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ORIGINAL ARTICLE

Epidemiology of Autism Spectrum Disorders in French Children Aged 8

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Abstract

Purpose Reliable and up-to-date data on autism spectrum disorder (ASD) prevalence in France remain limited. This study aimed to describe long-term trends in ASD diagnosis rates at age 8 in a French county between 2003 and 2024 and to provide a detailed epidemiological, clinical, educational, and care-related profile of children with ASD in the most recent years.

Methods Data were drawn from the Haute-Garonne Child Disability Registry, which records children diagnosed with ASD by age 8 using multiple sources and validated diagnoses. Long-term registry-based prevalence trends were examined considering children born between 1995 and 2016. Descriptive and comparative analyses were conducted for children born between 2014 and 2016, focusing on sex, intellectual disability (ID), associated conditions, age at diagnosis, schooling and care arrangements.

Results The registry-based prevalence of ASD at age 8 increased markedly ranging from 2.1‰ in 2003 to 13.5‰ in 2024. In 2024, the prevalence reached 21.1‰ among boys. The increase was predominantly driven by ASD without ID, which accounted for nearly 70% of recent cases. For recent cases the median age at diagnosis was 4 years. Over 20% had co-occurring attention deficit hyperactivity disorder, while sleep and eating disorders were also frequent. Schooling and care arrangements differed substantially according to the presence of ID.

Conclusion The increase in registry-based prevalence does not appear to have levelled off, with diagnoses overwhelmingly and increasingly being made in children without ID. The situation regarding neurodevelopmental disorders in France is changing profoundly and requires ongoing monitoring, which registries are contributing to.

Keywords Autism spectrum disorders · Epidemiology · Prevalence · Associated disorders · Schooling

Introduction

Autism spectrum disorders (ASD) are currently considered neurodevelopmental disorders characterized primarily by persistent deficits in communication and social interaction and by restricted and repetitive behaviors, interests, and activities (American Psychiatric Association, 2013). ASDs vary greatly in severity from one individual to another and are frequently associated with other disorders such as attention deficit/hyperactivity disorder (ADHD), anxiety disorders, sleep disorders, epilepsy, or intellectual disability (Lai et al., 2019; Simonoff et al., 2008; Tick et al., 2016; Zeidan et al., 2022). Currently grouped under the single term ASD, they encompass various disorders that were previously classified as pervasive developmental disorders (PDD) according to the international classification of diseases (ICD-10) (World Health Organization, 1992).

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The median prevalence in high-income countries and Europe is around 1% (Zeidan et al., 2022), with major disparities between the continents and countries studied, and the increase in prevalence is significant worldwide (Talantseva et al., 2023). The broadening of the concept of ASD and its diagnostic criteria, potential diagnostic substitutions over time—which, in some countries, may be linked to access to early care services being dependent on an ASD diagnosis—public awareness, and advances in diagnostic procedures are all factors that may explain the differences in prevalence observed between countries, as well as the increase in prevalence over time. These factors have been discussed in detail by Fombonne et al. (Fombonne, 2018, 2024, 2025; Fombonne et al., 2021), who also points out (Fombonne, 2023) that, to date, no study has been able to accurately assess changes in the actual underlying "true" prevalence over time, given how difficult it is to perfectly control these various factors. He also questions the risks of current overdiagnosis of ASD. Ultimately, it is clear that the reasons for the rise in ASD diagnosis rates remain a subject of debate, with the question being whether this increase in reported diagnoses truly reflects trends in the underlying prevalence of ASD (Eccles et al., 2026). The methodology used to count ASD cases is also important and the key point is to distinguish between studies based on an active or passive case ascertainment (Tromans & Brugha, 2022). Studies using active ascertainment, based on the general population, using a multi-stage approach with a screening phase to identify possible cases and a final phase after confirmation of the diagnosis, provide a more accurate picture of the underlying "true" prevalence of ASD (Fombonne et al., 2016; Morales-Hidalgo et al., 2018; Narzisi et al., 2020; Sun et al., 2019). However, these studies may be limited by population coverage, sample representativeness, participant response rates during the various stages, or the sensitivity and specificity of screening tools. Other studies, such as those conducted by registries, although based on the general population and not on data from the healthcare system, only capture cases that are identified and diagnosed at a given age. The advantage of these studies is that they are based on clearly established and validated diagnoses. They report a prevalence of previously diagnosed cases and the underlying "true" prevalence is therefore underestimated, as cases that have not yet been identified and diagnosed are not taken into account. Nevertheless, these prevalence data including the registries-based prevalence accurately reflect the situation at a given age and can be used to plan services and identify potential barriers and inequalities in access to diagnosis and care pathways. Therefore, given the rapid changes in these reported prevalence and the challenges of extrapolating data from other countries, up-to-date prevalence data combined with a clinical description of children with ASD remains essential. In France, there is no national system for monitoring ASD diagnoses in the general population. There are two ASD registries in metropolitan France, the Haute-Garonne Disability Registry (RHE31) and the Isère and Savoie Disability Registry and Perinatal Observatory, which have provided registry-based prevalence data for these three departments (Delobel-Ayoub et al., 2020a, 2020b; Van Bakel et al., 2015). The robust and reliable population-based data from the RHE31 study allow us to meet the objectives of this study: (1) Aim 1: describing the time trends in registry-based prevalence of ASD and (2) Aim 2: providing an up-to-date description of comorbidities and care for affected children on the most recent data.

Methods

Participants

The data comes from the Child Disability Registry (RHE31) of the Haute-Garonne County (an administrative region in south-west France with an estimated population of 1.5 million and 16,833 8-year-old children residing in this county in 2024). This registry systematically records all children born since 1995 whose parents live in the Haute-Garonne county during the calendar year in which the child reaches the age of 8 (regardless of their place of birth) and who have been diagnosed with ASD by a healthcare professional no later than the year they turn 8. The parents of the children included in the registry have all been contacted and have not objected to their children's inclusion. The registry has all the necessary authorizations to use these data. The registry has been approved by the National Registry Evaluation Committee and the French Data Protection Authority (Commission Nationale Infomatique et Libertés) for all its usual activities (Authorization No. 900263V1).

Case ascertainment is conducted by an experienced registry paediatrician with training in public health. It is based on the systematic review of comprehensive multiple sources records which ensures the greatest possible comprehensiveness by guaranteeing that all children are identified, regardless of the severity of their disability or the type of care they receive. The main source of data for the registry is the Departmental House for People with Disabilities of the Haute-Garonne County. This organisation centralises all requests that families of children with ASD (whether severe or otherwise) may need to make during childhood, such as requests for financial assistance, referrals to specialized educational institutions, and all types of educational accommodations (additional time for assessments or personalised support such as teaching assistants). All benefits are obtained regardless of the socio-economic situation of

families. The collection of cases based on the records of this structure is assumed to provide excellent coverage, as almost all families of children with ASD are likely to use one of the services offered, with at least, for the least severe cases, educational accommodations at the age of 8. The child's file includes a complete medical record as well as information concerning the child's care and schooling. Children whose families did not use the services covered by the primary data source could still be identified through complementary secondary sources, representing 1.7% of all registered cases. These additional secondary sources included records from child psychiatry health services, the autism reference centre and paediatric departments of the university hospital. ASD diagnoses were verified through specialist assessments reports documented in medical records. Only children with a formally confirmed diagnosis of ASD were included in the registry; suspected diagnoses or diagnoses subsequently invalidated following expert assessment were excluded.

Data Collected

To ensure continuity in diagnostic criteria and adapt to changes over time, the evolution between PDD and ASD diagnoses must be taken into account. To study changes in prevalence over time and to accurately reflect changes in diagnostic practices (prevalence at age 8 between 2003 and 2024, for children born between 1995 and 2016), we presented separately: (i) ASD diagnoses that meet the current DSM-5 criteria and also include all diagnoses of typical autism, atypical autism, or Asperger's syndrome when reported with ICD-10 in the data sources; (ii) diagnoses of "other PDDs" or "PDDs not otherwise specified" (ICD-10 codes F84.8 and F84.9), whose correspondence with current ASD diagnoses has evolved over time. Historically, these codes were frequently used to record diagnoses based on the French classification of mental disorders, many of which would now likely to be classified as ASD. Following the adoption of the DSM-5, F84.8/F84.9 diagnoses became increasingly uncommon. As these categories do not systematically meet criteria for ASD, only confirmed ASD diagnoses were considered in the most recent data (2022 to 2024).

The age at diagnosis is the age reached during the calendar year in which the diagnosis was made. By definition of the inclusion criteria in the RHE31, it is a maximum of 8 years. The median age and interquartile range, the average age with standard deviation (SD) and age groups at diagnosis were presented (1–2 years, 3–4 years, 5–6 years, 7–8 years).

The following disorders associated with ASD were extracted from medical records: (i) epilepsy; (ii) intellectual disability (ID) corresponding to an IQ level < 70; (iii) Attention Deficit Disorder with or without Hyperactivity (ADD/ADHD); (iv) sleep disorder; (v) eating disorder; (vi) cerebral palsy. IQ estimates were based on information available, either from formal cognitive testing or from clinical assessments reporting an IQ estimate. When intellectual disability was documented without further detail, cases were classified as having an IQ < 70. In cases where multiple assessments were performed at different ages, the assessment closest to 8 years was retained. ADHD was recorded only when explicitly stated in medical records; however, as ASD was the primary focus, some ADHD diagnoses may have been missed, and underestimation cannot be excluded. Sleep and eating difficulties were recorded as co-occurring symptoms rather than formal diagnoses.

Other available data concerned: (i) sex, (ii) parity, (iii) age of parents at birth, (iv) prematurity (gestational age [GA] < 37 weeks of amenorrhea), low birth weight (less than 2500 g), caesarean section delivery, and hospitalization in the neonatal unit at birth; (v) the presence of any associated malformation; (vi) the presence of a known genetic syndrome or abnormality.

Educational data included whether the child received support from a teaching assistant (yes/no), as well as the type and setting of schooling (mainstream school in a regular or specialised class; split placement between a specialized educational institution and a mainstream school; placement in a specialized educational institution only; or home schooling). Care interventions included speech therapy, physical therapy, psychological support, educational support, and social skills training. These services are delivered in various settings, including private practice, day-care hospitals, public multidisciplinary care centres and specialized educational institutions.

Data Analysis

For registry-based prevalence trends over the long term (aim 1), children born between 1995 and 2016 were included, having received a diagnosis no later than the calendar year in which the child reached the age of 8, i.e., between 2003 and 2024. Registry-based prevalence rates were calculated per 1,000 children aged 8 residing in the county during the same years (2003 to 2024 [data from the French National Institute of Statistics and Economic Studies (INSEE)]) and 95% exact binomial confidence intervals (CI) were estimated. Registry-based prevalence rates were first presented separately for diagnoses of ASD and other PDD or PDD not otherwise specified. The registry-based prevalence rates for ASD and other PDD/PDD not otherwise specified were then presented together according to sex and according to the presence of an intellectual disability associated with ASD. To examine changes in sex ratios of prevalence over time, we used the Mann–Kendall's test for monotonic trend. The

time trends in sex ratios were also estimated separately in the subgroups defined by the presence of an associated ID.

For the description of recent epidemiological data (aim 2), we included only children born between 2014 and 2016 who were diagnosed with ASD only, no later than between 2022 and 2024. Proportion were presented with their 95% CI. Associated disorders and age at diagnosis were presented according to sex and according to the presence of ID associated with ASD. To account for the associations between intellectual disability, sex, and comorbid disorders, comparisons of the frequencies of associated disorders by sex or the presence of an associated ID were analyzed using adjusted logistic regression. Schooling and care were presented according to the presence of an associated ID. Comparisons of schooling modalities or care arrangements according to sex or the presence of an associated ID were evaluated using chi-square tests or Fisher exact tests. The age of the parents at birth and the age at diagnosis were measured separately according to sex and the presence of an associated ID and compared using Student's t-test. For age at diagnosis in categories, proportion were compared using chi-square or Fisher exact tests according to sex and the presence of an associated ID.

Results

Aim 1

Figure 1 (and Table S1) shows the trend in the registry-based prevalence of ASD and other PDD/PDD not otherwise specified at age 8 between 2003 and 2024. The increase in registry-based prevalence was significant, ranging, for all disorders, from 2.1‰ CI 95% [1.4–3.1] in 2003 to 6.2‰ CI 95% [5.0–7.6] in 2013 and up to 13.5‰ CI 95% [11.8–15.3] in 2024. In 2024, only 4.4% of all cases were still coded as other PDDs or PDDs not otherwise specified. In 2024, the registry-based prevalence of ASD alone was 12.9‰ CI95% [11.2–14.7], reaching 21.1‰ CI 95% [18.1–24.3] among boys and 4.4‰ CI95% [3.1–6.0] among girls, representing a ratio of prevalence of 4.8 between boys and girl. Tests for trends in sex ratios of prevalence were not statistically significant either for all ASDs (including other PDDs and PDDs not otherwise specified) ($p=0.06$), for ASDs with ID ($p=0.14$) or for ASD without ID ($p=0.82$).

Figure 2 (and Table S2) shows the trend in the 8-year registry-based prevalence of ASD and other PDD/PDD not otherwise specified between 2003 and 2024, according to the presence of associated ID and sex. The increase in the registry-based prevalence of ASD and other PDDs has been overwhelmingly in favour of forms without associated ID. In 2024, the prevalence of ASD and others PDD without associated ID was 8.7‰ CI 95% [7.3–10.2], while that of those with ID was 4.3‰ CI 95% [3.3–5.4]. This trend was

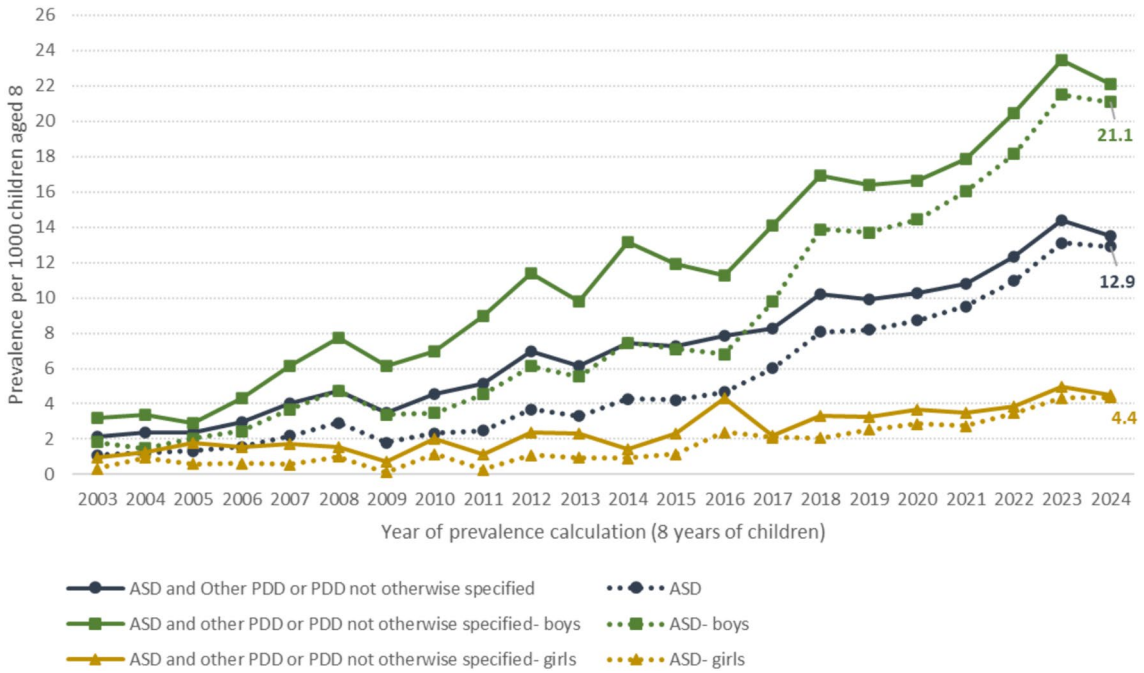

Fig. 1 Registry-based prevalence at age 8 of Autism Spectrum Disorders (ASD) and other Pervasive Developmental Disorders (PDD) /PDD not otherwise specified by sex, between 2003 and 2024, per 1,000 children aged 8 residing in the French county of Haute-Garonne

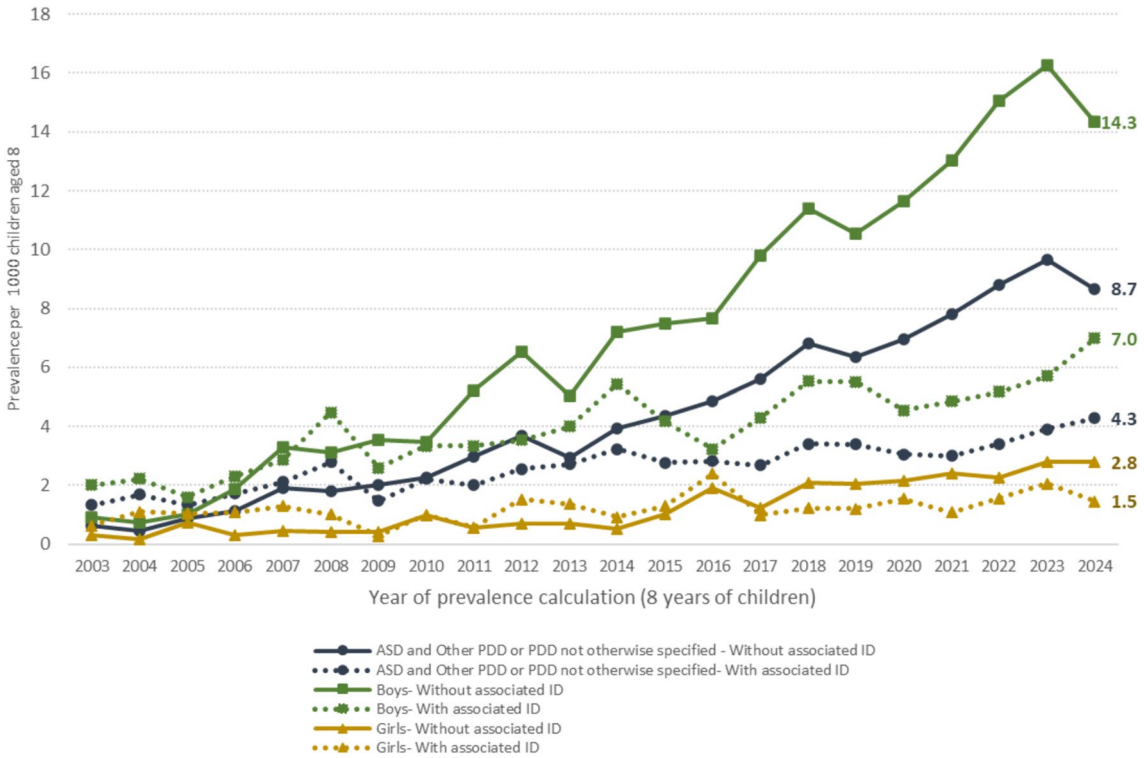

Fig. 2 Registry-based prevalence at age 8 of Autism Spectrum Disorders (ASD) and other Pervasive Developmental Disorders (PDD) / PDD not otherwise specified by sex and associated intellectual deficiency, between 2003 and 2024, per 1,000 children aged 8 residing in the French county of Haute-Garonne

particularly pronounced among boys, with a prevalence in 2024 of ASD and others PDD without associated ID of 14.3‰ CI 95% [11.9–17.1], compared to 7‰ CI 95% [5.3–9.0] for those with ID. Similar results were observed for ASD alone (Table S3).

Aim 2

The epidemiological data between 2022 and 2024 concerned 625 children born between 2014 and 2016 with ASD, including 524 boys (84%) and 101 girls (16%). Among these children, 64 (10.2%) were known to have been born prematurely and 65 (10.4%) with low birth weight (<2500 g), 136 (21.8%) were known to be born by caesarean section and 61 (9.8%) had been hospitalized in a neonatal unit. In just over half of the cases (50.7%), the mothers were primiparous. A genetic syndrome or chromosomal abnormality was found in 30 children (4.8%), with a possible link to ASD in 14 of them (link to ASD unlikely for 10 cases and uncertain or unknown for six cases). A malformation was found in 27 children, or 4.3% of cases (including cardiac malformation in 11 cases, cerebral malformation in six cases, and hypospadias in five cases). Details of these data are presented in the supplementary table (Supplementary Table S4). The average age of mothers at birth (known for 617 children) was 30.9 years (SD 5.5, range 25–75% [27–35]), with no difference based on the sex of the child (Student's t-test, $p=0.45$) or whether or not the child had an associated ID (Student's t-test, $p=0.55$). The age of fathers at birth (known for 551 children) was 35 years (SD 7.1, range 25–75% [30–39]) and was significantly higher (Student's t-test, $p=0.006$) among fathers of children with ID (36.3 years SD 7.4, range 25%-75% [31–41]) than among fathers of children without associated ID (34.4 years SD 7.0, range 25–75% [30–38]).

Among the 605 children born between 2014 and 2016 for whom information on intellectual level was available, 416 (68.8%) did not have associated ID (IQ level≥70), with this proportion being significantly (chi-square test, $p=0.03$) higher among boys (70.6%) than among girls (59.6%). Details of IQ levels are presented in Table 1. Table 2 shows the disorders associated with ASD according to sex and the presence of an associated ID. After adjustment on presence of ID, sleep disorders ($p=0.03$) and associated epilepsy ($p=0.04$) were significantly more common in girls than in boys. More than 20% of children had ADD/ADHD, which was significantly more common when ASD was not associated with an ID (29.3% vs 10.6%, $p<0.001$ with adjustment on sex). Conversely, the others disorders were more common in children with ID associated with ASD, after adjustment on sex: eating disorders (22.1% of all cases, 29.1%

Table 1 Intellectual disability associated with Autism Spectrum Disorders (ASD) in children aged 8 between 2022 and 2024 and for whom the intellectual level was known

	Boys		Girls		Total	
	N	%	N	%	N	%
No intellectual disability (IQ > 70)	357	70.6	59	59.6	416	68.8
IQ level between 50 and 70	30	5.9	6	6.1	36	6.0
IQ level < 50	45	8.9	21	21.2	66	10.9
IQ level < 70 not otherwise specified	74	14.6	13	13.1	87	14.4
Total	506	100	99	100	605	100

for those with ID vs 19.7% without ID, p = 0.01), sleep disorders (13.6% of all cases, 20.6 for those with ID vs 11.1 without ID, p = 0.004), epilepsy (3% of all cases, 7.4% for those with ID vs 1% without ID, p < 0.001), and associated cerebral palsy (1% of all cases, 2.7% for those with ID vs 0.2% without ID, p = 0.03).

Among the 576 children born between 2014 and 2016 for whom the age at diagnosis was known, the average age was 4.7 years (SD 1.79, median 4, range 25–75% [3–6]). It was significantly lower in cases where ID was also present (average age of 4 years, SD 1.33, range 25–75% [3–5] versus 5 years, SD 1.89, range 25–75% [4–7] in the absence of ID, Student's t-test, p < 0.001) and did not differ on average between boys and girls (Student's t-test, p = 0.47). For all cases, the diagnosis was most often made between 3 and 4 years of age (42.2% of cases), in 28.1% of cases it was made between 5 and 6 years of age, in 20.7% of cases between 7 and 8 years of age, and in 9% of cases between 1 and 2 years of age. Significant differences (chi-square test, p < 0.001) were found depending on whether or not there was an associated ID (Fig. 3). Indeed, the diagnosis was made between the ages of 7 and 8 in 28% (95%CI [23.6–32.7]) of cases without associated ID, whereas this age group represented only 4.5% (95%CI [2.0–8.7]) of cases with associated ID. Conversely, most cases with ID were diagnosed between the ages of 3 and 4 (54.5% 95%CI [46.9–62.0]), compared with only 36.9% (95%CI [32.1–41.9]) for forms without ID. Little difference in age groups at diagnosis was found based on the child's sex and was non-significant (chi-square test, p = 0.57) either among children without ID (Fisher exact test, p = 0.89) or those with ID (Fisher exact test, p = 0.21).

Of the 625 children born between 2014 and 2016, nine were not enrolled in school and information on school attendance was missing for 33 children. Of the 583 children enrolled in school, 507 (87%) had a teaching assistant. The types and locations of schooling were reported for 567 schoolchildren for whom an intellectual level was known (Table 3) and differed significantly depending on the presence of an associated ID (Fischer exact test, p < 0.001). Enrolment in mainstream classes concerned 72.9% (95% CI [68.3–77.2]) of children with ASD without associated ID, but only 21.4% (95% CI [15.5–28.4]) of children with associated ID. Most children with associated ID (51.8% 95% CI [44.0–59.5]) were enrolled in specialized classes within mainstream schools, and in 16.7% (95%CI [11.4–23.2]) of cases, in specialized educational institutions only. Support from a teaching assistant was significantly more common among children with ID (59% versus 34% of children without ID, chi-square test, p < 0.001). Regarding the types of care provided, some of them also differed depending on the presence of an associated ID. Overall, 85% of children received physical therapy and 84% received speech therapy, with the latter being slightly more common for children with associated ID (89% versus 81% for children without ID, chi-square test, p = 0.02). Conversely, nearly half (48%) of children without ID received support from a psychologist and 30% participated in social skills groups, whereas only 31% (chi-square test, p = 0.02) and 9% (chi-square test, p < 0.001) of children with ID received such support, respectively. Support, sometimes multiple, was provided by private practitioners for the vast majority of children (61.7%), significantly (chi-square test, p = 0.002) more often for children without ID (65.9% of cases) than for those with associated ID (52.4%). Approximately 30% of children received care at a public multidisciplinary care center. Care in specialized educational institutions concerned 24.9% of children with ID but only 4.1% of children without associated ID (chi-square test, p < 0.001). Daycare hospital was also significantly (chi-square test, p = 0.047) more frequent in children with ID (10.6% of cases) compared to those without associated ID (6%). Finally, 7.9% of children received support from a special education and home care service.

Discussion

The increase in the registry-based prevalence of ASD observed in the French county of Haute-Garonne over the last two decades is considerable. In 2024, the registry-based prevalence of confirmed ASD was 12.9‰, reaching 21.1‰ among boys and 4.4‰ among girls, representing a ratio of 5 boys to 1 girl. Similarly to what was found in the recent study by Furnier et al. (2026), this increase in the registry-based prevalence was particularly marked for ASD without associated ID which accounted for nearly 70% of

Table 2 Disorders associated with autism spectrum disorders (ASD) according to sex and to the presence of an associated intellectual disability (ID) in children aged 8 between 2022 and 2024

	Total		Boys		Girls		ORa[2]	95% CI[3]	p-value	All ASD with information on IQ level	ASD with ID		ASD without ID		ORa[4]	95% CI[3]	p-value
	N	%	N	%	N	%	Boys as reference			N	N	%	N	%	ASD without ID as reference		
Epilepsy	19	3.0	12	2.3	7	6.9	2.8	[1.1–7.7]	0.04	18	14	7.4	4	1.0	7.6	[2.5–23.6]	<0.001
ADD/ADHD[1]	143	22.9	123	23.5	20	19.8	0.9	[0.5–1.5]	0.68	142	20	10.6	122	29.3	0.3	[0.2–0.5]	<0.001
Eating disorder	138	22.1	111	21.2	27	26.7	1.3	[0.8–2.1]	0.33	137	55	29.1	82	19.7	1.6	[1.1–2.4]	0.01
Sleep disorder	85	13.6	63	12.0	22	21.8	1.9	[1.1–3.2]	0.03	85	39	20.6	46	11.1	2.0	[1.3–3.2]	0.004
Cerebral palsy	6	1.0	4	0.8	2	2.0	2.0	[0.4–11.5]	0.42	6	5	2.7	1	0.2	10.6	[1.2–92.3]	0.03

[1]ADD/ADHD: Attention deficit disorder with or without hyperactivity;

[2]ORa: Odds Ratio adjusted on ID

[3]95% CI: 95% confidence interval

[4]ORa: Odds Ratio adjusted on sex

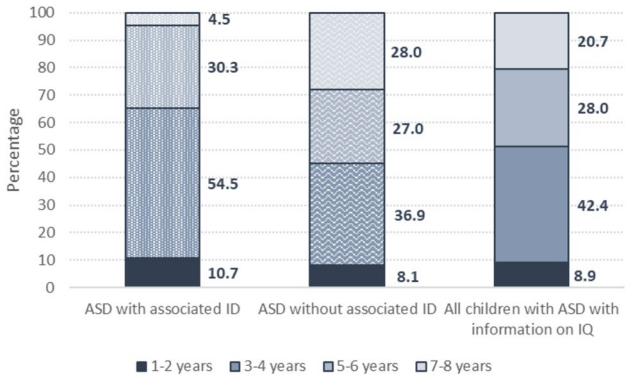

Fig. 3 Age at diagnosis according to the presence or absence of intellectual disability (ID) associated with Autism Spectrum Disorders (ASD) in children aged 8 between 2022 and 2024 (N = 571)

cases among boys and in the most recent generations studied. According to the most recent data, the median age at diagnosis was 4 years, and more than 20% of children had a diagnosis of ADD/ADHD associated with ASD.

The steady increase in registry-based prevalence observed is completely consistent with what is described in the literature for high-income countries (Solmi et al., 2022). The estimate of 12.9 per 1,000 children aged 8 in 2024 is within the median prevalence range of 1% described in Europe in the literature review by Zeidan et al. (2022) and close to the average of 1.18% for Europe and North America for the period 2015–2019 estimated by Talantseva et al. (2023). However, these reviews do not include generations as recent as those reported here, and the prevalence reported here in 2024 is close to that observed in Denmark in 2015 [1.26%] (Delobel-Ayoub et al., 2020a, 2020b). The results of some recent studies continue to show considerable heterogeneity in the reported prevalence rates. The US surveillance program reports an average prevalence across the 16 sites studied of 3.2% at age 8 in 2022, with a sex ratio of 3.4 and wide variation in prevalence among the states studied, ranging from 0.97 to 5.3% (Shaw et al., 2025). A large British study found a prevalence of 1.76% in 2017, with a sex ratio of 4.3 (Roman-Urrestarazu et al., 2021), when a Scottish study found a prevalence of 2.6% in 2022 (Maciver et al., 2023) for children in primary school. A Swedish cohort study with a small sample size found a prevalence of 1.1% at age 12 in 2019 (Fast et al., 2024), when a large Canadian study found a prevalence of 2% for the same year, 2019 (Public Health Agency of Canada, 2022). In France, studies based on health system data (National Health Data System) provided some national-level estimates of average prevalence at age seven (Ha et al., 2020; Ponnou et al., 2025). However, these data have significant limitations, particularly due to an underestimation bias linked to the exclusive use of healthcare service as data source for case ascertainment. Furthermore, as these data are based on the medical-administrative coding of

Table 3 Places and types of schooling for the 567 schoolchildren aged 8 between 2022 and 2024 for whom information on intellectual ability was available, according to the presence or absence of intellectual disability (ID) associated with autism spectrum disorders (ASD)

	ASD with associated ID (IQ < 70)		ASD without associated ID (IQ ≥ 70)		All ASD with information on IQ level	
	n	%	n	%	n	%
Mainstream school in a mainstream class	36	21.4	291	72.9	327	57.7
Mainstream school in specialized class	87	51.8	83	20.8	170	30.0
Split between a specialized educational institution and a mainstream school	14	8.3	13	3.3	27	4.8
In a specialized educational institution only	28	16.7	7	1.8	35	6.2
At home	3	1.8	5	1.3	8	1.4
Total	168	100	399	100	567	100

healthcare activity, they have significant limitations in terms of the reliability and accuracy of ASD diagnoses and associated comorbidities. Compared to these French data (Ponnou et al., 2025), the registry-based prevalence rates based on multiple complementary sources we described here for the most recent generations studied are higher, particularly for boys (in 2022, 12.3 vs 9.4 per 1000 for all ASDs and 20.4 vs 15 per 1000 for boys).

The increase in registry-based prevalence, which was predominantly observed among boys, led to a sex ratio of five boys to one girl in 2024 (although no significant trend in the sex ratio over time was identified whether among cases with or without associated ID). Although there are significant fluctuations depending on the study, this ratio remains higher than the European median ratio of 4.2 (Zeidan et al., 2022) and higher than the trend observed in the literature, which is towards a decrease over time (Solmi et al., 2022). In their 2017 meta-analysis, Loomes et al. (2017) also reported an average sex ratio of 4.2, though with very high heterogeneity. They showed, in particular, that this ratio decreased to 3.25 when only studies identifying cases independently of pre-established diagnoses were considered. The authors therefore suggest that the 'true' sex ratio is likely closer to 3, and that the discrepancy with that found in studies based on established diagnoses is due to an ongoing diagnostic bias towards girls who meet the criteria for ASD, but who are less frequently diagnosed as such (Loomes et al., 2017). Almost all cases among the latest generations studied corresponded to confirmed ASD, with only 4.4% still coded as other PDD or PDD not otherwise specified. This clearly reflects the evolution of the classifications used. Ponnou et al. (Ponnou et al., 2025) observed a similar trend based on data from the National Health Data System. However, these data do not allow for the same level of precision in diagnoses, and the proportion of these cases remains much higher than that described based on registry data. Regarding age at diagnosis, our results are above the average age of 3.6 years found in the meta-analysis of Van't Hof et al. (2021) for studies where diagnoses were made before the age of 10. However, in more than 50% of cases, diagnosis occurred before the age of 4, which is also consistent with the findings of Ponnou et al. (2025), who identified a peak in diagnoses at age 3, followed by a rapid decline. Thus, as we have clearly explained, our results on prevalence, sex ratio, type of disorder recorded and age at diagnosis reflect clinical practices at a given time and age.

In our population, 31% of children had associated ID, which is relatively comparable to the figures reported in the literature, ranging from a median proportion in Europe of around 20% to 33% in North America (Zeidan et al., 2022). Regarding other neurodevelopmental disorders and associated impairments, the results in the literature again show considerable heterogeneity (Lai et al., 2019; Shaw et al., 2025; Simonoff et al., 2008; Zeidan et al., 2022). However, the results of Lai et al.'s, meta-analysis (Lai et al., 2019) suggest a consensus on an increased risk of ADHD, anxiety disorders, depressive disorders, conduct disorders and sleep disorders compared to the general population. With just over 20% of cases presenting ADHD associated with ASD, our results are at the lower end of international estimates, which are around 30% of cases (Lai et al., 2019; Public Health Agency of Canada, 2022; Shaw et al., 2025; Simonoff et al., 2008), including French results from the National Health Data System (Ponnou et al., 2025). In our study, ADHD was more prevalent among children without an associated ID, a topic that has received limited attention in the literature. We identified sleep disorders in 13.6% of cases, which is exactly the same proportion reported in the meta-analysis by Lai et al. (2019). Finally, our study found that eating disorders were present in more than 20% of cases. These disorders are rarely studied in literature, but when investigated, they are consistently reported, most often in the form of avoidant/restrictive eating with severe food selectivity (Bourne et al., 2022).

Our study has several limitations. First, the registry-based prevalence estimates reported here reflect the prevalence of ASD as currently diagnosed at age 8. As some children with ASD may be diagnosed later in childhood, these estimates are likely to underestimate the underlying "true" prevalence. While registry data is, by definition,

intended to be exhaustive, there are certain potential obstacles that can be cited. Firstly, around 3 to 4% of parents refused inclusion for their child, and since parental consent is required before the registry physician can access the child's medical records, we cannot estimate the proportion of children with ASD among those who were not included. Although this refusal rate is low, it may affect the prevalence estimate. Secondly, the registry is based on several sources to identify cases, including the Departmental House for People with Disabilities of Haute-Garonne, the child psychiatry services and the autism reference centre of the Haute-Garonne County. Children who might escape detection could thus be those with mild ASD without associated impairments, who do not require any specific care or adjustments to their schooling by the age of eight, and who could potentially only be treated by private practitioners. While these cases are considered to be very rare, their exact number is actually unknown. Finally, with regard to disorders associated with ASD, our data correspond to the diagnoses mentioned in the children's medical records. Apart from ID that is almost always mentioned in the child's medical records, the prevalence of other co-occurring disorders is likely underestimated due to their non-systematic reporting. This could be consistent with the tendency to underestimate ADHD associated with ASD in our results compared to the literature. It is also consistent with the findings of Lai et al.'s meta-analysis (2019), which showed that the prevalence of associated disorders was higher in clinical studies than in registry-based studies.

The strengths of our study lie in the quality of the registry data. Unlike data from the National Health Data System, for example, our prevalence data are not based on healthcare use, which avoids an obvious systematic underestimation bias. Registry case identification relies on multiple complementary data sources and all cases included are based on expert-validated diagnosis. Thus, registry data enables long-term monitoring, provide an up-to-date description of ASD cases and their perinatal risk factors, and enable the assessment of associated disorders. Finally, these data provide an overview of schooling and care, which are rare data in the general population and enable an up-to-date assessment of the situation of children with ASD aged 8 between 2022 and 2024.

However, these data do not reflect the needs expressed by families and children themselves, nor the potential gap between their expectations and the care provided. Current debates surrounding the concept of neurodiversity (Baron-Cohen, 2017) question the notion of "disorder" as something inherent to the individual, as well as the focus on deficits, which obscure the potential influence of social and environmental factors that may nevertheless be significant (Pellicano & Den Houting, 2022). As suggested by Bölte et al. (2021), taking these factors into account could enable a more relevant and holistic assessment and management of ASD. These considerations highlight the need for a diversity of approaches in order to better study and assess ASD, but also to better support those affected.

In conclusion, while an accurate assessment of the prevalence of autism appears crucial to guide public authorities' decisions and adapt resources and support services, the various data available should be considered with caution. Indeed, the significant differences between countries and regions are likely to reflect, at least in part, a variety of professional practices, public policies and resources allocated to diagnosing and supporting those affected. Given that diagnosis rates vary by a factor of three between France and other similarly developed countries—with rates exceeding 3% in the US and Iceland (Delobel-Ayoub et al., 2020a, 2020b; Shaw et al., 2025)—it is unreasonable to assume that there is such a disparity in 'real' prevalence. Clearly, current professional practices do not permit perfectly harmonised ASD diagnoses across different countries. In this context, it therefore seems essential to have access to data that best reflects the situation in France and enables its evolution to be monitored effectively. The increase in prevalence does not appear to have levelled off, with diagnoses overwhelmingly and increasingly being made in children without associated ID although a significant proportion of these children present with ADHD. The situation regarding neurodevelopmental disorders in France is therefore changing profoundly and requires ongoing monitoring, which registries are contributing to.

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Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval This study was performed in line with the principles of the Declaration of Helsinki. The registry has been approved by the National Registry Evaluation Committee and the French Data Protection Authority (Commission Nationale Infomatique et Libertés) for all its usual activities (authorization no. 900263V1).

Informed Consent According to the French regulation, registries require parental consent to access diagnostic records and informed consent was obtained from parents of all individual participants included in the study.

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