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Autism spectrum disorder prevalence in children aged 12-13 years from the Longitudinal Study of Australian Children

Short title: Autism prevalence in Australia

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Scientific Abstract

This study aimed to provide an autism spectrum disorder (ASD) prevalence update from parent and teacher report using the Longitudinal Study of Australian Children (LSAC). The LSAC is a prospective cohort study of Australian children representative of the population with two cohorts: Kinder (birth year 1999/2000) and Birth cohort (birth year 2003/2004). Children in the Birth and Kinder cohort with parent- and teacher-reported ASD prevalence were compared to children without ASD. There were N=3,381 (66%) responding in the Birth cohort at age 12 and N=3089 (62%) for the Kinder cohort at age 16. Quality of life was measured by the Paediatric Quality of Life Inventory, and emotional/behaviour problems using the Strengths and Difficulties Questionnaire. Parent-reported ASD prevalence increased to 4.36% [95% CI 3.56 -5.19] at age 12-13 years in the Birth cohort and 2.60% [95% CI 2.07-3.31] in the Kinder cohort. Kinder cohort ASD-children had more parent- and teacher-reported social problems, and lower parent-reported social and psychosocial quality of life. As expected, parent-reported ASD prevalence continued to rise. Higher prevalence in the Birth cohort may relate to milder cases of ASD being diagnosed.

Lay Summary: Parent reported ASD prevalence in 2016 in 12 year old children from the Birth cohort of the Longitudinal Study of Australian Children was 4.4%, and higher than the 2.6% in the earlier born Kinder cohort. The Birth cohort had a milder presentation with fewer social, emotional and behavioural problems than the Kinder cohort. Milder cases of ASD are

being diagnosed in Australia resulting in one of the highest reported prevalence rates in the world.

Key words: autism spectrum disorder, prevalence, epidemiology, emotional and behavioural problems, longitudinal

Autism Spectrum Disorder (ASD) prevalence has shown increases over time in most countries around the world with numerous factors likely involved (Nevison, Blaxill, & Zahorodny, 2018). Differing ascertainment methods have resulted in some heterogeneity in prevalence (Fombonne, 2018). In the US, parent reported information on ASD prevalence from 2016 indicated 2.5%, or 1 in 40 children aged 3 to 17 years had ASD (Kogan et al., 2018). Studies which have used screening and clinical assessment generally report lower prevalence than parent report (Baio et al., 2018; Christensen et al., 2018), and cultural factors may also be at play, with lower prevalence in minority groups (Levaot, Meiri, Dinstein, Menashe, & Shoham-Vardi, 2019).

The Longitudinal Study of Australian Children (LSAC) has been collecting information every two years from around 10,000 children in two cohorts born four years apart, who are representative of the Australian population. In 2004 the Birth cohort was recruited at age 0-1 years and the Kindergarten cohort at age 4-5 years. Data is now available for the Birth cohort at age 12-13 years and the Kindergarten cohort at age 16-17 years. Information collected has included both parent and teacher reports of whether a child has ASD from when the Birth cohort were 6 years of age, as well as parent reported age of diagnosis.

We have previously reported the prevalence of ASD based on parent report was higher in the later born Birth cohort at 10-11 years of age than the earlier born Kindergarten cohort (3.9% versus 2.4%) (May, Sciberras, Brignell, & Williams, 2017). We suggested a number of inter-related factors in Australia may have contributed to this cohort effect. These include the change in ASD criteria from DSM-IV-TR to DSM-5(American Psychiatric Association, 2013) in 2013 and introduction of government funding for intervention services that required an ASD diagnosis via the Helping Children with Autism Package (HCWA) in 2008. This was the first national funding scheme for young children in Australia with ASD who otherwise accessed early intervention and therapy based on state or territory schemes. The National Disability Insurance Scheme (NDIS), a national approach to funding disability support in Australia, commenced full roll-out to all states and territories in Australia in July 2016 and replaced the HCWA package for early intervention and is not dependent on a diagnosis. The NDIS does not replace access to Medicare rebated therapy services as long as a diagnosis is made before the age of 13 (May et al., 2018).

The aim of this study was to 1) provide an update on ASD prevalence in Australia based on parent and teacher report from LSAC when the children were aged 12-13 years of age, 2) compare demographic factors including age of diagnosis, quality of life and emotional and behaviour problems between the ASD Birth and Kinder cohorts at 12-13 years of age, and 3) provide parent-reported ASD prevalence for the Kinder cohort at age 14-15 and 16-17 years.

Method

Details of the LSAC design are reported in our prior studies (May et al., 2017; Randall et al., 2016). In brief, LSAC employs a cross-sequential design that follows two Australian population representative cohorts of children, initially aged 0–1 years (Birth cohort; n=5107) and 4–5 years (Kinder cohort; n=4983) in 2004, assessed every two years. At wave 7 there were N=3,381 (66%) responding in the Birth cohort (age 12-13) and N=3089 (62%) for the Kinder cohort (age 16-17 years)(Sanson et al., 2002). At wave 1 the sample was only marginally different to the Australian bureau of Statistics Australian 2001 census data. The largest difference was children with mothers who had completed secondary school were over-represented in the sample being 10% higher than the 2001 Census (Australian Institutde of Family Studies, 2018).

Participants can participate in a wave of data collection even if they have missed previous waves. The participants used in this data were those who participated in each wave regardless of whether they participated in prior waves.

Parent-reported ASD status: From wave 4 onward (Birth age 6, Kinder age 10), the primary caregiver was asked via interview: 'Does your child have any of these ongoing conditions? Autism, Aspergers, or other autism spectrum', to which they could reply yes or no. Parents were also asked the child's age at diagnosis and to rate his/her severity as mild/moderate/severe. There was no standardised scale and no information provided to parents when rating the severity of their child's ASD.

Teacher-reported ASD status: Teachers were asked via questionnaire 'Does this child receive any specialised services provided within the school because of a diagnosed disability or

additional need?' and if endorsed, 'What is the main reason that the study child requires additional assistance or specialised services to enable them to succeed in the regular school programme?' Response options were intellectual disability, hearing impairment, vision impairment, physical disability, speech/language impairment, emotional/ behavioural problem, poor understanding of standard Australian English/ESL, ASD and learning disability/problems either with reading or mathematics. This was not collected in the Kinder cohort at 6-7 years or 16-17 years. Teacher prevalence was calculated using the number of teachers identifying ASD from the total number of completed teacher reports.

Demographic variables. Neighbourhood socioeconomic disadvantage measured using the Socio-Economic Indexes for Areas Disadvantage Index [SEIFA(ABS, 2011)] corresponding to the]family's postcode of residence, geographic remoteness (dichotomised to very remote/ remote or non-remote), number of siblings in the family, whether English was the primary language spoken at home, single parent family, indigenous status, paternal and maternal age and education level.

Emotional/behavioural problems. Parent-reported and teacher-reported Strengths and Difficulties Questionnaire (SDQ)(Goodman, 1997) with higher scores indicating more difficulties, except for the prosocial subscale.

Quality of life. Paediatric Quality of Life Inventory (PedsQL) 4.0 (Varni, Burwinkle, Seid, & Skarr, 2003) parent proxy report with higher scores indicating better health-related quality of life.

Procedure

At each LSAC wave, trained interviewers conducted face to face interviews with the primary caregiver in the home with direct assessments of children and administration of parent and teacher surveys. LSAC is approved by the Australian Institute of Family Studies Ethics Committee, and parents provided written informed consent. Permission was granted to use LSAC data for addressing the current aims.

Data Analysis

Survey methods were used to account for the unequal probability of participant selection into the sample, non-response and sample attrition and the multi-stage, clustered sampling design. Prevalence was calculated separately for each cohort using weights from the corresponding wave of data collection. Missing values were excluded from prevalence calculations such that the proportion of individuals with ASD at any particular wave was the number of those with ASD divided by the number of those without ASD who participated in that wave. Summary statistics, including z-tests to compare proportions, were used to describe differences in parent-reported and teacher-reported ASD prevalence and characteristics for each cohort. Parent-reported ASD prevalence in the Kinder cohort was retrospectively calculated at 6 and 8 years based on the age of diagnosis of parent report at 10/11 years. Age of diagnosis for children with ASD at age 12-13 years was based on the earliest report from parents. Analyses were conducted in Stata Version 15.0.

Results

Responders versus non-responders with and without ASD at wave 7

We compared the baseline (wave 1 – Kinder 4 years of age, Birth 0 years of age) demographic characteristics between those who did and did not participant when the children were aged 12 years, for both cohorts, refer Table 1. Responders at age 12 in each sample had lower rates of Aboriginal and Torres Strait Islander heritage, higher proportion of both parents in the family, older and higher educated parents, and higher neighbourhood advantage. In the birth cohort, retained participants were more likely to have English as the main language spoken at home and have fewer children in the home. Responders in the kinder sample were less likely to reside in a remote location than non-responders.

<insert Table 1 about here>

Prevalence

The adjusted prevalence of parent reported ASD at age 12-13 years was 4.36 [95% Confidence Interval (CI) 3.56 -5.19] (unadjusted 4.39 [95% CI 3.75-5.15]) in the Birth cohort and 2.60% [95% CI 2.07-3.31] (unadjusted 2.5 [95% CI 2.06-3.04]) in the Kinder cohort, which was significantly different (z=4.1, p<.001). The Kinder cohort ASD adjusted prevalence increased to 2.9% [95% CI 2.28-3.48] at 14-15 years and 3.53% [95% CI 2.79 – 4.47] at 16-17 years.

Teacher reported ASD at age 12-13 years was 2.29% [95% CI 1.7-3.1] (unadjusted 2.40 [95% CI 1.8-3.1]) in the Birth cohort and 1.38% [95% CI 0.99-1.91] (unadjusted 1.48 [95% CI 1.1-2.0]) in the Kinder Cohort, which was significantly different (z=-2.43, p<.015). In the Kinder cohort at 14-15 years, teacher reported ASD adjusted prevalence slightly

reduced to 1.23% [95% CI 0.85-1.77]. Figure 1 reports the adjusted parent and teacher reported prevalence by child age.

<Insert Figure 1 about here>

Demographic comparisons

The demographic variables were compared between children with parent-reported ASD in the Birth and Kinder cohorts and those without ASD, Table 2. There were more males with ASD in both cohorts than in each respective cohort without ASD. In the ASD Birth cohort, there were fewer children in the family and more single parent families than the non-ASD Birth cohort. Maternal and paternal age at child's birth was higher in the Birth non-ASD cohort than the Kinder non-ASD group; but there was no difference in maternal and paternal age at birth between children with ASD in the Kinder and Birth cohort. A higher proportion of children with ASD in both cohorts attended a special school than children without ASD. Similarly, children with ASD in both cohorts had lower neighbourhood disadvantage scores than children without ASD.

<insert Table 2 about here>

Age of diagnosis trends

The frequency of each age of diagnosis in the Birth and Kinder cohorts is reported in Figure 2. At 12-13 years the adjusted mean age of diagnosis in parent-reported ASD cases was 6.12

years [95% CI 5.46-6.79] in the Kinder cohort and 6.39 years [95% CI 5.89-6.89] in the Birth cohort which was not statistically different, *p*=.53. The most frequent age of diagnosis were 5 and 6 years in the Birth cohort and 2 and 4 years in the Kinder cohort.

<Insert Figure 2 about here>

Quality of life and Emotional and behavioural problems: ASD cohort comparison at 12-13 years of age

We compared quality of life (PedsQL), and emotional and behavioural problems (SDQ) at age 12-13 years in parent reported cases of ASD for both cohorts, Table 3. The Kinder ASD cohort had higher parent reported SDQ emotional problems, peer problems and total problem score than the Birth ASD cohort; and on the PedsQL lower social, psychosocial and total quality of life. Teachers also reported more SDQ peer problems in the Kinder ASD cohort than the Birth ASD cohort.

We compared the SDQ and PedsQL between the non-ASD children in both cohorts and none of the above differences found between the two cohorts of children with ASD were present. On the parent-reported PedsQL the non-ASD Birth cohort had a small but significantly lower school quality of life than the non-ASD Kinder cohort (Birth *M*=82.6, *SD*=18.4; Kinder *M*=83.8, *SD*=17.6; *p*=.034). Teacher reported conduct problems were significantly higher in the Kinder cohort than the Birth cohort, although the difference was

small (Birth *M*=0.6, *SD*=1.2; Kinder *M*=0.7, *SD*=1.5; *p*=.011). There were no other differences between the non-ASD Birth and Kinder cohorts.

Parent reported severity of symptoms was compared, with Chi Square tests indicating significant different proportions of severity for each cohort, Table 2. Parents reported that 70% of children had mild ASD in the Birth cohort versus 54% in the Kinder cohort. Only 24% of children were rated as moderate severity ASD in the Birth cohort compared to 41% in the Kinder cohort. Both cohorts reported around 5% of children had severe ASD.

<Insert Table 3 about here>

Quality of life and Emotional and behavioural problems: ASD Teacher & Parent versus Parent only report at 12-13 years of age

Children with teacher and parent reported ASD versus having only a parent ASD report were compared on the SDQ and PedsQL to understand any difference in functioning. Unadjusted means and standard deviations are reported in Table 4 as there were too few stratum to conduct survey methods for these smaller subgroups.

For the Kinder cohort, there were no difference in parent reported quality of life or social and emotional problems. Teachers reported significantly higher levels of hyperactivity on the SDQ for children with a teacher and parent report compared to children with only a parent report of ASD. For the Birth cohort, there were no significant differences in the groups for the SDQ (parent and teacher reports) or the PedsQL.

<Insert Table 4 about here>

Discussion

The aim of this research was to provide an updated parent and teacher reported prevalence estimate in the two cohorts of children from the LSAC. This study provides opportunities to understand any cohort effects which may influence ASD prevalence in Australia. The main finding was the later born Birth cohort continued to have higher parent and teacher reported ASD prevalence than the earlier born Kinder cohort at 12-13 years of age, and a milder presentation based on parent reported ASD severity levels. Teacher reports of ASD continued to be lower than parent reports in both cohorts.

There were no demographic differences to explain the prevalence differences between the two ASD cohorts when children were aged 12-13 years. There were within cohort differences between children with ASD and without ASD. In children with ASD in both cohorts, there was lower neighbourhood disadvantage, more males, and a higher proportion attended special schools than their non-ASD peers. Within the Kinder cohort, children reported to have ASD were more likely to live in a single parent household and to live with fewer other children. However, children with ASD in the Birth and Kinder cohorts were not statistically different on these factors and had similar rates of single parent households and other children in the family. The average age of ASD diagnosis, six years, was similar in the ASD Birth and Kinder cohorts; but the most frequent age at diagnosis was lower in the Kinder cohort (2 and 4 years) than the Birth cohort (5 and 6 years). Maternal and paternal age at childbirth were higher in the non-ASD Birth cohort compared to the non-ASD Kinder cohort; but there was no difference in these between the ASD Birth and Kinder cohorts. Thus,

there were few demographic differences between the children with ASD in the Birth and Kinder cohorts.

There were differences between cohorts in some areas of quality of life and emotional and behavioural problems in children with parent-reported ASD. Parents and teachers reported higher levels of peer problems in the ASD Kinder cohort compared to the ASD Birth cohort. Parents reported lower social and psychosocial quality of life in the Kinder cohort. Given social/peer challenges are a core deficit in ASD, as per our previous findings, the later born Birth cohort includes milder cases of ASD than the Kinder cohort. These differences were not reflecting differences in the broader cohorts as the non-ASD Kinder and Birth cohorts were not statistically different in these areas. Parents indicated mild ASD accounted for 70% of the Birth cohort versus only 54% of the Kinder cohort.

External factors such as increased public and service provider awareness of ASD over the period, the change to DSM-5 which may broaden what is considered ASD to now include milder cases, and diagnostic requirements for funding access to early intervention services and Medicare rebated therapy services may be involved. As noted previously, in Australia ASD-specific early intervention funding dependent on receiving an ASD diagnosis and to be used before a child turned 7 years of age was made available in 2008. This corresponds to the Kinder cohort being aged 8-9 years and so not eligible for the early intervention component; while the Birth cohort was aged 4-5 years when this was introduced and thus eligible if they had or were able to receive an ASD diagnosis. Additional allied health services are available up until a child turned 13 years of age. We speculate that a need for a diagnosis to access these essential services may have contributed to milder cases receiving a diagnosis; with

HCWA early intervention funding not available for the Kinder cohort. The impact of Medicare service age cut-off will only become clear when all children in the Birth cohort have turned 13. That teacher reports of ASD were lower than parent reports may be due to the stricter diagnostic severity requirements in some states for children to receive funding at school for ASD, although there were too few identified children to conduct a state comparison. For example, in Victoria, one of Australia's largest states, children at government schools require adaptive behaviour and language impairment to be two standard deviations below the mean to receive funding for ASD which is not a requirement of some other states. When children with teacher and parent versus parent only ASD diagnoses were compared, children with teacher and parent reports had more hyperactivity than parent only reported diagnoses, in the Kinder cohort. There were no other statistical differences but we note the small sample sizes likely did not have enough power to detect smaller differences for this subgroup analysis. Teachers reported more social and emotional problems and parents a lower quality of life in children with a parent and teacher report, suggesting that children with a parent only report had generally milder problems.

Limitations of this study include non-verified parent reported ASD diagnoses. It may be that parents have miss-reported diagnoses, although some research suggests that parents are very accurate reporters (Warnell et al., 2015) and this should not create internal validity risk. Furthermore, parent rated severity was based on a parent estimate without any standardised scale or instructions provided. Hence, parent report of severity may differ widely between parents. We also note the loss to follow up of LSAC with 66% of parents in the Birth cohort (wave 7; 81% teacher response) and 79% in the Kinder cohort (wave 5; 84%

teacher response) responding when the children were aged 12-13 years. The non-responders at age 12 were more socio-economically disadvantaged with lower parent education and age, more children in the home, higher rates of single parent families and English as a second language. This loss to follow up (which is inevitable in such a study) means that findings at later ages of the study are less representative of the Australian population and reflect more socio-economically advantaged families in Australia. We adjusted for this using survey methods and reported only these adjusted findings where possible, but note this significant limitation.

In summary, as expected with a lifelong condition that can be diagnosed at any age the prevalence of ASD continued to rise in the two LSAC cohorts, with parent reported ASD impacting between 2.9 to 4.4% of 12-13 year old Australian children. Identification of milder cases, likely driven by external factors such as a broadening of the diagnostic criteria, health systems requirements for service access and awareness of ASD, is likely to explain the higher prevalence of ASD in the younger cohort.

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Figure Captions

Figure 1. Adjusted percentage of children with ASD in LSAC based on parent and teacher reports in the Birth and Kinder cohorts. Six and eight years of age prevalence for Kinder cohort parent report are calculated based on parent reported age of diagnosis. Adjusted figures are reported based on LSAC sample design.

Figure 2. Frequency of parent-reported age of diagnosis in years in Birth and Kinder parent-reported ASD cases.

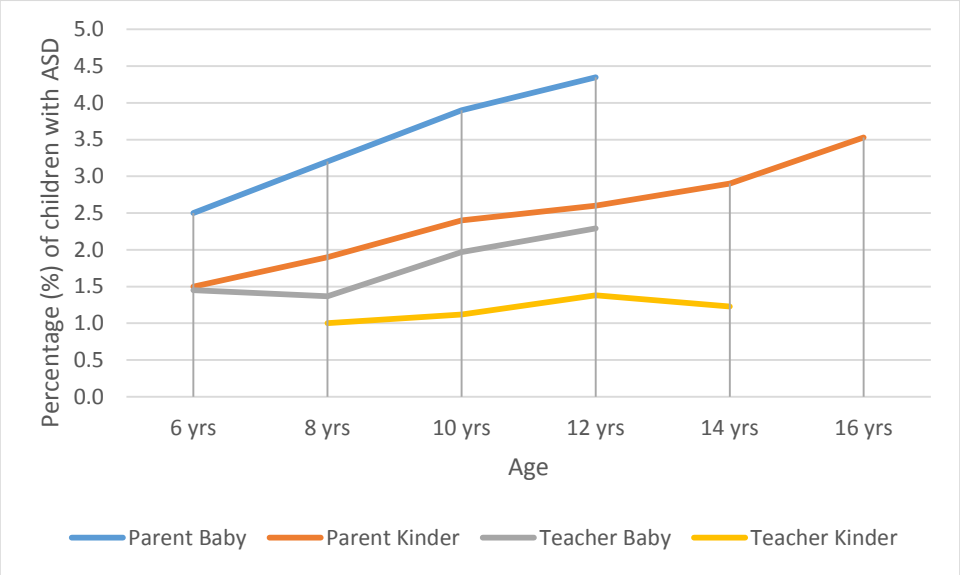

Figure 1. Adjusted percentage of children with ASD in LSAC based on parent and teacher reports in the Birth and Kinder cohorts. Six and eight years of age prevalence for Kinder cohort parent report are calculated based on parent reported age of diagnosis. Adjusted figures are reported based on LSAC sample design.

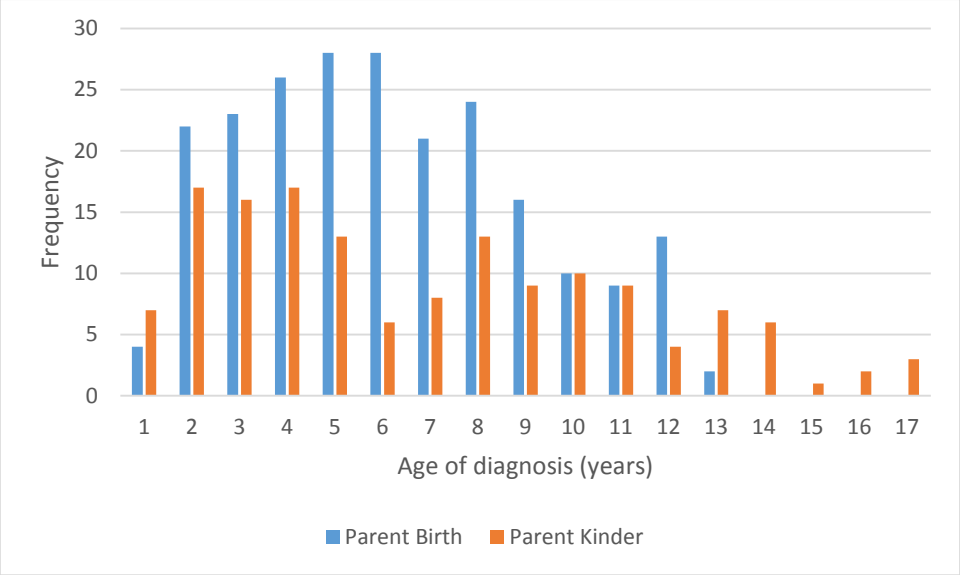

Figure 2. Frequency of parent-reported age of diagnosis in years in Birth and Kinder parent-reported ASD cases.

Table 1. Within cohort demographic comparison of baseline characteristics (age 4 years Kinder, age 0 years Birth) of responders and non-responders at age 12 years

Baseline variable (4 years Kinder; 0 years Birth)	Kinder responders N=3520-3,949†	Kinder non-responders N=797-1,034†	Birth responders N=2997-3,381†	Birth non-responders N=899-1,726†
Male (%)	51.1	10.2	51.3	50.6
Number of children at home, mean (SD)	1.5 (1.0)	1.5 (1.2)	0.9 (1.0)	1.0 (1.2)**
English main language spoken at home (%) ~	89.9	78.6	91.5	84.6**
Indigenous (%) ~	2.9	7.2**	2.6	8.3**
Remote/very remote location (%) ~	3.2	4.7*	4.2	4.8
Single parent family (%)	11.3	24.2**	5.7	16.5**
Maternal age at childbirth, mean (SD)	30.7 (5.0)	29.0 (6.1)**	31.5 (5.0)	29.8 (5.8)**
Paternal age at childbirth, mean (SD)	33.4 (6.0)	32.3 (6.7)**	33.9 (5.7)	32.9 (6.7)**
Primary caregiver did not complete high school (%)	38.2	55.9**	26.8	46.1**
Neighbourhood disadvantage, mean (SD)	1012.6 (58.2)	1005.6 (60.4)**	1013.0 (59.4)	1000.4 (61.1)**

*p<.05, **p<.01, based on simple regression or Chi Square test; †N reported as a range due to missing data across the outcome measures.

Table 2. Comparison of adjusted sample characteristics for children with parent-reported ASD and non-ASD in the Birth and Kinder cohorts at 12-13 years.

	Birth non-ASD N=3155	Birth ASD N=145	Kinder non-ASD N=3815	Kinder ASD N=98	Significant group differences
Child age in years, mean (SD)	12.9 (0.4)	12.9 (0.4)	12.9 (0.3)	12.9 (0.3)	-
Male (%)	50.0	76.6	51.2	75.6	Birth ASD > Birth Non-ASD; Kinder ASD > Kinder Non-ASD
Number of children at home, mean (SD)	2.6 (1.1)	2.4 (0.9)	2.6 (1.1) N=3184	2.7 (1.4)	Birth ASD < Birth Non-ASD
English main language spoken at home (%) ~	91.6	94.5	91.7	94.9	-
Indigenous (%) ~	2.8	2.5	2.8	2.0	-
Remote/very remote location (%) ~	3.6 N=3114	3.5 N=144	3.8 N=3784	2.0	-
Single parent family (%)	17.5	31.6	18.0	22.4	Birth ASD > Birth Non-ASD
Maternal age at childbirth, mean (SD)	31.0 (5.4)	30.1 (5.1)	30.4 (5.1)	29.3 (5.7)	Birth Non-ASD > Kinder Non-ASD
Paternal age at childbirth, mean (SD)	33.8 (6.0)	32.8 (5.7)	33.4 (6.2)	32.0 (6.5)	Birth Non-ASD>Kinder Non-ASD
Primary caregiver did not complete high school (%)	42.0	46.4	49.4	58.0	-
Child attends special school (%; teacher report)	0.4 N=2461	7.7 N=101	0.5 N=3138	10.7 N=83	Birth ASD > Birth Non-ASD; Kinder ASD > Kinder Non-ASD
Neighbourhood disadvantage, mean (SD)	1009.6 (70.9) N=3,154	991.3 (63.7)	1006.3 (69.7) N=3814	989.9 (71.0)	Birth ASD < Birth Non-ASD;

	Kinder ASD < Kinder Non-ASD

All proportions are weighted and adjusted for LSAC sample design; ~Unadjusted figure reported due to small sample size; ASD, autism spectrum disorder. Birth, Birth Cohort; Kinder, Kindergarten Cohort

Table 3. Comparison of quality of life (PedsQL) and emotional and behaviour problems (SDQ) at age 12-13 years.

	Birth ASD parent reported	Kinder ASD parent reported	*p* value~
SDQ parent M (SD)	N=143	N=87	
Emotional	**4.1 (2.6)**	**4.9 (2.2)**	**.004***
Conduct	2.2 (1.8)	2.4 (2.0)	.90
Hyperactivity	6.0 (2.4)	5.9 (2.4)	.80
Peer problems	**4.0 (2.0)**	**4.8 (2.1)**	**.001***
Prosocial^	6.6 (2.3)	6.2 (2.5)	.28
Total	**16.4 (6.2)**	**17.9 (5.8)**	**.01***
SDQ Teacher M (SD)	N=99-100	N=82	
Emotional	3.1 (2.5)	3.5 (2.4)	.65
Conduct	1.5 (1.9)	1.7 (2.4)	.28
Hyperactivity	5.0 (3.0)	4.3 (2.8)	.06
Peer problems	**2.9 (2.2)**	**4.0 (2.3)**	**.005****
Prosocial^	5.6 (2.6)	5.1 (2.5)	.32
Total	12.3 (7.0)	13.6 (7.2)	.99
Quality of life (PedsQL) M (SD)^	N=143	N=97	
Physical^	68.5 (21.3)	66.7 (20.7)	.25
Emotional^	57.2 (19.7)	56.8 (19.1)	.34
Social^	**57.2 (20.3)**	**50.7 (24.1)**	**.02***
School^	71.6 (23.9)	75.0 (22.2)	.52
Psychosocial^	**57.4 (15.9)**	**53.7 (18.5)**	**.019***
Total^	**62.3 (16.0)**	**59.4 (16.8)**	**.041***
Parent reported ASD severity (%)			
Mild	**70.3%**	**54.1%**	**.021~**
Moderate	**24.2%**	**40.8%**	
Severe	5.5%	5.1%	

^Higher scores indicate better functioning; ~Adjusted for child age and gender, number of children in the home, language spoken at home, indigenous status, geographic location, neighbourhood disadvantage, parent education, mother and father age at Birth. *p<.05; **p<.01; SDQ, strengths and difficulties questionnaire; ASD, Autism Spectrum Disorder; ~based on Chi Square test; PedsQL, Paediatric Quality of Life Inventory

Table 4. Comparison of teacher and parent reported ASD versus parent only reported ASD in the Birth and Kinder Cohorts for quality of life (PedsQL), emotional and behaviour problems (SDQ) at age 12-13 years.

	Birth parent & Teacher report (N=48)	Birth Parent only report (N=44-45†)	Kinder parent & Teacher report (N=40)	Kinder Parent only report (N=35-36†)
SDQ parent M (SD)				
Emotional	3.6 (2.6)	4.1 (2.8)	4.9 (2.3)	4.9 (2.2)
Conduct	2.0 (2.0)	1.9 (1.6)	2.4 (2.2)	2.0 (1.9)
Hyperactivity	5.8 (2.7)	5.8 (2.3)	6.2 (2.1)	5.5 (2.6)
Peer problems	4.2 (2.0)	3.4 (2.1)	4.6 (2.2)	4.4 (2.0)
Prosocial^	6.2 (2.7)	7.0 (2.1)	6.2 (2.5)	6.1 (2.6)
Total	15.7 (6.6)	15.2 (5.8)	18.1 (6.1)	16.8 (5.1)
SDQ Teacher M (SD)				
Emotional	3.3 (2.4)	2.7 (2.4)	4.0 (2.4)	3.4 (2.3)
Conduct	1.5 (1.9)	1.3 (1.8)	1.9 (2.4)	1.4 (2.1)
Hyperactivity	5.3 (3.0)	4.6 (3.0)	**5.0 (2.7)**	**3.8 (2.7)****
Peer problems	3.2 (2.4)	3.0 (2.2)	4.0 (2.3)	4.2 (2.1)
Prosocial^	5.0 (2.7)	5.7 (2.6)	5.1 (2.7)	4.9 (2.4)
Total	13.3 (7.1)	11.3 (6.5)	14.8 (7.3)	12.7 (6.5)
Quality of life (PedsQL) M (SD)^				
Physical^	66.6 (22.6)	71.7 (18.7)	69.5 (19.4)	62.9 (20.6)
Emotional^	59.5 (19.0)	56.6 (19.7)	56.6 (19.7)	58.7 (17.4)
Social^	51.1 (20.9)	62.2 (20.4)	51.0 (17.8)	54.4 (24.2)
School^	76.6 (23.3)	74.7 (19.5)	80.0 (19.4)	71.1 (22.4)
Psychosocial^	55.8 (16.7)	59.4 (15.4)	53.7 (15.8)	56.3 (17.8)
Total^	60.6 (16.9)	64.9 (14.8)	60.8 (15.3)	59.1 (15.6)
Parent reported ASD severity (%)				
Mild	70.8	77.8	55.0	52.8

Moderate	27.1	22.2	37.5	41.7
Severe	2.1	0	7.5	5.6

^Higher scores indicate better functioning; Unadjusted figures reported due to small sample size. *p<.05; **p<.01 adjusted for child age, sex, neighbourhood disadvantage, number of children in the family, parent education level; SDQ, strengths and difficulties questionnaire; ASD, Autism Spectrum Disorder; PedsQL, Paediatric Quality of Life Inventory; †N reported as a range due to missing data across the outcome measures.