychiatry to be 18% compared to 53% in our study. Our higher rate might partly be explained by that we only included young adults (18–25 years of age), and that we made a full clinical examination performed by experienced psychiatrist whereas the study by Karlsdotter used a semi structured diagnostic interview and had a age range between 17 and 72 years. Also, Deberdt et al. (2015) reported a lower ADHD prevalence rate than ours, corresponding to around 15%. However, they only had 1986 patients completing the study out of the originally 5662 patients that were approached. In our study we could establish a diagnosis for as many as 170 out of 172 patients.

Seven of the 34 patients who received an ASD diagnosis in our study had a previously established ASD diagnosis at the time for referral. Our results indicate that there may be a substantial group of patients with ASD and other NDDs that are missed in childhood. This is supported by the retrospective study of clinical charts of adults in two university services specialized in the assessment and treatment of adolescents and adults with ASD. They found that the mean age for the first formal ASD diagnosis was 22 years for men and 26 years for women (Fusar-Poli et al., 2020).

The women in our study group had poorer overall functioning and more severe symptoms than the males. Women were also more often affected by affective disorders and anxiety disorders, more often had borderline personality disorder, and more often had eating disorder. The gender differences that we found in affective disorders, anxiety disorders and eating disorders are consistent with those reported by other research (Striegel-Moore et al., 2009; Van Droogenbroeck et al., 2018). The literature regarding gender differences in borderline personality disorder has been equivocal (Busch et al., 2016). We found no gender difference regarding the rate of ASD after full assessment, suggesting that many female patients with ASD are missed in childhood, since studies from childhood show a male:female ratio of 3:1. (Loomes et al., 2017). Our results suggest also that female patients may be missed regarding ADHD in childhood, which have been reported in the study of Quinn et al. (2014). Only six percent of the females in our study had a previous ADHD diagnosis compared to 48% after full assessment in the study. The traditional gender ratio reported from childhood studies (Polanczyk et al., 2010) was not obvious in our NDD group. We found a trend for ADHD to be slightly more common in males but the difference was not significant.

We did not either find gender difference in the rate of previous NDD diagnosis established by external clinician when grouping all NDDs.
However, more men than females had a previous ADHD diagnosis. The results suggest the importance of screening for NDD, regardless of referral reason, in both adult psychiatric care and child and adolescent psychiatric care. The high rate found of women with NDD and additional psychiatric problems might suggest the notion that an early identification of NDD might have altered the outcome for this group.

The strength of this study is the thorough assessment (including assessment of NDD, psychiatric disorder, and intellectual functioning) performed by experienced clinicians using validated instruments. The low rate of attrition is another strength of the study. The limitation of the study is that patients with psychotic disorders, due to organizational circumstances, were missed in the study, and that there is no possibility of drawing straightforward conclusions regarding generalizability to other AOP populations. Another limitation is that the study only covered the age range 18–25 years of age.

In conclusion, the findings of the present study suggest that, unless specifically addressed and assessed for, NDD diagnoses will not be properly established in young patients attending adult psychiatric services. Two thirds of our rather typical AOP clientele had NDD. Given that ADHD and ASD begin in early childhood it is likely that NDDs are “precursors” of psychiatric disorders and not separate comorbidities. Interventions for NDD should possibly be seen as first-line intervention options in these young AOP clinic attendees rather than being considered possible comorbidity after affective, anxiety and personality disorders have been diagnosed and treated as primary psychiatric disorders.

CRediT authorship contribution statement

David Eberhard: Visualization, Investigation, Formal analysis, Writing – original draft. Eva Billstedt: Methodology, Supervision, Formal analysis, Writing – review & editing. Christopher Gillberg: Methodology, Visualization, Supervision, Funding acquisition, Validation, Writing – review & editing.

Declaration of Competing Interest

There are no conflicts of interests to report.

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