Stability of co-occurring psychiatric diagnoses in autistic men and women

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A B S T R A C T

Background: Despite a high prevalence of psychiatric conditions in autistic adults, research examining the diagnostic stability of psychiatric conditions diagnosed prior to autism is limited.
Method: The present study examined the occurrence of (1) psychiatric diagnoses obtained before autism was diagnosed, (2) psychiatric conditions co-occurring with autism following its diagnosis, and (3) psychiatric conditions that were diagnosed before autism but no longer co-occurred with autism following its diagnosis. Participants (N = 1019, 51.5% female) provided information on psychiatric conditions predating their diagnosis of autism and psychiatric conditions co-occurring with autism. This information was combined to identify prior diagnoses that were no longer present post-autism diagnosis.
Results: Results showed that 50.2% of participants (62.7% of females and 37% of males) had at least one prior diagnosis. Mood and personality disorders were the most frequent prior diagnoses. Moreover, 59.3% (67% of females and 51% of males) reported having at least one diagnosis co-occurring with autism. Mood and anxiety disorders were the most frequent co-occurring diagnoses. Finally, 37.7% (47% of females and 27.3% of males) reported at least one previously diagnosed psychiatric condition that was no longer listed as a condition co-occurring with autism following its diagnosis. Personality disorders were most frequently no longer reported as diagnoses co-occurring with autism, despite being listed as prior diagnoses.
Conclusions: This study provides quantitative estimates of the temporal stability of specific psychiatric conditions before and after a diagnosis of autism in adults.

1. Introduction

Autism spectrum disorder (ASD) is an early-onset, neurodevelopmental condition characterized by difficulties in social interaction and communication, alongside repetitive or stereotyped behaviours and restricted interests (American Psychiatric Association, 2013). Growing awareness of ASD has facilitated the recognition of a "lost generation" of autistic adults who were previously excluded from diagnosis and any ensuing treatment or support (Lai & Baron-Cohen, 2015). Nevertheless, making an accurate first-time ASD diagnosis later in life remains challenging due to several factors, including the lack of reliable information about an individual's developmental history (Fusar-Poli, Brondino, Politi, & Aguglia, 2020; Walsh, Vida, Morrisey, & Rutherford, 2015), the acquisition of compensatory

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strategies that mask behavioural markers of ASD (Cage & Troxell-Whitman, 2019; Livingston, Shah, & Happé, 2019), symptom overlap between ASD and different forms of psychopathology (Cath, Ran, Smit, van Balkom, & Comijs, 2008; Craig et al., 2015), and the presence of psychiatric conditions that co-occur with ASD (Lugo-Marín et al., 2019). In fact, research has revealed a complex and dynamic pattern of psychopathology in autistic adults (Fusar-Poli et al., 2020; Geurts & Jansen, 2012; Joshi et al., 2013). Despite evidence of a long psychiatric history and complicated pathways towards obtaining an ASD diagnosis (Au-Yeung et al., 2018; Fusar-Poli et al., 2020; Leedham, Thompson, Smith, & Freeth, 2019), the precise extent to which previously diagnosed conditions remain stable after a diagnosis of ASD is not fully understood. The current study aimed to address this gap by quantifying rates of (1) psychiatric diagnoses obtained before ASD was identified (hereafter referred to as prior diagnoses), (2) psychiatric diagnoses co-occurring with ASD following its diagnosis (referred to as co-occurring diagnoses), and (3) prior diagnoses that were no longer listed as co-occurring with ASD following its diagnosis.

Psychiatric conditions co-occurring simultaneously with ASD are highly prevalent (Lever & Geurts, 2016; Lugo-Marín et al., 2019; Simonoff et al., 2008), to the extent that adults with an ASD diagnosis are estimated to receive almost twice as many current and lifetime psychiatric diagnoses as other clinically-referred adults without ASD (Joshi et al., 2013; Lai & Baron-Cohen, 2015). Previous studies have established that as many as 70–79% of autistic adults will also meet diagnostic criteria for at least one other psychiatric condition during their lifetime (Buck et al., 2014; Lever & Geurts, 2016; Moss, Howlin, Savage, Bolton, & Rutter, 2015; Rosen, Mazefsky, Vasa, & Lerner, 2018). Nevertheless, experiences of late-diagnosed adults suggest that those who identify as autistic or possibly autistic receive more psychiatric diagnoses compared to non-autistic adults, but are simultaneously less likely to agree with these diagnoses (Au-Yeung et al., 2018). Moreover, approximately two-thirds of clinically-referred individuals who received a first-time diagnosis of ASD in adulthood have been previously diagnosed with one or more psychiatric conditions other than ASD (Fusar-Poli et al., 2020; Geurts & Jansen, 2012), and half of these still qualify for the prior diagnosis after being diagnosed with ASD (Fusar-Poli et al., 2020). Results from a sample of clinically-referred adults show that 37% have received one psychiatric diagnosis prior to being diagnosed with ASD, 27% have received two or three prior diagnoses, whereas a remaining 9% have received between four to eight prior diagnoses (Fusar-Poli et al., 2020), the most common of which include intellectual disability, schizophrenia or other psychotic disorders, personality disorders, depression, anxiety, conduct disorders, and ADHD (Fusar-Poli et al., 2020; Geurts & Jansen, 2012). Previous studies evaluating the psychiatric history of individuals who were first diagnosed with ASD in adulthood report a 12-year delay between the first clinical evaluation by a mental health professional and the ASD diagnosis (Fusar-Poli et al., 2020; Geurts & Jansen, 2012), despite the first contact with mental health services having been established at a median age of 13 years (Fusar-Poli et al., 2020). Autistic adults have a lower number of prior diagnoses relative to adults who are assessed for ASD but do not receive a diagnosis (Geurts & Jansen, 2012), suggesting that the number of prior diagnoses may influence the likelihood of receiving an ASD diagnosis following extensive and specialized assessment.

The high prevalence of prior and co-occurring psychiatric diagnoses in autistic adults may be the result of shared underlying pathophysiology or overlapping symptom dimensions between autism and various psychiatric conditions (Lai & Baron-Cohen, 2015; Tick et al., 2016), but could also reflect byproducts of living with (undiagnosed) ASD and encountering long-term stressors (Aggarwal & Angus, 2015; Takara & Kondo, 2014). Research has revealed the interrelatedness and overlapping phenomenology between ASD and numerous conditions such as ADHD (Antshel & Russo, 2019; Clark, Feehan, Tinline, & Vostanis, 1999; Craig et al., 2015), social anxiety (Lai & Baron-Cohen, 2015), personality disorders (Dudas et al., 2017; Trubanova, Donlon, Kreiser, Ollendick, & White, 2014), and eating disorders (Dell'Osso et al., 2018; Karjalainen, Rastam, Paulson-Karlsson, & Wentz, 2019; Mandy & Tchanturia, 2015). Symptom overlap between ASD and a range of psychiatric conditions may mask autistic symptoms, allowing the diagnosis of psychiatric conditions but possibly delaying the diagnosis of ASD (Aggarwal & Angus, 2015; Au-Yeung et al., 2018; Matson & Williams, 2013). In addition, living without an established ASD diagnosis is linked to negative experiences involving feelings of distress, isolation, anxiety, or confusion (Camm-Crosbie, Bradley, Shaw, Baron-Cohen, & Cassidy, 2018; Leedham et al., 2019; Takara & Kondo, 2014). These experiences can act as precipitating factors for mental health problems (Camm-Crosbie et al., 2018), possibly resulting in different psychiatric diagnoses before ASD is eventually identified. Prior and co-occurring diagnoses in some autistic adults could therefore reflect the culmination of multiple sources of stress involving challenges in navigating interpersonal relationships (Cage & Troxell-Whitman, 2019) and barriers in accessing appropriate treatment and support (Hull & Mandy, 2017).

Autistic women may face greater likelihood of experiencing this phenomenon, possibly due to the existence of a *female autism phenotype* that deviates from the prototypical traits that health practitioners traditionally rely on to diagnose ASD (Bargiela, Steward, & Mandy, 2016). Specifically, autistic women may show fewer stereotyped and repetitive behaviours and greater interest in initiating or maintaining social connections (Baldwin & Costley, 2016; Dean, Harwood, & Kasari, 2017; Hiller, Young, & Weber, 2016). Compared to autistic men, women may also camouflage difficulties in social communication through learned behaviours meant to approximate normatively appropriate social phenotypes (Cage & Troxell-Whitman, 2019), and may show better non-verbal communication patterns that are more likely to be perceived by parents, teachers, or healthcare professionals as signs of intact communication skills (Rynkiewicz et al., 2016). Both typically-developing and autistic women are more likely than men to experience internalizing conditions, such as depression and anxiety (Hull, Mandy, & Petrides, 2017; Solomon, Miller, Taylor, Hinshaw, & Carter, 2012), whereas autistic men are more likely than women to experience externalizing problems such as disruptive behaviour and hyperactivity (Lai & Baron-Cohen, 2015). This may further add to the diagnostic confusion that adult women with ASD are likely to encounter (Asher, Asnaani, & Aderka, 2017; McLean, Asnaani, Litz, & Hofmann, 2011), as individuals with internalizing problems are less likely to demonstrate disruptive behaviours which trigger clinical assessment (Trubanova et al., 2014). However, the extent to which specific prior diagnoses remain stable after a diagnosis of ASD is obtained has not yet been compared between men and women.

In order to address existing gaps, this study explored the temporal stability of prior psychiatric conditions in autistic adults. We examined rates of psychiatric conditions diagnosed before a diagnosis of ASD was obtained, conditions co-occurring with autism

following its diagnosis, and previously diagnosed conditions that were no longer listed as co-occurring with ASD following its diagnosis. These rates were also compared between men and women, and it was predicted that women would be significantly more likely to report prior diagnoses that were no longer present sometime after a diagnosis of ASD was obtained. Additionally, this study explored the associations between the severity of autistic traits, subjective well-being and prior psychiatric diagnoses other than ASD. We compared the severity of autistic traits and well-being between participants who reported one or more prior diagnoses and those who reported no prior diagnoses. We also compared the severity of autistic traits and well-being between participants who reported one or more prior diagnoses that were no longer listed as co-occurring with ASD following its diagnosis and those who retained their prior diagnosis (or diagnoses).

2. Method

2.1. Procedure

All data presented in the current report were drawn from the Netherlands Autism Register (NAR), a longitudinal register containing data from approximately 3300 individuals with autism. The NAR was established by the Dutch Association for Autism (Nederlandse Vereniging voor Autisme; NVA) in collaboration with the Vrije Universiteit Amsterdam, and distributes an online survey to its members on a yearly basis. It contains information on multiple domains, including general demographics, diagnosis and diagnostic history, ASD symptom profile, co-occurring diagnoses, treatment, education, employment, overall well-being, social skills and relationships, as well as sensory processing, physical complaints, special interests, and cognitive functioning. Participation in the NAR is possible for parents of children with autism, legal guardians of individuals with autism, as well as adults with autism ($\geq$16 years). In the case of underage participants, responses are collected on their behalf from parents or guardians. Each year, participants are invited to complete the survey again, while new participants are also recruited. Participation in the register is entirely voluntary and free, and all participants provide informed consent before entering the survey. The current study analyzes data from adult participants, focusing on prior diagnoses and psychiatric conditions co-occurring with autism.

2.2. Participants

The present study included participants who were 16 years or older the first time they completed the NAR survey. All participants reported having received a formal diagnosis of pervasive developmental disorder according to the Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition (DSM-IV), or autism spectrum disorder according to the DSM-5 by a qualified clinician unaffiliated to this study. Participants' average current age was 45.84 years (N = 1019, range: 20.35–84.35 years, SD = 13.23). The mean age of ASD diagnosis, based on available data from 942 participants, was 34.20 years (SD = 15.40, range: 2.33–75.50 years). Independent samples t-tests showed that men (M = 36.32, SD = 16.92) were diagnosed with ASD significantly later than women (M = 32.24, SD = 13.57; t(866) = 4.06, $p > .001$, 95% CI of the difference [2.10–6.05]), and that men (M = 48.96, SD = 13.83) were significantly older than women (M = 42.91, SD = 11.93; t(975) = 6.05, $p > .001$, 95% CI = [4.46–7.64]). Sex was associated with age of diagnosis, while controlling for participants' current age, F(1, 939) = 48.99, p < .001, R^2 = .861, $R^2_{adjusted}$ = .860), with a later age of ASD diagnosis for females than males (β = .088, t(939) = 7.00, $p < .001$). Additional participant characteristics are presented in Table 1.

2.3. Materials

2.3.1. Survey questions

Participants initially provided information regarding psychiatric diagnoses obtained before they were diagnosed with autism. Subsequently, they provided information regarding current psychiatric diagnoses co-occurring with autism. Participants provided information on diagnoses predating their diagnosis of autism by responding to the following question: "Did you have another earlier diagnosis, other than ASD?" Possible response options included "Yes", "No", or "Don't know/Unknown". Responding with "Yes" was followed by the question "Which earlier diagnosis (diagnoses) have you received, other than ASD?" Below this question, a matrix table containing a list of (psychiatric) conditions was presented. Participants were then able to indicate earlier diagnoses obtained before

Table 1
Participant characteristics.

	Total (N = 1019)	Men (N = 494)	Women (N = 525)
Current age	45.84 (SD = 13.23)	48.95 (SD = 13.82)	42.91 (SD = 11.93)
Age of ASD diagnosis	34.20 (15.40)	36.32 (16.92)	32.24 (13.57)
AQ-Short total score	83.10 (11.47)	82.11 (12.43)	84.00 (10.46)
AQ-Short – Factor Social Skills	21.51 (3.96)	21.13 (4.30)	21.85 (3.59)
AQ-Short – Factor Routine	12.20 (2.44)	11.75 (2.57)	12.60 (2.23)
AQ-Short – Factor Switching	13.03 (2.26)	12.71 (2.42)	13.33 (2.06)
AQ-Short – Factor Imagination	22.77 (4.36)	22.58 (4.22)	22.94 (4.49)
AQ-Short – Factor Numbers and Patterns	13.58 (3.79)	13.93 (3.80)	13.27 (3.75)
AQ-Short – Factor Social Behaviour	60.81 (8.26)	59.63 (8.90)	61.89 (7.47)
Cantril Ladder	5.98 (1.87)	5.97 (1.95)	5.99 (1.79)

ASD was diagnosed by selecting from the table the condition(s) that applied to them. If their prior diagnosis was not mentioned on the list, participants were also given the option to type their own response. In addition, we obtained data on co-occurring diagnoses. Participants indicated whether they had any conditions co-occurring with autism by responding to the following question: "In addition to ASD, do you currently have any other (psychiatric) diagnosis (diagnoses)?". Possible response options included "Yes", "No", or "Don't know/Unknown". Responding with "Yes" was followed by the question "In addition to ASD, which diagnosis (diagnoses) do you currently have?" Below this question, a matrix table containing a list of (psychiatric) conditions was presented. Participants were then able to indicate current diagnoses co-occurring with autism by selecting the condition(s) that applied to them. If their current diagnosis was not mentioned on the list, participants were also given the option to type their own response. Participants were not allowed to skip these questions, and could not proceed to the next question before responding to the current one. The specific conditions examined in the current study were anxiety disorders, mood disorders (including major depressive disorder, dysthymia, or bipolar disorder), Attention Deficit/Hyperactivity Disorder (ADHD/ADD), substance use disorder (SUD), personality disorders, post-traumatic stress disorder (PTSD) or other trauma-related disorders, oppositional defiant disorder or conduct disorder (ODD/CD), and chronic fatigue or burnout-related disorder. The most common co-occurring conditions were selected for this survey. Information concerning participants' prior and co-occurring diagnoses was then combined to identify cases where a condition diagnosed prior to autism was no longer listed as co-occurring with autism following its diagnosis, indicating that it was either withdrawn or no longer relevant/prevalent after a diagnosis of autism was made. Participants were not asked to provide the reasons why prior diagnoses were no longer listed as conditions co-occurring with autism following its diagnosis.

2.3.2. Autism-Spectrum Quotient–Short

Autistic traits were quantified using the Autism-Spectrum Quotient-Short (AQ-Short). The AQ-Short is an abridged, 28-item self-report measure of autistic traits (Hoekstra et al., 2011). It comprises two higher order factors assessing a broad range of difficulties in social functioning (Social Behavior factor) and a fascination with numbers and patterns (Numbers/Patterns factor). The Social Behavior factor is further subdivided into four lower order factors assessing Social Skills, Routine, Switching, and Imagination (Hoekstra et al., 2011). Participants respond using a 4-point Likert scale, ranging from "1 = definitely agree" to "4 = definitely disagree." Higher scores indicate a higher degree of autistic traits. The AQ-Short has shown acceptable to good internal consistency and correlates highly ($r = 0.95$) with the full-scale, 50-item AQ (Hoekstra et al., 2011).

2.3.3. Cantril's Self-Anchoring Scale

Subjective well-being was measured using the Cantril Self-Anchoring Scale (Cantril Ladder). Respondents are asked to rate their life on a ladder scale with 11 steps (Cantril, 1965). The end points of the scale are defined by the respondents in terms of their best and worst possible life experiences (Glatzer & Gulyas, 2014). The question is worded as follows: "Please imagine a ladder with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you, and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time?"

2.4. Statistical analyses

All statistical analyses were conducted using IBM SPSS Statistics for Macintosh, Version 26.0. As a first step, we analyzed rates of (1) prior diagnoses, (2) co-occurring conditions, and (3) prior diagnoses that were no longer reported as co-occurring with autism following its diagnosis. The association between sex and prior diagnoses, co-occurring diagnoses, and prior diagnoses no longer reported as co-occurring was then examined using separate chi-square tests of independence, with sex as the independent variable. Logistic regression was used to examine the probability of a prior diagnosis being absent post-autism diagnosis as a function of sex, while controlling for participants' current age. Sex was coded as women = 1 and men = 0, so that men formed the reference category. In order to test whether prior diagnoses for specific psychiatric conditions are more likely to be absent post-autism diagnosis in women or men, the probability of a prior diagnosis being absent post-autism diagnosis was examined separately for each different psychiatric condition that contained such cases. To account for multiple hypothesis testing, the Bonferroni correction was applied. Nine separate logistic regression models were tested in order to examine the association between sex and the probability of a prior diagnosis being absent post-autism diagnosis with regard to: personality disorders, mood disorders, anxiety disorders, burnout/fatigue-related disorders, PTSD or trauma-related disorders, eating disorders, ADHD/ADD, ODD/CD, and SUD. Consequently, an adjusted alpha level of .0056 was used to assess statistical significance.

The possible link between the severity of autistic traits and prior psychiatric diagnoses was explored by comparing autistic traits between participants who reported one or more prior psychiatric diagnoses and those who did not, and by comparing autistic traits between participants who reported one or more prior diagnoses that were no longer listed as co-occurring with autism following its diagnosis and those who did not. This link was examined using separate independent samples t-tests. The presence (or absence) of at least one prior diagnosis was used as the independent variable, while participants' score on autistic traits was used as the dependent variable. Similarly, the presence (or absence) or a prior diagnosis that was no longer listed as co-occurring was used as the independent variable, while participants' score on autistic traits was used as the dependent variable. Finally, the possible link between subjective well-being and prior diagnoses was explored by comparing well-being ratings between participants who reported one or more prior psychiatric diagnoses and those who did not, and by comparing well-being ratings between participants who reported one or more prior diagnoses that were no longer listed as co-occurring and those who did not. This link was also examined using separate independent samples t-tests.

3. Results

3.1. Prior diagnoses

Results showed that 50.2% (N = 512) of participants reported at least one prior diagnosis. Women (62.7%) were more likely than men (37%) to report at least one prior diagnosis (x^2(1, N = 1019) = 66.84, $p < .001$, $\varphi = .26$). Sex significantly predicted the probability of reporting at least one prior diagnosis ($b = -1.127$, $p < .001$, $OR = .324$ (95% CI = [.249–.422])), while controlling for current age. Prior diagnoses included mood (26.1%), personality (19.6%), anxiety (16.9%), ADHD (10.5%), burnout/fatigue-related (8.0%), eating (5.4%) and PTSD/trauma-related disorders (5.3%) (Table 2). The average number of prior diagnoses was 1.04 ($SD = 1.47$, range: 0–12). Men reported an average of 0.71 prior diagnoses ($SD = 1.31$, range: 0–12), whereas women reported on average 1.35 prior diagnoses ($SD = 1.54$, range: 0–8). Overall, 18.8% of participants reported one prior diagnosis, 14.8% reported two prior diagnoses, 7.0% reported three prior diagnoses, 4.5% reported four prior diagnoses, while another 3% reported five or more prior diagnoses. A remaining 2.1% reported having a prior diagnosis for at least one psychiatric condition, but did not provide information on which specific prior diagnoses they had obtained. More detailed information regarding the number of prior diagnoses can be found in Table 3.

3.2. Co-occurring conditions

Results further showed that 59.3% (N = 604) of the total sample reported having *at least* one co-occurring psychiatric condition. Women (67%) were more likely than men (51%) to report at least one co-occurring condition (N = 518; χ^2(1, N = 1019) = 27.11, $p < .001$, $\varphi = .16$). Sex significantly predicted the probability of having at least one co-occurring diagnosis ($b = .671$, $p < .001$, $OR = 1.956$ (95% CI = [1.508–2.538])), while controlling for current age. Mood (29.7%) and anxiety disorders (17.9%) were the most prevalent co-occurring diagnoses, followed by ADHD/ADD (16.8%), burnout/fatigue-related disorders (12.4%), PTSD/trauma-related-disorders (11.7%), personality (8.3%) and eating (6.0%) disorders (Table 2). The average number of co-occurring diagnoses was 2.13 ($SD = 2.59$, range: 0–17). Men reported an average of 1.77 co-occurring diagnoses ($SD = 2.50$, range: 0–17), whereas women reported on average 2.47 co-occurring diagnoses ($SD = 2.62$, range: 0–13). Specifically, 8.9% of participants reported only one co-occurring psychiatric diagnosis. An additional 17.6% reported two co-occurring diagnoses, 7.2% reported three co-occurring diagnoses, 9.9% reported four co-occurring diagnoses, while a remaining 15.7% reported five or more co-occurring diagnoses. More detailed information regarding the number of co-occurring diagnoses can be found in Table 3.

3.3. Prior diagnoses no longer present post-autism diagnosis

Based on 1019 observations, it was estimated that 37.5% (N = 382) of participants had received at least one prior diagnosis that was no longer present as a co-occurring diagnosis after a diagnosis of autism was established. Women (47%) were more likely than men (27.3%) to report at least one prior diagnosis that was no longer present post-autism diagnosis (χ^2(1, N = 1019) = 42.23, $p < .001$, $\varphi = .20$). Sex significantly predicted the probability of reporting at least one prior diagnosis that was no longer present post-autism diagnosis ($b = .897$, $p < .001$, $OR = 2.453$ (95% CI = [1.872–3.124])), while controlling for current age. Regarding specific psychiatric conditions, personality (14.7%), mood (9.4%), anxiety (8.7%) and burnout or fatigue-related disorders (5.1%) were most prevalent in the entire sample (Table 4). The average number of prior diagnoses that were no longer present post-autism diagnosis was 0.66 ($SD = 1.07$, range: 0–8). Men reported an average of 0.43 such diagnoses ($SD = 0.86$, range: 0–6), whereas women reported an average of 0.88 diagnoses ($SD = 1.20$, range: 0–8). Specifically, 19.7% of participants reported one prior diagnosis that was no longer

Table 2

Reported rates of psychiatric diagnoses obtained prior to the ASD diagnosis (prior diagnoses), and diagnoses co-occurring with ASD (co-occurring diagnoses).

	Prior diagnoses						Co-occurring diagnoses					
	Male		Female		Total		Male		Female		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
At least one prior diagnosis/at least one co-occurring diagnosis	183	37	329	62.7	512	50.2	252	51.0	352	67.0	604	59.3
Mood disorders	77	15.6	189	36.0	266	26.1	113	22.9	190	36.2	303	29.7
Anxiety disorders	51	10.3	121	23.0	172	16.9	71	14.4	111	21.1	182	17.9
Attention-deficit/hyperactivity Disorder	38	7.7	69	13.1	107	10.5	65	13.2	106	20.2	171	16.8
Burnout/chronic fatigue	22	4.5	60	11.4	82	8.0	50	10.1	76	14.5	126	12.4
Trauma-related disorders	11	2.2	43	8.2	54	5.3	30	6.1	89	17.0	119	11.7
Personality disorders	54	10.9	146	27.8	200	19.6	32	6.5	53	10.1	85	8.3
Eating disorders	8	1.6	47	9.0	55	5.4	11	2.2	50	9.5	61	6.0
Substance use disorder	19	3.8	16	3.0	35	3.4	22	4.5	14	2.7	36	3.5
Oppositional defiant disorder/conduct disorder	16	3.2	8	1.5	24	2.4	14	2.8	7	1.3	21	2.1

Note. The % values under the columns *Total* reflect the rate of participants who reported a prior diagnosis or a co-occurring diagnosis for a specific psychiatric condition, relative to the entire sample of adult participants (*N* = 1019). The % values under the *Male* and *Female* columns reflect the rates of males and females who reported a prior diagnosis or a co-occurring diagnosis, relative to the total sample of males and females, respectively.

Table 3

Frequencies of prior diagnoses and co-occurring conditions across male and female participants.

Count	Prior diagnoses						Co-occurring diagnoses					
	Male		Female		Total		Male		Female		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
0	322	65.2	207	39.4	529	51.9	242	49.0	173	33.0	415	40.7
1	78	15.8	114	21.7	192	18.8	41	8.3	50	9.5	91	8.9
2	51	10.3	100	19.0	151	14.8	86	17.4	93	17.7	179	17.6
3	18	3.6	53	10.1	71	7.0	24	4.9	49	9.3	73	7.2
4	16	3.2	30	5.7	46	4.5	40	8.1	61	11.6	101	9.9
5+	9	1.9	21	4.2	30	3.0	61	12.3	99	18.9	160	15.7
Total	494	100	**525**	100	**1019**	100	**494**	100	**525**	100	**1019**	100

Table 4

Observed rates of prior diagnoses that were no longer present post-autism diagnosis for specific psychiatric conditions, and logistic regression parameters.

	Prior diagnoses no longer present post-autism diagnosis												
	Male		Female		Total		Logistic Regression						
	N	%	N	%	N	%	b	SE	Wald χ^2	p	OR	Wald 95% CI	
At least one prior diagnosis no longer present post-autism diagnosis	135	27.3	247	47	382	37.5	0.89	.17	42.23	**<.001***	2.45	1.87	3.12
Personality Disorders	35	7.1	115	21.9	150	14.7	1.46	.21	46.75	**<.001***	4.30	2.83	6.53
Mood Disorders	26	5.3	70	13.3	96	9.4	1.12	.25	20.53	**<.001***	3.06	1.89	4.96
Anxiety Disorders	23	4.7	66	12.6	89	8.7	1.02	.26	16.04	**<.001***	2.78	1.69	4.60
Burnout/Chronic Fatigue	11	2.2	41	7.8	52	5.1	1.61	.36	19.98	**<.001***	5.00	2.47	10.13
Eating Disorders	3	0.6	26	5.0	29	2.8	2.18	.62	12.33	**<.001***	8.85	2.62	29.91
Attention-Deficit/ Hyperactivity Disorder	15	3.0	24	4.6	39	3.8	.37	.34	1.13	.287	1.44	.74	2.82
Trauma-related Disorders	5	1.0	15	2.9	20	2.0	1.27	.54	5.54	.019	3.54	1.24	10.15
Oppositional Defiant Disorder/ Conduct Disorder	13	2.6	7	1.3	20	2.0	−.65	.49	1.81	.179	.52	.20	1.35
Substance Use Disorder	9	1.8	7	1.6	16	1.6	−.04	.53	.00	.947	.97	.34	2.72

Note. The % values under the column *Total* reflect the rate of participants who reported a prior diagnosis that was no longer present post-autism diagnosis for each psychiatric condition relative to the entire sample of adult participants (N = 1019). The % values under the *Male* and *Female* columns reflect the within-group values.

SE, Standard Error. *OR*, Odds Ratio.

***$p<.001$ following Bonferroni correction for multiple testing.

present post-autism diagnosis. An additional 10.9% showed two prior diagnoses that were no longer present post-autism diagnosis.

A two-predictor logistic model was fitted to the data to test whether sex could predict the probability that a prior diagnosis for a specific psychiatric condition would no longer be present after a diagnosis of autism was obtained, while controlling for current age. Sex significantly predicted the probability of having such a diagnosis for personality disorders ($b = 1.459, p < .001, OR = 4.301$ (95%

Table 5

Links between autistic traits, subjective well-being, and prior diagnoses.

	Prior diagnoses				Prior diagnoses still present (post-autism diagnosis)			
	Yes	No	p	t	Yes	No	p	t
AQ-Short total score	84.38	11.43	**.002**	3.140	84.14	82.50	**.05***	1.900
AQ-Short – Factor Social Skills	21.80	21.21	**.039***	2.063	21.83	21.33	.099	1.653
AQ-Short – Factor Routine	12.68	11.70	**.000***	5.616	12.65	11.94	**.000***	3.927
AQ-Short – Factor Switching	13.36	12.69	**.000***	4.148	13.38	12.83	**.001**	3.237
AQ-Short – Factor Imagination	22.90	22.64	.396	.849	22.82	22.74	.809	.242
AQ-Short – Factor Numbers and Patterns	13.63	13.54	.737	.336	13.46	13.65	.496	.680
AQ-Short – Factor Social Behaviour	61.90	59.70	**.000***	3.698	61.80	60.26	**.013***	2.486
Subjective well-being	5.55	6.42	**.000***	5.883	5.63	6.19	**.000***	3.574

Note. The "Prior diagnoses" column presents the results of the analyses comparing autistic traits and subjective well-being between participants who reported one or more prior diagnoses (Yes) and those who did not (No). The "Prior diagnoses still present post-autism diagnosis" column presents the results of the analyses comparing autistic traits and subjective well-being between participants who reported one or more prior diagnoses that were still present post-autism diagnosis (Yes) and those who did not retain prior diagnoses (No).

AQ-Short, Autism-Spectrum Quotient-Short.

*$p<.05$. **$p<.01$. ***$p<.001$.

CI = [2.831–6.533])), mood disorders ($b = 1.118$, $p < .001$, $OR = 3.059$ (95% CI = [1.886–4.962])), anxiety disorders ($b = 1.024$, $p < .001$, $OR = 2.784$ (95% CI = [1.687–4.595])), burnout/fatigue-related disorders ($b = 1.610$, $p < .001$, $OR = 5.002$ (95% CI = [2.470–10.129])), and eating disorders ($b = 2.181$, $p < .001$, $OR = 8.853$ (95% CI = [2.621–29.905])). For all of the above psychiatric conditions, women were more likely to experience prior diagnoses that were no longer present post-autism diagnosis relative to men. However, sex did not emerge as a significant predictor of the probability of no longer reporting a prior diagnosis of ADHD/ADD, PTSD, ODD/CD or SUD (Table 4).

3.4. Links to autistic characteristics and subjective well-being

Regarding the link between prior diagnoses and autistic traits, an independent samples *t*-test showed that participants who reported at least one prior diagnosis ($M = 84.38$, $SD = 11.43$) had a significantly higher total score on the AQ-Short relative to participants who reported no prior diagnoses ($M = 81.78$, $SD = 11.37$; $t(760) = 3.14$, $p = .002$, 95% CI of the difference [.97–4.22]). Similarly, participants who reported at least one prior diagnosis that was no longer present after a diagnosis of autism was obtained ($M = 84.14$, $SD = 11.61$) had a significantly higher total score on the AQ-Short relative to participants who retained their prior diagnosis (or diagnoses) ($M = 82.50$, $SD = 11.16$; $t(760) = 1.90$, $p = .05$, 95% CI of the difference [.06–3.34]). The link between prior diagnoses and autistic traits was also examined separately for each factor of the AQ-Short. These findings are presented in Table 5.

Regarding the link between prior diagnoses and subjective well-being, an independent samples *t*-test revealed that participants who reported at least one prior diagnosis ($M = 5.55$, $SD = 1.91$) had a significantly lower score on the Cantril Ladder relative to participants who reported no prior diagnoses ($M = 6.45$, $SD = 1.72$; $t(610) = 5.88$, $p < .001$, 95% CI of the difference [.58–1.16]). Similarly, participants who reported at least one prior diagnosis that was no longer present after a diagnosis of autism was obtained ($M = 5.63$, $SD = 1.86$) had a significantly lower score on the Cantril Ladder relative to participants who retained their prior diagnosis (or diagnoses) ($M = 6.20$, $SD = 1.85$; $t(610) = 3.57$, $p < .001$, 95% CI of the difference [.25–.86]).

4. Discussion

The present study examined the rates of psychiatric conditions in autistic adults, focusing on (1) psychiatric diagnoses obtained before autism was identified (prior diagnoses), (2) psychiatric diagnoses co-occurring with autism following its diagnosis, and (3) prior diagnoses that were no longer listed as co-occurring with autism following its diagnosis. In addition, this study explored the links between the severity of autistic traits, subjective well-being, and prior psychiatric diagnoses. Results showed that 50.2% of participants had obtained at least one diagnosis prior to being diagnosed with autism, 59.3% had at least one condition co-occurring with autism after it was diagnosed, and 37.5% reported at least one prior diagnosis that was no longer listed as co-occurring with autism following its diagnosis. Compared with men, women were significantly more likely to report at least one prior diagnosis, co-occurring diagnosis, and prior diagnosis that was no longer present after a diagnosis of autism was obtained. Significantly higher levels of autistic traits and lower levels of subjective well-being were observed in participants with one or more prior diagnoses and in participants with one or more prior diagnoses that were no longer present post-autism diagnosis, relative to those who reported no prior diagnoses or retained their prior diagnoses, respectively.

Current findings are in line with previous research (Lever & Geurts, 2016; Lugo-Marín et al., 2019) demonstrating that co-occurring conditions are highly prevalent in adults with autism, both before and after a diagnosis of autism is obtained. In the present sample, mood and personality disorders were the most frequent prior diagnoses, followed by anxiety disorders and ADHD. Mood and anxiety disorders were the most frequent co-occurring diagnoses, followed by ADHD, burnout/fatigue-related disorders, PTSD/trauma-related disorders, and personality disorders. Multiple co-occurring diagnoses were present in the majority of the sample, to the extent that the number of participants with two co-occurring conditions (17.6%) was almost twice the number of participants with only one co-occurring condition (8.9%). In line with current findings, a recent meta-analysis focusing on co-occurring psychiatric conditions in autistic adults concluded that the prevalence of any psychiatric condition was approximately 55%, with the most prevalent being ADHD, mood disorders, and anxiety disorders (Lugo-Marín et al., 2019). Similarly, Lever and Geurts (2016) reported that over 57% of autistic adults met criteria for more than one co-occurring psychopathology. By contrast, the majority of participants from a typically developing comparison group met criteria for either one or no diagnosis, with only a minority (16%) meeting criteria for more than one type of psychopathology (Lever & Geurts, 2016).

Differential diagnosis and accurately diagnosing similar but distinct co-occurring conditions are critical for implementing specialized and tailored treatments (Camm-Crosbie et al., 2018; Matson & Williams, 2013). Yet, previous and current findings suggest that differential diagnosis likely becomes increasingly complex in autistic adults who meet the criteria for one or more co-occurring diagnoses (Camm-Crosbie et al., 2018), even more so when co-occurring conditions have overlapping symptomatology (Matson & Williams, 2013). Despite this challenge, little is known about the appropriateness and psychometric properties of measurement tools used to assess psychiatric conditions in autistic adults. For example, few studies have used a well-validated tool to assess depression or suicidality in autistic adults as opposed to adults from the general population, and no tools are available that have specifically been developed for this group (Cassidy, Bradley, Bowen, Wigham, & Rodgers, 2018a; Cassidy, Bradley, Bowen, Wigham, & Rodgers, 2018b). Available assessment tools may not operate in the same way for autistic adults and adults from the general population, precluding the possibility of using these tools in clinical practice or research with autistic adults without first adapting them for appropriate use in this group (Cassidy et al., 2020). Therefore, although findings suggest a high prevalence of psychiatric conditions in autistic adults, traditional diagnostic instruments may not adequately capture the unique presentation of psychiatric conditions in this group (Cassidy et al., 2020), increasing the risk of inaccurate identification.

A primary aim of the current study was to explore the temporal stability of prior psychiatric diagnoses after a diagnosis of autism was obtained. Findings showed that 37.5% of participants had at least one prior diagnosis that was no longer present after a diagnosis of autism was obtained. This statistic likely encompasses a combination of individuals, including those who no longer met diagnostic criteria for their prior diagnosis at subsequent assessments and those whose autism symptoms were possibly misinterpreted as symptoms of another psychiatric condition. Previous research has shown that living with undiagnosed autism and having limited access to appropriate support can create multiple sources of distress (Camm-Crosbie et al., 2018; Leedham et al., 2019; Takara & Kondo, 2014) that may serve as precursors of mental health problems (Camm-Crosbie et al., 2018; Huang, Arnold, Foley, & Trollor, 2020). As a result, adults may present with different mental health difficulties before underlying symptoms of autism are eventually recognized (Huang et al., 2020). For example, adolescents and adults with undiagnosed autism may initially present to health services because of common differential diagnoses (Aggarwal & Angus, 2015; Au-Yeung et al., 2018; Huang et al., 2020; Takara & Kondo, 2014) involving depressive symptoms (Geurts & Jansen, 2012), psychotic symptoms, or a combination of anxiety and depressive symptoms (Aggarwal & Angus, 2015). Obtaining an accurate diagnosis of autism may eventually mitigate the stressors experienced by individuals previously living with undiagnosed autism or without access to appropriate support, potentially leading to the resolution of mental health difficulties that were present prior to the autism diagnosis (Huang et al., 2020). In this case, prior diagnoses may no longer be present after a diagnosis of autism is established, either because the prior condition was successfully treated or because receiving an autism diagnosis allowed access to specialized care and support. Interestingly, the rate of new diagnoses obtained when or sometime after autism was diagnosed exceeded the rate of prior diagnoses that were no longer present following an autism diagnosis, suggesting that receiving an autism diagnosis may have also prompted further psychiatric assessment which allowed the recognition of previously overshadowed conditions. The importance of identifying adults with undiagnosed autism was further highlighted by the results of our exploratory analyses. In line with previous studies (Au-Yeung et al., 2018; Huang et al., 2020; Leedham et al., 2019), individuals with one or more prior diagnoses that were no longer present after receiving an autism diagnosis reported lower levels of subjective well-being, suggesting a negative link between more complex diagnostic pathways and participants' overall well-being.

However, symptom overlap or insufficient awareness of the presentation of autism-related symptoms in adulthood could also lead to overdiagnosis and/or misdiagnosis of psychiatric conditions in autistic adults (Au-Yeung et al., 2018; Lai & Baron-Cohen, 2015). Case studies highlight the scarcity of detailed information regarding an adult's developmental history and limited knowledge about the presentation of autism in adulthood, and suggest that this may contribute to misdiagnosed psychiatric conditions in both individuals with an existing autism diagnosis and those who go on to receive an autism diagnosis later (Au-Yeung et al., 2018; Leedham et al., 2019; Van Schalkwyk, Peluso, Qayyum, McPartland, & Volkmar, 2015). A recent survey of adults who identified as either autistic, possibly autistic, or non-autistic, demonstrated that approximately 35% of those identifying as autistic did not entirely agree with their co-occurring mental health diagnoses (Au-Yeung et al., 2018). In fact, only half of participants in both the autistic (58%) and possibly autistic (45.5%) groups agreed with their mental health diagnoses, as opposed to over 86.5% of participants in the non-autistic group (Au-Yeung et al., 2018). Autistic adults who voiced disagreement with one or more of their co-occurring diagnoses suggested that their autistic characteristics were mistakenly interpreted as symptoms of a mental health condition (Au-Yeung et al., 2018). Although the present study cannot identify the precise proportion of participants whose prior conditions were the byproduct of living with undiagnosed autism and participants whose prior conditions reflected misdiagnoses, it is likely that a subset of participants in the current sample who no longer reported one or more of their prior diagnoses had experienced a misdiagnosis.

Compared with men, women in the current sample were more likely to report prior diagnoses for mood disorders, personality disorders, eating disorders, and fatigue/burnout-related disorders, that were no longer present sometime after a diagnosis of autism was obtained. These findings highlight that difficulties faced by adult women who may otherwise meet full diagnostic criteria for autism are perhaps more likely to be accompanied by alternative prior psychiatric diagnoses relative to men (Bargiela et al., 2016; Fusar-Poli et al., 2020), possibly delaying the diagnosis of autism until either successful treatment of the prior diagnosis reveals persistent difficulties that can be traced back to autism or additional assessment reveals that existing symptoms are best accounted for by a diagnosis of autism rather than any existing psychiatric diagnoses (Leedham, Thompson, Smith, & Freeth, 2020; Trubanova et al., 2014). This ascertainment bias has been partly conceptualized as a consequence of a female-specific manifestation of autism that may encompass greater motivation and interest in socialization, fewer stereotyped and repetitive behaviours, special interests that more closely resemble societal and gender norms, as well as higher levels of co-occurring psychopathology and emotional difficulties (Baldwin & Costley, 2016; Dean et al., 2017). Previous research has also suggested that adult autistic women may engage in more camouflaging and may be better equipped to recruit "deeper" compensation strategies, relative to men (Beck, Lundwall, Gabrielsen, Cox, & South, 2020; Hull, Petrides, & Mandy, 2020; Lai et al., 2019). For example, although autistic men show hypoactive mentalizing and self-representation neural responses compared with typically developing men, autistic women show no significant differences compared with typically developing women, indicating that autistic women may have relatively intact self-representation and mentalizing abilities (Lai et al., 2019). In addition, an autism diagnosis in women might also be influenced by diagnostic practices and available measurement tools that originally were based primarily on the behavioural manifestation of autism in males and so may not capture the areas in which autistic women may present differently relative to men (Goldman, 2013; Gould & Ashton-Smith, 2011). As a result, although the majority of adult autistic women have one or more co-occurring psychiatric diagnoses (the most common of which are often anxiety, depression, personality, and eating disorders), healthcare professionals may often fail to notice that such symptoms might be linked to autism (Au-Yeung et al., 2018; Bargiela et al., 2016; Leedham et al., 2019). Even in cases where women suspect that they might have autism, healthcare professionals may dismiss their concerns and offer little to no additional assessment (Bargiela et al., 2016; Leedham et al., 2019). Overall, adult women frequently express the belief that receiving a delayed autism diagnosis was in part due to insufficient knowledge of the unique presentation of autism in adult women (Bargiela et al., 2016; Gould & Ashton-Smith, 2011; Hull & Mandy, 2017).

4.1. Limitations

The present research has a number of limitations. Information concerning prior and co-occurring psychiatric diagnoses was solely based on self-report, so the possibility that some of the information provided might be imprecise cannot be ruled out. Moreover, no additional information was available with regard to participants' prior and current co-occurring diagnoses, so it was not possible to see whether participants were re-assessed for previous diagnoses or not. It is also possible that participants who did not fully agree with one or more of their current diagnoses co-occurring with autism may have chosen not to disclose them. Given that assessment tools designed for and widely used in the general population likely cannot be used in clinical practice or research with autistic adults without first undergoing adaptation and validation for appropriate use in this group (Cassidy et al., 2018a, 2020), we recommend that future studies circumvent this limitation by developing appropriately adapted measures to corroborate participants' self-reported diagnoses. Additionally, it is important to highlight that based on the available data it remains uncertain to what extent prior diagnoses that were no longer reported as co-occurring with autism reflect misdiagnoses, or appropriate diagnoses that were resolved either because obtaining a diagnosis of autism mitigated the stressors experienced by participants living with undiagnosed autism or because participants were able to receive appropriate treatment and support that allowed them to resolve prior diagnoses. We therefore recommend that future studies explore to what extent prior diagnoses that are no longer listed as co-occurring with autism constitute misdiagnoses or accurate diagnoses that have been resolved. Finally, given that the analyses examining the links between autistic traits, subjective well-being, and prior diagnoses are exploratory, we recommend that the results of these analyses are interpreted with caution and further explored in future research.

4.2. Conclusion

The present study examined the rates of prior psychiatric diagnoses, current co-occurring diagnoses, and prior diagnoses that no longer co-occurred with autism after it was diagnosed. Results confirmed the high prevalence of prior and co-occurring diagnoses across the entire sample. In addition, more than one third of our sample had at least one prior diagnosis that was no longer present after a diagnosis of autism was obtained. Adult women were not only more likely than men to receive psychiatric diagnoses before being diagnosed with autism, but were also more likely to report diagnoses co-occurring with autism. Compared with men, women also experienced less diagnostic stability of prior psychiatric conditions, and were more likely to no longer report a diagnosis for mood disorders, personality disorders, eating disorders, and burnout/fatigue-related disorders after being diagnosed with autism. These findings highlight the need to increase awareness among health professionals of the unique presentation of autism in adult women, develop adapted measurement tools that can detect elements of the female autism phenotype, and screen for autism in adult women presenting with mental health concerns. Incorporating comprehensive assessments of participants' psychiatric symptoms over time could also help clarify whether other psychiatric conditions are a consequence of living with autism or whether these are distinct conditions that share no underlying causes. Overall, current findings and conclusions are preliminary. More research is necessary using robust measures to assess the temporal stability of psychiatric conditions in autistic adults.

CRediT authorship contribution statement

Vasiliki Kentrou: Conceptualization, Methodology, Formal analysis, Writing - original draft, Writing - review & editing. **Milou Oostervink:** Conceptualization, Methodology. **Anke M. Scheeren:** Validation, Writing - review & editing, Supervision, Funding acquisition. **Sander Begeer:** Validation, Writing - review & editing, Supervision, Funding acquisition.

Declaration of Competing Interest

The authors declare no conflict of interest.

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