International Journal of Population Data Science

Journal Website: www.ijpds.org

Enrolment, Attendance, and Education Resourcing and Support among 5-12 year old Autistic Students in Aotearoa New Zealand: A Nationwide Cross-sectional Study

Nicholas Bowden[1,2,*], Francesca Anns[3,4], Sally Clendon[5], Joanne Dacombe[1], Lisa Meehan[6], Hien Vu[1], Emma Woodford[2], and Laurie McLay[2]

Submission History

Submitted:	29/09/2025
Accepted:	08/12/2025
Published:	19/03/2026

[1] Department of Paediatrics and Child Health, Dunedin School of Medicine, Ōtākou Whakaihu Waka | University of Otago, Ōtepoti | Dunedin, Aotearoa | New Zealand

[2] Te Kaupeka Oranga | Faculty of Health and Child Well-being Research Institute, Te Whare Wānanga o Waitaha | University of Canterbury, Ōtautahi | Christchurch, Aotearoa | New Zealand

[3] COMPASS Research Centre, Waipapa Taumata Rau | University of Auckland, Tāmaki Makaurau | Auckland, Aotearoa | New Zealand

[4] School of Psychology, Waipapa Taumata Rau | University of Auckland, Tāmaki Makaurau | Auckland, Aotearoa | New Zealand

[5] Institute of Education, Te Kunenga ki Pūrehuroa | Massey University, Tāmaki Makaurau | Auckland, Aotearoa | New Zealand

[6] New Zealand Policy Research Unit, Te Wānanga Aronui o Tāmaki Makau Rau | Auckland University of Technology, Tāmaki Makaurau | Auckland, Aotearoa | New Zealand

Abstract

Introduction
Participation in education underpins positive lifelong outcomes, yet Autistic children often encounter barriers to enrolment, attendance, and access to support. Evidence indicates that systemic challenges such as inadequate support, limited autism-specific teacher training, and restricted access to resources contribute to disparities in educational outcomes. While small sample studies highlight these inequities, population-level evidence is limited.

Objectives
To quantify nationwide differences in school enrolment, attendance, and access to educational resourcing and support services between Autistic and non-Autistic children aged 5–12 years in Aotearoa New Zealand (NZ), and to examine variation by co-occurring intellectual disability (ID).

Methods
Cross-sectional analysis using NZ's Integrated Data Infrastructure, including all children aged 5–12 in 2019. Autism and ID were identified from hospital, mental health, and disability service use datasets. Outcomes included enrolment, attendance, and access to supports. Propensity score matching (1:10) compared Autistic and non-Autistic students across outcomes, including stratification by ID status.

Results
Among 517,872 students aged 5-12 years, 8,169 (1.6%) were Autistic and of those 28.8% had co-occurring ID. Compared to matched peers, Autistic children were less likely to be enrolled in school (94.9% vs. 97.4%; Prevalence ratio [PR]=0.97, 95% confidence interval [CI]=0.97-0.98) but more likely to be enrolled in specialist schools (14.4% vs. 0.2%; PR=70.15, 95% CI=65.73-74.88), Te Kura (2.1% vs. 0.2%; PR=9.65, 95% CI=8.22-11.34), or home-schooling (2.2% vs. 0.9%; PR=2.45, 95% CI=2.11-2.84). Regular attendance was lower (49.3% vs. 61.2; PR=0.80, 95% CI=0.79-0.82), with higher rates of chronic absence (7.7% vs. 3.2%; PR=2.45, 95% CI=2.27-2.64). Access to supports was significantly higher for Autistic students across a range of services. Disparities were often more pronounced among Autistic children with ID.

Conclusion
This study demonstrates significant differences in enrolment, attendance, and access to educational supports between Autistic and non-Autistic students in NZ, underscoring the urgent need for targeted and sufficiently resourced supports to ensure equitable participation.

Keywords
autism; education; school attendance; school enrolment; supports

*Corresponding Author:
Email Address: nick.bowden@otago.ac.nz (Nicholas Bowden)

https://doi.org/10.23889/ijpds.v10i2.3362

Introduction

Participation in formal education is critical for children's development and is strongly associated with a range of positive life outcomes. High levels of school attendance and academic achievement have been linked to higher employment rates and overall income, reduced involvement in the criminal justice system, and enhanced mental health and quality of life [1–3].

Autistic students experience a range of differences that can affect their participation in formal education. These can include differences in communication and social interaction, sensory processing, and higher rates of co-occurring mental (e.g., anxiety, attention-deficit/hyperactivity disorder) and physical health conditions (e.g., epilepsy) [4–11]. These individual-level factors are often exacerbated by structural and systemic barriers to accessing education (e.g., inadequate resourcing of specialist support), lack of inclusive environments and curriculums, practices that fail to accommodate the needs of Autistic students, and inadequate autism-specific teacher training [8, 12–14].

As a consequence of these barriers, Autistic students often experience lower levels of participation in education. This includes comparatively low rates of school enrolment [15, 16], irregular attendance, and higher rates of chronic absence, compared to their non-Autistic peers [13, 17–19]. Moreover, Autistic students are more likely to encounter social difficulties, including higher rates of peer exclusion, bullying [20–22], and feelings of loneliness [23, 24]. These experiences can further exacerbate difficulties accessing the curriculum, maintaining motivation, and managing school-related stress [25].

Due to increasing recognition of the challenges faced by Autistic students and the importance of educational engagement and attainment, it is crucial that these students have access to services and supports that facilitate their participation. Indeed, research shows that in-school support and adequate resourcing may improve educational, social, and mental health outcomes for Autistic youth [14, 26–30].

In Aotearoa New Zealand (NZ), in-school resourcing and support is provided via a range of Government-funded, Ministry of Education (MoE)-delivered individualised and school-based funding mechanisms, including School High Health Needs Funding (SHHNF), early intervention services, Interim Response Funding (IRF), and specialist Communication, Behaviour and Attendance Services (see Methods). The most comprehensive individual-level funding stream is the Ongoing Resourcing Scheme (ORS) which supports students with high and complex learning needs by providing access to specialist teachers, tailored resources, and support staff (e.g., teacher aides) to facilitate participation in schooling. Other funding supports may be directed toward specialist teacher training (e.g., *Incredible Years* teacher programme, *Tilting the Seesaw for Teams*, and learning support study awards to enable teachers to complete a specialist teaching qualification; [31–33]), tailored educational materials, and access to community services (e.g., public health nurse, mental health services). These initiatives aim to create an inclusive environment that addresses the diverse needs of students, and support school attendance, social inclusion, and academic achievement. Indeed, ORS funding was found to be associated with a reduced likelihood of suspension among Autistic children in NZ, highlighting the importance of providing appropriate resourcing and support for these students [27].

While there is evidence of the benefits of additional educational resourcing and supports for Autistic students [26, 27, 34], existing research predominantly focuses on short-term outcomes, settings that are not educationally based (e.g., participants' homes, laboratories), and relies heavily on small, non-representative samples [26]. This limits the generalisability of findings and often overlooks broader indicators of school participation and equity in access to educational supports. There is a scarcity of population-level research that systematically examines the multidimensional aspects of education for Autistic children using objective, administrative data sources. A recent systematic review on quantitative educational outcome research for Autistic students concluded that more research is needed to capture outcomes beyond academic attainment for this population [35].

This study addresses the lack of population-level evidence on educational access and support for Autistic students. The Stats NZ Integrated Data Infrastructure (IDI) is used to link health, education and social data, enabling the first nationwide analysis of school enrolment, attendance, and access to supports among Autistic students, with comparisons to non-Autistic peers and disaggregation by co-occurring intellectual disability (ID). This distinction is critical, as educational experiences and outcomes differ markedly for Autistic children with ID compared with those without ID [36]. The analysis provides comprehensive evidence on the scale and nature of educational inequities, demonstrates the potential of linked administrative data for monitoring disability equity in education, and generates policy-relevant insights into systematic shortcomings and opportunities for reform to create more inclusive schooling.

Methods

Study design and participants

This study was a nationwide retrospective cohort analysis that utilised individual level linked administrative data from the SNZ-IDI (see below for detail). The study population consisted of the SNZ-IDI estimated resident population (IDI-ERP) of all children aged 5–12 years in NZ for the 2019 calendar year, the most recent full school year of data available, unaffected by the COVID-19 Pandemic. The calendar year was chosen as this aligns with the NZ school year. This age range was selected to align with the typical schooling years for primary and intermediate education in NZ. However, compulsory education does not technically start until 6 years of age. Age was determined as of December 31, 2019. The IDI-ERP was derived using established methodologies for estimating resident populations within the SNZ-IDI framework [37]. In brief, this population is constructed by combining activity signals across multiple administrative datasets (e.g., health, education, tax, and border movements) and applying rules to determine whether an individual is likely to be a usual resident of NZ at a given reference point.

Data sources

All data were accessed through the SNZ-IDI, a secure, whole-of-population research database that links de-identified administrative and survey data from multiple government agencies using encrypted identifiers. Linkage in the SNZ-IDI occurs through deterministic matching using unique identifiers when available (e.g. National Student Number) and through probabilistic matching using name, date of birth, and sex, when deterministic linkage is not possible [38]. The IDI enables researchers to follow individuals over time and across sectors while ensuring privacy through the Five Safes framework (safe people, projects, settings, data, and outputs). The IDI covers nearly all usual NZ residents, allowing analyses that are both comprehensive and population-level.

Health data were sourced from routinely collected administrative datasets, including the National Minimum Dataset (NMDS) for publicly funded hospital discharges, the Programme for the Integration of Mental Health Data (PRIMHD) for specialist mental health service contacts, and Socrates, the national system used to administer and record Ministry of Health–funded disability support services. Education data were drawn from the MoE's ENROL (enrolment) system, attendance collections, and the School Leavers dataset, as well as funding and support service records. These data are collected by service providers and reported to the MoE for administrative purposes.

Demographic variables were obtained from the *Personal Details* and *Address Notification* tables, which are derived from multiple administrative sources including birth registrations, health enrolments, and tax records. The *Personal Details* table provide basic demographic information such as sex, date of birth, and ethnicity, while the *Address Notification* table contains tracking of individuals' usual residential addresses over time. The address notifications are sourced primarily from interactions with health, tax, and education systems, supporting consistent geographic assignment (e.g., deprivation index, region) for each individual at specific points in time.

Autism

To identify Autistic individuals, a well-established case ascertainment method was applied [39]. This approach identifies only those children and young people with a recorded autism diagnosis, based on diagnostic data from NMDS, PRIMHD, and Socrates. An individual was classified as Autistic if an autism diagnosis code appeared in any of these datasets at any point from birth onward (see Appendix Table 1 for further details). Those without such a diagnosis code were categorised as non-Autistic (general population); however, this group will include some Autistic children who do not have a recorded diagnosis. This methodology has been increasingly used in NZ-based research, however, it has not undergone formal validation [40–44].

Intellectual disability

The identification process for co-occurring intellectual (or learning) disability (hereafter referred to as ID) followed a methodology similar to that used for autism detection, based on an established approach [39]. Among the Autistic group, diagnostic data from PRIMHD, NMDS, and Socrates were reviewed. An individual was classified as having an ID if a relevant diagnosis code was present in any of these datasets (see Appendix Table 2 for further details).

Education outcomes

A range of educational outcomes were generated for the cohort across the following three sub-categories: school enrolment; school attendance; and supports and services.

School enrolment

Binary indicators for school enrolment (both public and private), specialist school enrolment (public), home-schooling, and Te Kura (public correspondence school providing distance education for students who are unable to attend a local school or require flexible, individualised learning) enrolment were generated using MoE enrolment data. Enrolment data covered the full 2019 calendar year, capturing any school moves that occurred during this period; as a result, students could appear in multiple enrolment categories if they changed schooling arrangements across the year. An individual was classified as being enrolled in school if there was a record of enrolment any time during the 2019 calendar year. Likewise, if there was a record of specialist school enrolment, home-schooling, or Te Kura enrolment during the 2019 calendar year, those respective indicators were set to '1'.

School attendance

School attendance data were captured from the SNZ-IDI code module table for school attendance which are sourced from the MoE. Four binary indicators of attendance were created in line with standard metrics used to track school attendance in NZ [45]. These included *regular attendance*: present for more than 90% of half-days; *irregular absence*: present for between 80-90% of half-days; *moderate absence*: present for between 70-80% of half-days; and *chronic absence*: present for 70% or less of half-days. A half-day of attendance is defined as being present for a minimum of two hours in the morning or afternoon.

Funding supports and services

A range of education-based funding supports and services measures were explored, as described below. It is important to note that each support and service has its own eligibility criteria. Therefore, it is possible, and in many cases likely, that not all students who would benefit from them are able to access them. In contrast, others may be receiving multiple supports and services. Binary indicators for each of the funding support and service measures were established using data from the MoE *interventions table*.

Ongoing Resourcing Scheme (ORS)

The ORS provides funding for students with significant and complex long-term needs. The funding is allocated based on the individual needs of each student, as assessed by certified assessors from the MoE, and it is not influenced

by the student's location or school. However, eligibility is narrow, and only 1.2% of students receive ORS funding [27]. This funding is given to schools to employ teacher aides, and/or specialist teachers, and to source necessary materials to facilitate learning alongside other students. Additionally, specialists such as speech-language therapists, psychologists, and occupational therapists may provide further assistance. However, funding is often not sufficient to cover the full costs of support in practice, as it does not meet the expense of a full-time teacher aide and requires schools to top up shortfalls from their own budgets. Once initiated, ORS funding continues throughout the student's schooling, although the funded amount may be reduced. For this reason, a student was considered to be ORS funded if an ORS start date was recorded prior to 31 December 2019, regardless of whether the funding began several years earlier.

School High Health Need Fund (SHHNF)

The SHHNF supports students with their health needs at school while helping them to optimally manage their own care needs. When students have a high health need and care and support is needed for more than 6 weeks, the SHHNF contributes towards the employment of a teacher aide.

Early intervention services

Early intervention services offer assistance to children with high needs from birth until they start school. This includes support in the transition into school, with a gradual handover to school-based services. Services are available to parents, families, and teachers to help develop a plan for the child's involvement in education. Early intervention teams collaborate with families and early childhood educators who seek help regarding concerns about a child's learning and development.

Interim Response Funding (IRF)

IRF provides short-term financial support to help keep students engaged in learning following a challenging event while a more comprehensive plan is developed. This funding has been utilised in cases of severe student behaviour that poses harm; distress among students, staff, families, or the community; and when school leadership has exhausted all available resources and strategies.

Communication service

The Communication Service is a specialised support service designed to assist children who have significant speech, language, and communication needs. This service provides expert help from speech-language therapists who work with children, their families, and educators to develop tailored strategies and interventions. The aim is to enhance the child's ability to communicate effectively, which is crucial for their overall learning and social interaction. This service is targeted to students aged 5-8 years.

Behaviour service

The Behaviour Service is a dedicated service aimed at supporting children and young people who exhibit challenging behaviours that impact their learning and social interactions. This service involves collaboration between specialist staff, including psychologists and behaviour specialists, who work closely with students, families, and educators to develop individualised behaviour plans. The goal is to help students develop self-regulation, social skills, and resilience, enabling them to engage more effectively in their education and improve their overall well-being.

Resource Teacher Learning Behaviour (RTLB)

RTLB is a specialised service aimed at assisting students who face significant challenges in learning and behaviour. RTLBs are trained educators who work collaboratively with teachers and schools to develop and implement strategies tailored to individual student needs. The service focuses on enhancing the educational outcomes of students by providing targeted interventions, professional guidance, and resources to schools.

Attendance services

Attendance Services is a programme dedicated to promoting and improving school attendance among students. This service works to identify and address barriers to regular school attendance, ensuring that every child has the opportunity to participate fully in their education.

Sociodemographic measures

Sex (male/female) and ethnicity data were sourced from the *personal details table*. Due to the lack of available data on non-binary gender identities, sex was classified as either male or female. Ethnicity was determined using the total response method, allowing individuals to identify with multiple ethnic groups. Participants were categorised into three groups: Māori (the indigenous people of NZ), Pacific, and non-Māori/non-Pacific (NMNP), based on three distinct binary variables, meaning some individuals were counted in both the Māori and Pacific groups where they identified as such. Data on neighbourhood-level deprivation and urban/rural classification were obtained from the residential address meshblock, recorded in the *address notification table* as of December 31, 2019. Deprivation was assessed using the 2018 New Zealand Index of Deprivation (NZDep) [46], which aggregates a range of Census-derived indicators including employment, income, education, and home ownership into a single index. This index was collapsed into quintiles, with one representing the least deprived areas and five indicating the most deprived. Urban or rural residence was classified using Stats NZ's standard urban/rural classification, where rural areas can be conceptualised as locations with fewer than 1,000 residents [47].

Statistical analysis

Initially the participant population was described including their sociodemographic characteristics, stratified by autism and co-occurring ID status. To facilitate comparison of education outcomes, matched samples of non-Autistic children were drawn from the 2019 IDI-ERP, separately for the overall Autistic population, Autistic population without

ID, and Autistic population with ID. Propensity score matching was used to select these non-Autistic counterparts, employing the 'MatchIt' package (version 3.0.2) in R with a nearest-neighbour one-to-ten matching strategy [48]. Matches were selected without replacement based on age in years, sex, ethnicity, deprivation level, and urban/rural residence. Individuals with an autism diagnosis or missing data in any matching variable were excluded from the comparison pool. Balance on matching variables was assessed and confirmed. This matching approach was chosen to create directly comparable groups with similar demographic profiles, providing clearer descriptive contrasts than regression-based adjustments alone. Prevalence ratios (PR) with 95% confidence intervals (CIs) were reported. Reporting of results were informed by RECORD guidelines [49].

Community involvement

This research actively engaged members of the Autistic and autism communities. This includes co-authors who are Autistic, family of Autistic people, and professionals working in health and education that support Autistic people.

Results

The 2019 IDI-ERP contained 517,872 children aged 5–12 years, of whom 8,169 (1.6%) were identified as Autistic. Among the Autistic population, 2,349 (28.8%) had a co-occurring ID. The demographic characteristics of the study population, stratified by autism and ID status, are presented in Table 1. Compared to non-Autistic children, Autistic children were more likely to be male (79.5% vs. 51.0%), less likely to identify as Pacific (11.9% vs. 14.4%), and less likely to live in the least deprived (18.3% vs. 21.5%) or rural areas (11.6% vs. 13.9%). Within the Autistic population, those with a co-occurring ID were more likely to be Pacific (19.7% vs. 8.8%), reside in areas of the highest level of deprivation (29.9% vs. 20.1%), and less likely to live in rural areas (8.2% vs. 12.9%), relative to Autistic children without ID.

Table 2 presents rates of educational outcomes and propensity score matched PR and 95% CIs for key educational outcomes among Autistic and non-Autistic children (see Supplementary Appendix Table 3 for observed educational outcomes). Autistic children were less likely to be enrolled in school compared to their non-Autistic peers (94.9% vs. 97.4%, PR = 0.97; 95% CI: 0.97–0.98), indicating a small but significant difference in overall school participation. However, they were significantly more likely to be enrolled in specialist schools (14.4% vs. 0.2%, PR = 70.15; 95% CI: 65.73–74.88), be enrolled in Te Kura (2.1% vs. 0.2%, PR = 9.65; 95% CI: 8.22–11.34), and to be home-schooled (2.2% vs. 0.9%, PR = 2.45; 95% CI: 2.11–2.84).

School attendance rates differed significantly between groups. Regular school attendance was lower among Autistic children compared to their non-Autistic peers (49.3% vs. 61.2%, PR = 0.80; 95% CI: 0.79–0.82). The rate of moderate absence (i.e., attending 70-80% of school days) was

Table 1: Demographic characteristics of the 5-12 year old population by autism and intellectual disability status, 2019

	Non-Autistic		Autistic		Autistic without ID		Autistic with ID	
	n	%	n	%	n	%	n	%
Total	509,703		8,169		5,820		2,349	
Sex								
Female	249,957	49.0	1,677	20.5	1,191	20.5	486	20.7
Male	259,746	51.0	6,492	79.5	4,629	79.5	1,863	79.3
Age (years)								
5-6	120,996	23.7	1,818	22.3	1,269	21.8	549	23.4
7-9	193,593	38.0	3,183	39.0	2,244	38.6	939	40.0
10-12	195,114	38.3	3,168	38.8	2,307	39.6	861	36.7
Ethnicity								
Māori	141,018	27.7	2,262	27.7	1,578	27.1	684	29.1
Pacific	73,173	14.4	972	11.9	510	8.8	462	19.7
NMNP	319,086	62.6	5,325	65.2	3,963	68.1	1,362	58.0
Deprivation								
1 (least deprived)	109,587	21.5	1,491	18.3	1,116	19.2	375	16.0
2	96,150	18.9	1,506	18.4	1,104	19.0	402	17.1
3	91,338	17.9	1,509	18.5	1,131	19.4	378	16.1
4	90,864	17.8	1,659	20.3	1,209	20.8	450	19.2
5 (most deprived)	111,528	21.9	1,869	22.9	1,167	20.1	702	29.9
Urban/Rural								
Urban	429,474	84.3	7,107	87.0	4,983	85.6	2,124	90.4
Rural	70,959	13.9	945	11.6	753	12.9	192	8.2

NMNP = non-Māori/non-Pacific.

Table 2: Educational outcomes comparison between 1:10 propensity score matched Autistic (N = 8,040) and non-Autistic populations (N = 80,367)

	Autistic n (%)	Non-Autistic n (%)	Autistic/non-Autistic PR (95% CI)
Enrolment			
School enrolment			
Yes	7,629 (94.9)	78,303 (97.4)	0.97 (0.97, 0.98)
No	411 (5.1)	2,064 (2.6)	
Specialist School enrolment			
Yes	1,158 (14.4)	165 (0.2)	70.15 (65.73, 74.88)
No	6,882 (85.6)	80,202 (99.8)	
Te Kura			
Yes	168 (2.1)	174 (0.2)	9.65 (8.22, 11.34)
No	7,872 (97.9)	80,193 (99.8)	
Home school			
Yes	177 (2.2)	723 (0.9)	2.45 (2.11, 2.84)
No	7,863 (97.8)	79,644 (99.1)	
Attendance			
Regular attendance			
Yes	3,960 (49.3)	49,176 (61.2)	0.80 (0.79, 0.82)
No	4,080 (50.7)	31,191 (38.8)	
Irregular attendance			
Yes	1,710 (21.3)	16,659 (20.7)	1.03 (0.98, 1.07)
No	6,330 (78.7)	63,708 (79.3)	
Moderate attendance			
Yes	645 (8.0)	4,329 (5.4)	1.49 (1.38, 1.6)
No	7,395 (92.0)	76,038 (94.6)	
Chronic attendance			
Yes	621 (7.7)	2,538 (3.2)	2.45 (2.27, 2.64)
No	7,419 (92.3)	77,829 (96.8)	
Funding supports and services			
ORS			
Yes	2,460 (30.6)	540 (0.7)	45.54 (43.9, 47.23)
No	5,580 (69.4)	79,827 (99.3)	
SHHNF			
Yes	210 (2.6)	312 (0.4)	6.73 (5.85, 7.74)
No	7,830 (97.4)	80,055 (99.6)	
IRF			
Yes	147 (1.8)	249 (0.3)	5.9 (4.99, 6.98)
No	7,893 (98.2)	80,118 (99.7)	
Early intervention			
Yes	1,062 (13.2)	1,131 (1.4)	9.39 (8.86, 9.94)
No	6,978 (86.8)	79,236 (98.6)	
Behaviour service			
Yes	618 (7.7)	762 (0.9)	8.11 (7.5, 8.77)
No	7,422 (92.3)	79,605 (99.1)	
Communication service			
Yes	663 (8.2)	1,287 (1.6)	5.15 (4.78, 5.55)
No	7,377 (91.8)	79,080 (98.4)	
RTLB			
Yes	672 (8.4)	1,131 (1.4)	5.94 (5.52, 6.4)
No	7,368 (91.6)	79,236 (98.6)	
Attendance services			
Yes	183 (2.3)	1,491 (1.9)	1.23 (1.06, 1.42)
No	7,857 (97.7)	78,876 (98.1)	

ORS = Ongoing Resourcing Scheme; SHHNF = School High Health Needs Fund; IRF = Interim Response Fund; RTLB = Resource Teacher Learning Behaviour.

significantly elevated among Autistic children (8.0% vs. 5.4%, PR = 1.49; 95% CI: 1.38–1.60), and chronic absence was more than twice as high in Autistic students compared to non-Autistic students (7.7% vs. 3.2%, PR = 2.45; 95% CI: 2.27–2.64), reflecting a pronounced risk of sustained school absence.

Autistic children were substantially more likely to receive funding supports and services than their non-Autistic peers. ORS funding was nearly 46 times more likely among Autistic students (30.6% vs. 0.7%, PR = 45.54; 95% CI: 43.90–47.23). Other funding schemes also showed significant disparities, including the School High Health Needs Fund (2.6% vs. 0.4%, PR = 6.73; 95% CI: 5.85–7.74) and Interim Response Fund (1.8% vs. 0.3%, PR = 5.90; 95% CI: 4.99–6.98). Autistic children were significantly more likely to access early intervention services (13.2% vs. 1.4%, PR = 9.39; 95% CI: 8.86–9.94), while participation in behaviour services was also significantly higher (7.7% vs. 0.9%, PR = 8.11; 95% CI: 7.50–8.77). Similarly, the use of the Resource Teacher Learning and Behaviour (RTLB) service was significantly more common among Autistic students (8.4% vs. 1.4%, PR = 5.94; 95% CI: 5.52–6.40). However, attendance service utilisation was only slightly higher in Autistic children (2.3% vs. 1.9%, PR = 1.23; 95% CI: 1.06–1.42).

Educational outcomes for Autistic populations, both with and without co-occurring ID compared to their matched non-Autistic counterparts, were broadly consistent with those observed in the overall Autistic population and their matched non-Autistic peers (see Figures 1–3 and Supplementary Appendix Table 4). A notable exception was that while specialist school enrolment was significantly higher in both Autistic groups, it was notably higher among Autistic children with ID (46.5% vs. 4.5%, PR = 10.42; 95% CI: 9.81–11.07). In contrast, Autistic children without ID had higher relative rates of home-schooling compared to Autistic children with ID.

School attendance patterns showed lower regular attendance and higher rates of absenteeism in both Autistic groups with marginal variation between Autistic students with and without ID.

There were some marked disparities in the receipt of educational supports and services between Autistic students with and without ID. ORS funding was substantially more common, among Autistic children with ID (26.3% vs. 0.3%, PR = 96.54; 95% CI: 75.26–123.83). Access to the SHHNF, early intervention, behavioural, communication, and attendance services was consistently higher for both Autistic groups compared to non-Autistic peers, with PRs often exceeding five. Notably, Autistic children without ID were more likely to use attendance services (PR = 1.46; 95% CI: 1.35–1.58), whereas Autistic children with ID used these slightly less than their matched counterparts (PR = 0.86; 95% CI: 0.76–0.97).

Discussion

This nationwide cross-sectional study used linked SNZ-IDI data to examine school enrolment, attendance, and access to funding supports and services among 5-12 year old Autistic children with and without ID, and their non-Autistic peers. The findings revealed that Autistic students were less likely to be enrolled in mainstream education; more likely to be enrolled in specialist schools, Te Kura, or be home-schooled; and exhibited higher rates of absenteeism compared to their non-Autistic peers. Additionally, Autistic students were significantly more likely to receive funding supports

Figure 1: Propensity score matched enrolment rate ratios comparing Autistic, Autistic without ID and Autistic with ID to matched non-Autistic samples

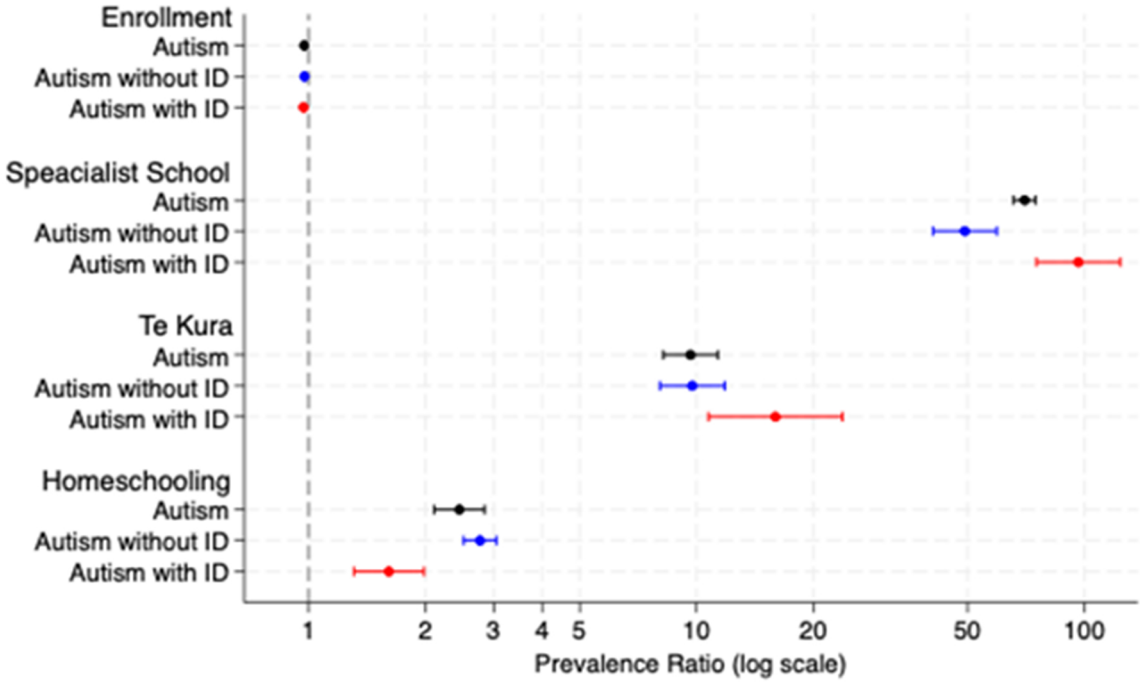


Figure 2: Propensity score matched attendance rate ratios comparing Autistic, Autistic without ID and Autistic with ID to matched non-Autistic samples

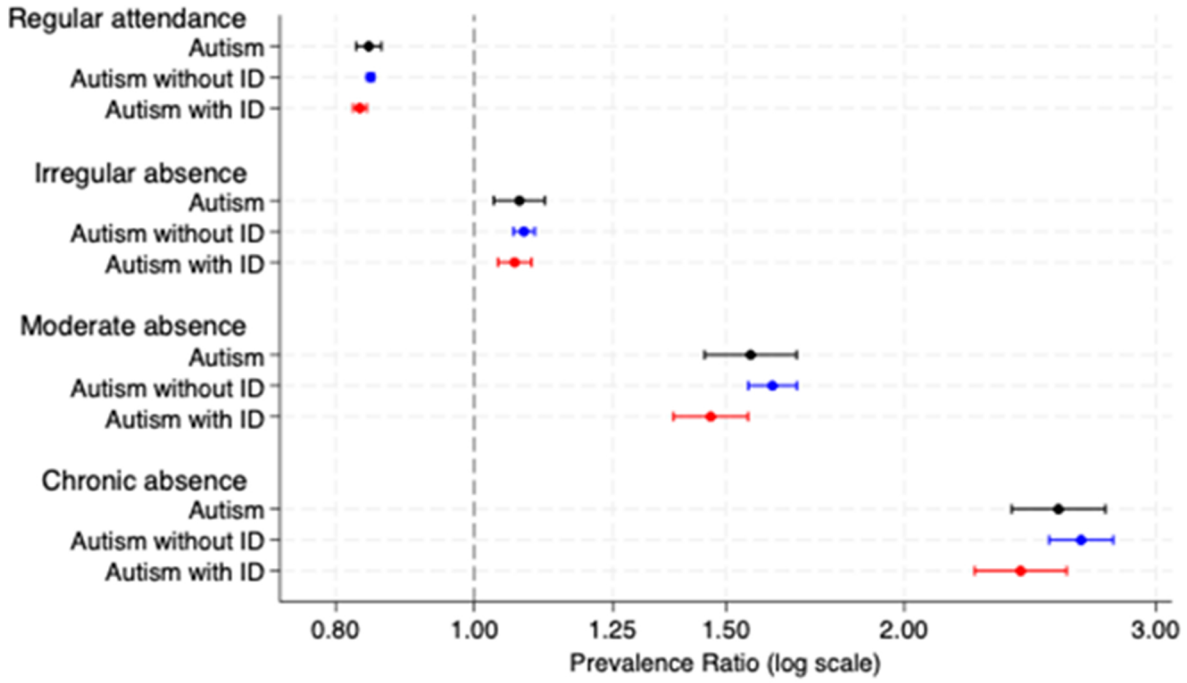
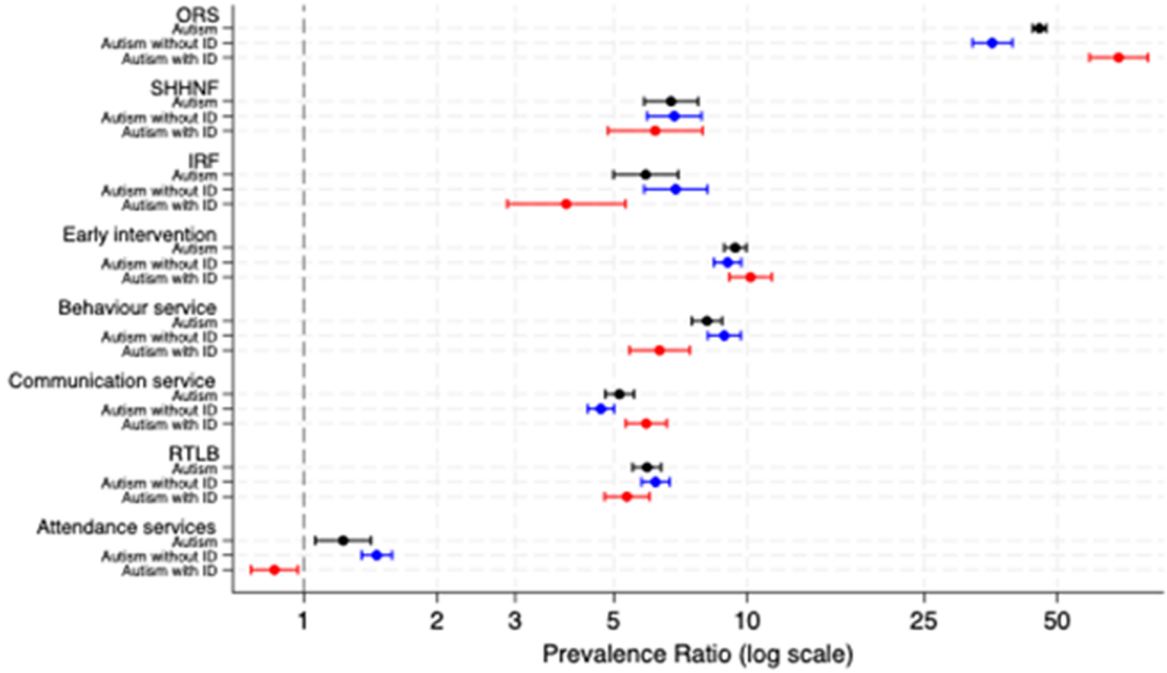


Figure 3: Propensity score matched funding supports and services rate ratios comparing Autistic, Autistic without ID and Autistic with ID to matched non-Autistic samples



ORS = Ongoing Resourcing Scheme; SHHNF = School High Health Needs Fund; IRF = Interim Response Fund; RTLB = Resource Teacher Learning Behaviour.

and services. These differences were particularly pronounced among Autistic children with an ID, highlighting both the complexity of their educational needs and the efforts to address these through targeted resources and individualised support.

Interpretation of findings

The findings pertaining to enrolment align closely with patterns observed in extant literature [15, 16, 22]. Mainstream schools often pose challenges for Autistic students due to

learning, social and sensory processing differences and a lack of appropriate supports and accommodations [50]. These challenges can result in high levels of anxiety, school avoidance and withdrawal [14, 22]. As a result, many families opt for specialist education environments that may be better equipped to respond to the individualised needs of their children [51], or turn to home or correspondence schooling when mainstream options are perceived to be inadequate [52]. It can often be the case that parents feel forced into these decisions out of necessity rather than preference, highlighting a lack of inclusion, resourcing and support within mainstream schools for Autistic learners [52, 53] that may be particularly amplified among those with an ID.

These enrolment patterns are mirrored in school attendance data, where Autistic students not only attend school less frequently than their non-Autistic peers, but are disproportionately represented among those with particularly high absenteeism. While enrolment provides a basic indicator of participation, attendance offers a more sensitive measure of ongoing engagement, which likely accounts for the larger differences observed. These attendance patterns may point to many of the same systemic barriers that shape enrolment decisions and are consistent with existing evidence of low attendance among Autistic students [12, 17]. The finding that Autistic children with ID are more likely to attend specialist schools and, at the same time, record lower rates of absenteeism than their Autistic peers without ID further underscores issues of educational fit. It suggests that mainstream environments may not adequately meet the needs of Autistic students, whereas specialist schools appear to provide more supportive and accommodating settings, particularly for those with greater learning differences, enabling more consistent attendance. While this study cannot identify the factors driving observed patterns, these findings suggest that both enrolment and attendance disparities reflect broader systemic barriers within mainstream education and underscore the need for further research that interrogates factors associated with these educational outcomes.

The comprehensive set of findings on education-based funding supports and services among Autistic compared to non-Autistic students is a first for NZ and novel internationally. These findings are comparable to a NZ Ministry of Education report that explored a similar set of supports and services among disabled learners [54]. Likewise, international research quantifying levels of education-based supports, while sparse, demonstrated higher rates of speech and language therapy, occupational therapy and other specialist supports (e.g., computer software or hardware and transportation) among Autistic compared to non-Autistic students [55].

While technically access to funding supports is needs based and does not require a diagnosis, the reality is that a diagnosis is likely to enable better access to support. A diagnosis itself is not mandatory, but the information contained in diagnostic assessment reports can be invaluable in helping parents and school teams describe and evidence a child's needs when applying for funding. It can also provide a foundation for advocacy and may connect families and schools with autism-specific services and supports. As a result, access to many supports still effectively hinges on having a formal diagnosis, meaning the study findings reflect not only differences in need but also inequities in recognition and service access. However, given the cross-sectional nature of these data, the direction of this relationship cannot be determined: while diagnosis may facilitate access to supports, it is also plausible that receiving additional supports within schools could prompt referrals to health services, ultimately leading to a formal diagnosis.

While these findings indicate relatively high levels of targeted investment in support services, lower rates of mainstream school enrolment and elevated absenteeism among Autistic students suggest they may still not be receiving the levels or type of support necessary to ensure equitable access, inclusion, and sustained engagement in mainstream education. Given that funding is often allocated according to the complexity of children's learning and communication needs, and with thresholds for eligibility set very high, it is unsurprising that children with ID received higher rates of early, ongoing, and individualised supports (e.g., ORS, early intervention, communication services) than their non-Autistic peers, while Autistic children without ID were more likely to receive attendance service involvement, reflecting their higher rates of non- or limited attendance.

Policy implications

The data presented in this study do not identify the reasons for disparities in enrolment or attendance rates. However, they highlight the need for a multi-pronged evidence-informed solution, coordinated across school- and system-levels, and supported by targeted investment. At the individual level, education should prioritise personalised learning and assessment approaches and environments that respond to the diverse needs, preferences, and interests of Autistic students. This may include flexible models of assessment and teaching, sensory accommodations, and modifications to the learning environment. School-wide inclusion must be reinforced through strong leadership, adequate resourcing, professional development, and whole-school strategies that foster belonging and reduce barriers (e.g., bullying). Finally, at the systems level, equitable diagnostic pathways, sustained investment in specialist services, and evidence-informed practice frameworks are fundamental, and must be co-designed and developed alongside Autistic people.

Evidence from NZ and internationally shows that early, school-based, targeted supports can enhance educational outcomes, buffer against exclusion, and support consistent attendance [26, 27, 56, 57]. However, mainstream educational systems often struggle to provide such support. Recent commitments in Budget 2025, the NZ Government's annual fiscal plan outlining national spending priorities, included a $746.7 million funding commitment. This includes the extension of the Early Intervention Service into Year 1, increasing funded teacher aide hours, the roll-out of Learning Support Coordinators to all Year 1–8 schools, increased funding and structural reform of ORS, and investment in workforce development [58]. This presents a unique opportunity to enhance school attendance and engagement. However, equitable uptake, effective implementation, and rigorous population-level evaluation of outcomes and impacts, will be critical to ensure these investments translate into meaningful and sustained improvements for Autistic students.

Limitations

This study has several limitations that should be considered when interpreting the findings. First, the cross-sectional design limits the ability to infer causality between support access and educational outcomes. Accordingly, while we describe who receives support, we cannot determine whether these supports were effective in improving enrolment, attendance or other relevant outcomes. Second, the reliance on contact with specific parts of the health system to capture diagnoses of autism, and the absence of data from primary care and outpatient settings, will undercount the true prevalence of autism [39]. For context, our estimated prevalence of 1.6% is notably lower than estimates from the United States of approximately 2.3% from a comparable time period [59]. Underestimation may also be uneven. In NZ, autism diagnosis typically requires referral to specialist paediatric or psychological services through primary care, early childhood centres, or schools. Access to these services is affected by wait times, regional availability, and parental advocacy, creating inequities in who is identified [43, 60, 61]. Internationally, children from higher socioeconomic backgrounds are often more likely to be diagnosed, particularly without ID [62, 63]. Girls may also be underrepresented due to male-biased diagnostic frameworks [64]. These patterns suggest that the identified cohort represents a subset of Autistic students who are formally diagnosed and engaged with services, rather than the full population of Autistic students in NZ schools. This may result in an element of selection bias, thereby impacting findings. A similar issue is likely for ID, where diagnosis and recording may also be incomplete due to the same data gaps. Third, while propensity score matching improved comparability, residual confounding from unobserved factors remains possible. Specifically, our data was limited to binary information on sex, preventing us from capturing gender diversity, which is known to be more prevalent among Autistic young people and may be relevant to understanding educational outcomes [65]. Finally, the absence of qualitative data restricts insights into the lived experiences of Autistic students and their families, which are crucial for understanding the enablers and barriers to school participation.

Future work

Future research should begin by developing a deeper understanding of the enablers and barriers to school attendance, engagement and achievement, and the role of resourcing and supports in enhancing these outcomes. This would provide the necessary foundation to inform the development of targeted approaches to supporting individual, school-wide, and systemic change. Development of supports should be co-designed with Autistic and autism communities to ensure they reflect the priorities and lived experiences of the intended beneficiaries. These supports should take a multi-layered approach, integrating enhanced teacher education, inclusive curriculum design, flexible learning environments, and responsive behavioural and emotional support strategies and should be informed by robust research evidence. It is essential that supports, modifications, and interventions are systemically evaluated to determine their impact on both immediate participation and long-term educational outcomes for Autistic students, ensuring accountability and continual improvement. Future studies could also examine how timing of diagnosis influences access to supports and outcomes, and investigate overlap between different supports to understand which combinations are most effective. Longitudinal approaches would enable tracking of attendance, engagement, and support use over time, and provide clearer evidence on whether disparities widen, narrow, or persist.

Conclusion

This study highlights significant differences in school enrolment, attendance, and access to funding supports and services between Autistic and non-Autistic students in NZ. The findings emphasise the critical need for targeted and adequately funded educational supports to promote equitable school participation for Autistic students.

Acknowledgements

The work was supported by funding from the Laura Ferguson Trust Ltd and the New Zealand Policy Research Institute - AUT. The funders did not have any role in the study design, data collection, or decision to submit this work for publication.

Statement of conflicts of interest

None declared

Ethics statement

Ethical approval was granted by the University of Otago Human Research Ethics Committee (Reference: HD17/004).

Data availability statement

The data supporting this study's findings are available with the Integrated Data Infrastructure (IDI), curated by Stats NZ. Restrictions apply to the availability of these data, which are used under license for this study. To apply for access to these data please see https://www.stats.govt.nz/integrated-data/how-to-apply-to-integrate-new-data/#how-add.

AI disclosure statement

The authors used ChatGPT for the purpose of language editing in this manuscript. The output was reviewed and verified by the authors.

Disclaimer

These results are not official statistics. They have been created for research purposes from the Integrated Data Infrastructure (IDI) which is carefully managed by Stats NZ. For more information about the IDI please visit https://www.stats.govt.nz/integrated-data/.

References

1. Hancock K, Shepherd C, Lawrence D, Zubrick S. Student attendance and educational outcomes: Every day counts: Department of Education Employment and Workplace Relations; 2013. https://doi.org/10.13140/2.1.4956.6728

2. Kennedy-Turner K, Serbin LA, Stack DM, Ledingham JE, Schwartzman AE. Beyond educational attainment: The role of achievement and school absence in the development of criminal justice involvement. Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement. 2021;53(4):412. https://doi.org/10.1037/cbs0000260

3. Flower RL, Richdale AL, Lawson LP. Brief report: What happens after school? Exploring post-school outcomes for a group of autistic and non-autistic Australian youth. Journal of Autism and Developmental Disorders. 2021;51(4):1385–91. https://doi.org/10.1007/s10803-020-04600-6

4. American Psychiatric Association. Diagnostic and statistical manual of mental disorders: DSM-5: Washington, DC: American Psychiatric Association; 2013. https://doi.org/10.1176/appi.books.9780890425596

5. Lai M-C, Kassee C, Besney R, Bonato S, Hull L, Mandy W, et al. Prevalence of co-occurring mental health diagnoses in the autism population: a systematic review and meta-analysis. The Lancet Psychiatry. 2019;6(10):819–29. https://doi.org/10.1016/S2215-0366(19)30289-5

6. Micai M, Fatta LM, Gila L, Caruso A, Salvitti T, Fulceri F, et al. Prevalence of co-occurring conditions in children and adults with autism spectrum disorder: A systematic review and meta-analysis. Neuroscience & Biobehavioral Reviews. 2023;155:105436. https://doi.org/10.1016/j.neubiorev.2023.105436

7. Rosen TE, Mazefsky CA, Vasa RA, Lerner MD. Co-occurring psychiatric conditions in autism spectrum disorder. International review of psychiatry. 2018;30(1):40–61. https://doi.org/10.1080/09540261.2018.1450229

8. Hedges SH, Kirby AV, Sreckovic MA, Kucharczyk S, Hume K, Pace S. " Falling through the cracks": challenges for high school students with autism spectrum disorder. The High School Journal. 2014;98(1):64–82. https://doi.org/10.1353/hsj.2014.0014

9. Leitner Y. The co-occurrence of autism and attention deficit hyperactivity disorder in children–what do we know? Frontiers in human neuroscience. 2014;8:268. https://doi.org/10.3389/fnhum.2014.00268

10. Rosello R, Martinez-Raga J, Mira A, Pastor JC, Solmi M, Cortese S. Cognitive, social, and behavioral manifestations of the co-occurrence of autism spectrum disorder and attention-deficit/hyperactivity disorder: A systematic review. Autism. 2022;26(4):743–60. https://doi.org/10.1177/1362361321106554

11. Mutluer T, Aslan Genç H, Özcan Morey A, Yapici Eser H, Ertinmaz B, Can M, et al. Population-based psychiatric comorbidity in children and adolescents with autism spectrum disorder: A meta-analysis. Frontiers in Psychiatry. 2022;13:856208. https://doi.org/10.3389/fpsyt.2022.856208

12. Nordin V, Palmgren M, Lindbladh A, Bölte S, Jonsson U. School absenteeism in autistic children and adolescents: A scoping review. Autism. 2024;28(7):1622–37. https://doi.org/10.1177/13623613231217409

13. Adams D. Child and parental mental health as correlates of school non-attendance and school refusal in children on the autism spectrum. Journal of Autism and Developmental Disorders. 2022;52(8):3353–65. https://doi.org/10.1007/s10803-021-05211-5

14. Adams D, Malone S, Dargue N, Rodgers J, Simpson K, Wicks R, et al. Brief Report: School Anxiety, School Attendance and School Refusal/Distress Following an Autism-Specific Parent-Mediated Intervention for Anxiety in Preschoolers. Journal of Autism and Developmental Disorders. 2025:1–7. https://doi.org/10.1007/s10803-025-06828-6

15. Pillay S, Duncan M, de Vries PJ. Who's waiting for a school? Rates, socio-demographics, disability and referral profile of children with autism spectrum disorder awaiting school placement in the Western Cape Province of South Africa. Autism. 2022;26(7):1849–63. https://doi.org/10.1177/13623613211067324

16. Netherlands Autism Register. NAR in cijfers [NAR in numbers]. 2022.

17. Bowden N, Anns F, Vu H, Dacombe J, Muir C, Russell J, et al. School Attendance Among Autistic Students in Aotearoa/New Zealand: A Population Cross-Sectional Study Using the Integrated Data Infrastructure. Journal of Paediatrics and Child Health. 2025. https://doi.org/10.1111/jpc.16795

18. Totsika V, Hastings RP, Dutton Y, Worsley A, Melvin G, Gray K, et al. Types and correlates of school non-attendance in students with autism spectrum disorders. Autism. 2020;24(7):1639–49. https://doi.org/10.1177/1362361320916967

19. Munkhaugen EK, Torske T, Gjevik E, Nærland T, Pripp AH, Diseth TH. Individual characteristics of students with autism spectrum disorders and school refusal behavior. Autism. 2019;23(2):413–23. https://doi.org/10.1177/1362361317748619

20. Kaljača S, Dučić B, Cvijetić M. Participation of children and youth with neurodevelopmental disorders in after-school activities. Disability and Rehabilitation. 2019;41(17):2036–48. https://doi.org/10.1080/09638288.2018.1457092

21. Locke J, Shih W, Kretzmann M, Kasari C. Examining playground engagement between elementary school

children with and without autism spectrum disorder. Autism. 2016;20(6):653–62. https://doi.org/10.1177/1362361315599468

22. O'Hagan S, Bond C, Hebron J. What do we know about home education and autism? A thematic synthesis review. Research in Autism Spectrum Disorders. 2021;80:101711. https://doi.org/10.1177/1362361315599468

23. Chang Y-C, Chen C-H, Huang P-C, Lin L-Y. Understanding the characteristics of friendship quality, activity participation, and emotional well-being in Taiwanese adolescents with autism spectrum disorder. Scandinavian journal of occupational therapy. 2019;26(6):452–62. https://doi.org/10.1177/1362361315599468

24. Deckers A, Muris P, Roelofs J. Being on your own or feeling lonely? Loneliness and other social variables in youths with autism spectrum disorders. Child Psychiatry & Human Development. 2017;48(5):828–39. https://doi.org/10.1007/s10578-016-0707-7

25. Keen D, Adams D, Simpson K. Teacher ratings of academic skills and academic enablers of children on the autism spectrum. International Journal of Inclusive Education. 2023;27(10):1085–101. https://doi.org/10.1080/13603116.2021.1881626

26. Macmillan CM, Pecora LA, Ridgway K, Hooley M, Thomson M, Dymond S, et al. An evaluation of education-based interventions for students with autism spectrum disorders without intellectual disability: A systematic review. Review Journal of Autism and Developmental Disorders. 2023;10(2):220–38. https://doi.org/10.1007/s40489-021-00289-0

27. Bowden N, Gibb S, Audas R, Clendon S, Dacombe J, Kokaua J, et al. Association Between High-Need Education-Based Funding and School Suspension Rates for Autistic Students in New Zealand. JAMA Pediatrics. 2022;176(7):664–71. https://doi.org/10.1001/jamapediatrics.2022.1296

28. Kokina A, Kern L. Social Story™ interventions for students with autism spectrum disorders: A meta-analysis. Journal of autism and developmental disorders. 2010;40(7):812–26. https://doi.org/10.1007/s10803-009-0931-0

29. Odom SL, Hall LJ, Morin KL, Kraemer BR, Hume KA, McIntyre NS, et al. Educational interventions for children and youth with autism: A 40-year perspective. Journal of Autism and Developmental Disorders. 2021;51(12):4354–69. https://doi.org/10.1007/s10803-021-04990-1

30. Whalon KJ, Conroy MA, Martinez JR, Werch BL. School-based peer-related social competence interventions for children with autism spectrum disorder: A meta-analysis and descriptive review of single case research design studies. Journal of autism and developmental disorders. 2015;45(6):1513–31. https://doi.org/10.1007/s10803-015-2373-1

31. Webster-Stratton C. The incredible years: Parents, teachers, and children training series. Innovative mental health interventions for children: Routledge; 2014. p. 31–45.

32. Autism New Zealand. Tilting the Seesaw for Teams 2025 [Available from: https://autismnz.org.nz/tilting-the-seesaw-for-teams/.

33. Ministry of Education. Learning support study awards 2025 [Available from: https://www.education.govt.nz/education-professionals/schools-year-0-13/scholarships-and-study-awards/learning-support-study-awards.

34. Scheef AR, McKnight-Lizotte M, Gwartney L. Supports and resources valued by autistic students enrolled in postsecondary education. Autism in Adulthood. 2019;1(3):219–26. https://doi.org/10.1089/aut.2019.0010

35. Smart R, Adams D, Simpson K. The Who, How, and What of Educational Outcome Research for Autistic Students Published in the Last Decade: A Systematic Quantitative Literature Review. British Journal of Educational Psychology. 2025. https://doi.org/10.1111/bjep.70015

36. Di Blasi FD, Costanzo AA, Finocchiaro M, Stimoli MA, Zuccarello R, Buono S, et al. Academic Skills in Students with Autism Spectrum Disorder and Intellectual Disability: A Systematic Review and Meta-Analysis. Education Sciences. 2023;13(10):1026. https://doi.org/10.3390/educsci13101026

37. Gibb S, Bycroft C, Matheson-Dunning N. Identifying the New Zealand resident population in the Integrated Data Infrastructure (IDI). Statistics New Zealand; 2016. Report No.: 0908350333.

38. Stats NZ. Integrated Data Infrastructure (IDI) refresh: linking report. Wellington: Statistics New Zealand,; 2020.

39. Bowden N, Thabrew H, Kokaua J, Audas R, Milne B, Smiler K, et al. Autism spectrum disorder/Takiwātanga: An Integrated Data Infrastructure-based approach to autism spectrum disorder research in New Zealand. Autism. 2020;24:2213–27. https://doi.org/10.1177/1362361320939329

40. Schluter PJ, Bowden N, Dacombe J, McLay L, Lee M. Hospital Dental Admissions and Caries Experience Among Children With Neurodevelopmental Disabilities: A Population-Based Record Linkage Cohort Study. Community Dentistry and Oral Epidemiology. 2024. https://doi.org/10.1111/cdoe.13018

41. Vu H, Bowden N, Gibb S, Audas R, Dacombe J, McLay L, et al. Mortality risk among Autistic children and young people: A nationwide birth cohort study. Autism. 2024. https://doi.org/10.1177/13623613231224015

42. McLay LK, Schluter PJ, Williams J, Anns F, Monk R, Dacombe J, et al. Health service utilization among

autistic youth in Aotearoa New Zealand: A nationwide cross-sectional study. Autism. 2024:13623613241298352. https://doi.org/10.1177/13623613241298352

43. Kokaua J, Kolose-Pulefolau B, Ruhe T, Aldridge F, Foliaki S, Kokaua L, et al. Is parent education a factor in identifying autism/takiwātanga in an ethnic cohort of Pacific children in Aotearoa, New Zealand? A national cross-sectional study using linked administrative data. Autism. 2023:13623613231217800. https://doi.org/10.1177/13623613231217800

44. Mujoo H, Bowden N, Thabrew H, Kokaua J, Audas R, Taylor B. Identifying neurodevelopmental disabilities from nationalised preschool health check. Australian & New Zealand Journal of Psychiatry. 2023;57(8):1140–9. https://doi.org/10.1177/00048674231151606

45. Ministry of Education. Student attendance survey term 2, 2019. Wellington, New Zealand: Ministry of Education,; 2020.

46. Atkinson J, Salmond C, Crampton P. NZDep2018 Index of Deprivation, Final Research Report, December 2020. Wellington, New Zealand: University of Otago; 2019.

47. Stats NZ. Statistical standard for geographic areas 2023. Stats NZ; 2022.

48. Ho D, Imai K, King G, Stuart EA. MatchIt: nonparametric preprocessing for parametric causal inference. Journal of statistical software. 2011;42:1–28. https://doi.org/10.18637/jss.v042.i08

49. Benchimol EI, Smeeth L, Guttmann A, Harron K, Moher D, Petersen I, et al. The REporting of studies Conducted using Observational Routinely-collected health Data (RECORD) statement. PLoS Medicine. 2015;12(10):e1001885. https://doi.org/10.1371/journal.pmed.1001885

50. Whaikaha - Ministry of Disabled People and Ministry of Education. Aotearoa New Zealand Autism Guideline: He Waka Huia Takiwātanga Rau: Third edition. Wellington: Whaikaha - Ministry of Disabled People,; 2022.

51. Kiefer KE. Public School, Private School, and Homeschool?: A Comparison of Social and Academic Effectiveness Among Educational Settings for Children with Autism Spectrum Disorder. 2015. https://doi.org/10.17615/03n6-6018

52. Mitchelson H, Adams D, Simpson K. Factors and experiences that influence school mobility for autistic students: A systematic review. British Journal of Educational Psychology. 2022;92(4):1366–83. https://doi.org/10.1111/bjep.12505

53. Roberts J, Webster A. Including students with autism in schools: a whole school approach to improve outcomes for students with autism. International Journal of Inclusive Education. 2020:1–18. https://doi.org/10.1080/13603116.2020.1712622

54. Ministry of Education. The educational experiences of disabled learners. Wellington: Ministry of Education,; 2020.

55. Wei X, Wagner M, Christiano ER, Shattuck P, Yu JW. Special education services received by students with autism spectrum disorders from preschool through high school. The Journal of special education. 2014;48(3):167–79. https://doi.org/10.1177/0022466913483576

56. Waisath W, McCormack M, Stek P, Heymann J. Dismantling barriers and advancing disability-inclusive education: an examination of national laws and policies across 193 countries. International Journal of Inclusive Education. 2024;28(10):2088–103. https://doi.org/10.1080/13603116.2022.2058623

57. Whitehouse A, Varcin K, Waddington H, Sulek R, Bent C, Ashburner J, et al. Interventions for children on the autism spectrum: A synthesis of research evidence. 2021. https://doi.org/https://doi.org/10.26181/6062b30adfbd9

58. Ministry of Education. Learning support 2025 [Available from: https://www.education.govt.nz/our-work/publications/corporate-documents/budget-2025/learning-support.

59. Maenner M, Shaw K, Bakian A, Bilder D, Durkin M, Esler A, et al. Prevalence and characteristics of autism spectrum disorder among children aged 8 years—autism and developmental disabilities monitoring network, 11 sites, United States, 2018. MMWR Surveillance Summaries. 2021;70(11):1. https://doi.org/10.15585/mmwr.ss7011a1

60. Ruhe T, Kolose-Pulefolau B, Foliaki S, Bowden N, Richards R, Kokaua J. Examining case complexity among Pasifika with autism/Takiwātanga in Aotearoa New Zealand: a national cross-sectional study. Pacific Health Dialog. 2022;21(10):673–82. https://doi.org/10.26635/phd.2024.144

61. Tupou J, Kewene F, Morrison-Young I, Wi-Hongi A, Sporle A, Diamond T, et al. Identification of Autistic Māori in Aotearoa New Zealand: A National Cross-Sectional Study. Autism. 2025;13623613251380927. https://doi.org/10.1177/136236132513809

62. Durkin MS, Maenner MJ, Meaney FJ, Levy SE, DiGuiseppi C, Nicholas JS, et al. Socioeconomic inequality in the prevalence of autism spectrum disorder: evidence from a US cross-sectional study. PloS one. 2010;5(7):e11551. https://doi.org/10.1371/journal.pone.0011551

63. Kelly B, Williams S, Collins S, Mushtaq F, Mon-Williams M, Wright B, et al. The association between socioeconomic status and autism diagnosis in the United Kingdom for children aged 5–8 years of age: Findings from the Born in Bradford cohort. Autism. 2019;23(1):131–40. https://doi.org/10.1177/1362361317733182

64. Loomes R, Hull L, Mandy WPL. What is the male-to-female ratio in autism spectrum disorder? A systematic review and meta-analysis. Journal of the American Academy of Child & Adolescent Psychiatry. 2017;56(6):466–74. https://doi.org/10.1016/j.jaac.2017.03.013

65. Bonazzi G, Peyroux E, Jurek L, Souiller L, Zufferey A, Giroudon C, et al. Gender on the Spectrum: Prevalence of Gender Diversity in Autism Spectrum Disorder—A Systematic Review and Meta-Analysis. Autism in Adulthood. 2025. https://doi.org/10.1089/aut.2024.0202

Supplementary Appendix 1

Table S1: Diagnostic codes for identifying autism

Dataset	Code Type	Code	Code Description
NMDS & PRIMHD	ICD-10-AM	F84.0	Autistic disorder
NMDS & PRIMHD	ICD-10-AM	F84.1	Atypical autism
NMDS & PRIMHD	ICD-10-AM	F84.3	Other childhood disintegrative disorder
NMDS & PRIMHD	ICD-10-AM	F84.5	Asperger's syndrome
NMDS & PRIMHD	ICD-10-AM	F84.8	Other pervasive developmental disorders
NMDS & PRIMHD	ICD-10-AM	F84.9	Pervasive developmental disorder, unspecified
PRIMHD	DSM-IV	299.00	Autistic disorder
PRIMHD	DSM-IV	299.10	Other childhood disintegrative disorder
PRIMHD	DSM-IV	299.80	Asperger's disorder/pervasive development disorder NOS
Socrates	Assigned Diagnosis	1206	Asperger's syndrome
Socrates	Assigned Diagnosis	1207	Other ASD
Socrates	Assigned Diagnosis	1211	Autism spectrum disorder

NMDS – National Minimum Dataset.
PRIMHD – Programme for the Integration of Mental Health Data.
ICD-10-AM – International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification.
DSM-IV – Diagnostic and Statistical Manual of Mental Disorders, 4^{th} edition.

Table S2: Diagnostic codes for identifying intellectual disability

Dataset	Code Type	Code	Code Description
NMDS & PRIMHD	ICD-10-AM	F70.x	Mild mental retardation
NMDS & PRIMHD	ICD-10-AM	F71.x	Moderate mental retardation
NMDS & PRIMHD	ICD-10-AM	F72.x	Severe mental retardation
NMDS & PRIMHD	ICD-10-AM	F73.x	Profound mental retardation
NMDS & PRIMHD	ICD-10-AM	F78.x	Other mental retardation
NMDS & PRIMHD	ICD-10-AM	F79.x	Unspecified mental retardation
PRIMHD	DSM-IV	317.x	Mild mental retardation
PRIMHD	DSM-IV	318.0	Moderate mental retardation
PRIMHD	DSM-IV	318.1	Severe mental retardation
PRIMHD	DSM-IV	318.2	Profound mental retardation
PRIMHD	DSM-IV	319.x	mental retardation, severity unspecified
PRIMHD	Team Type	12	Intellectual Disability Dual Diagnosis Team
Socrates	Assigned Diagnosis	1208	Intellectual disability, type not specified
Socrates	Assigned Diagnosis	1209	Learning disability, type not specified
Socrates	Assigned Diagnosis	1210	Developmental delay, type not specified
Socrates	Assigned Diagnosis	1299	Other intellectual, learning or developmental disorder

NMDS – National Minimum Dataset.
PRIMHD – Programme for the Integration of Mental Health Data.
ICD-10-AM – International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification.
DSM-IV – Diagnostic and Statistical Manual of Mental Disorders, 4^{th} edition.
Team Type – A code which described the team who provided a service.

Table S3: Observed educational outcomes among 5-12 year old students, stratified by autism status, 2019

	Non-Autistic		Autistic		Autistic without ID		Autistic with ID	
	n	%	n	%	n	%	n	%
Enrolment								
School enrolment								
Yes	496,641	97.4	7,755	94.9	5,535	95.1	2,220	94.5
No	13,062	2.6	414	5.1	285	4.9	129	5.5
Special School enrolment								
Yes	1,023	0.2	1,170	14.3	549	9.4	621	26.4
No	508,680	99.8	6,999	85.7	5,271	90.6	1,728	73.6
Te Kura								
Yes	1,164	0.2	171	2.1	123	2.1	48	2.0
No	509,115	99.8	8,070	97.9	5,745	97.9	2,325	98.0
Home school								
Yes	4,365	0.9	189	2.3	156	2.7	33	1.4
No	505,338	99.1	7,980	97.7	5,664	97.3	2,316	98.6
Attendance								
Regular Attendance								
Yes	311,511	67.7	4,026	57.1	2,946	58.2	1,080	54.1
No	148,581	32.3	3,027	42.9	2,112	41.8	915	45.9
Irregular absence								
Yes	105,159	22.9	1,734	24.6	1,224	24.2	510	25.6
No	354,933	77.1	5,319	75.4	3,834	75.8	1,485	74.4
Moderate absence								
Yes	27,597	6.0	660	9.4	462	9.1	198	9.9
No	432,495	94.0	6,393	90.6	4,596	90.9	1,797	90.1
Chronic absence								
Yes	15,825	3.4	630	8.9	432	8.5	198	9.9
No	444,267	96.6	6,423	91.1	4,626	91.5	1,797	90.1
Supports and services								
ORS								
Yes	2,949	0.6	2,493	30.5	1,323	22.7	1,170	49.8
No	506,754	99.4	5,676	69.5	4,497	77.3	1,179	50.2
SHHNF								
Yes	1,809	0.4	213	2.6	162	2.8	51	2.2
No	507,894	99.6	7,956	97.4	5,658	97.2	2,298	97.8
IRF								
Yes	1,026	0.2	150	1.8	120	2.1	30	1.3
No	508,677	99.8	8,019	98.2	5,700	97.9	2,319	98.7
Early intervention								
Yes	5,997	1.2	1,077	13.2	729	12.5	348	14.8
No	503,706	98.8	7,092	86.8	5,091	87.5	2,001	85.2
Behaviour service								
Yes	3,093	0.6	630	7.7	510	8.8	120	5.1
No	506,610	99.4	7,539	92.3	5,310	91.2	2,229	94.9
Communication service								
Yes	6,729	1.3	672	8.2	438	7.5	234	10.0
No	502,974	98.7	7,497	91.8	5,382	92.5	2,115	90.0
RTLB								
Yes	5,220	1.0	687	8.4	504	8.7	183	7.8
No	504,483	99.0	7,482	91.6	5,316	91.3	2,166	92.2
Attendance services								
Yes	9,447	1.9	186	2.3	138	2.4	48	2.0
No	500,256	98.1	7,983	97.7	5,682	97.6	2,301	98.0

ORS = Ongoing Resourcing Scheme; SHHNF = School High Health Needs Fund; IRF = Interim Response Fund; RTLB = Resource Teacher Learning Behaviour.

Table S4: Educational outcomes comparison between the Autistic population without ID (N=5,724) and the 1:10 propensity score matched non-Autistic population (N = 57,240) and the Autistic population with ID (N=2,316) and the 1:10 propensity score matched non-Autistic population (N = 23,130)

	Autistic without ID n (%)	Non-Autistic n (%)	Autistic without ID/ non-Autistic PR (95% CI)	Autistic with ID n (%)	Non-Autistic n (%)	Autistic with ID/ non-Autistic PR (95% CI)
Enrolment						
School enrolment						
Yes	5,445 (95.1)	55,815 (97.5)	0.98 (0.97, 0.98)	2,184 (94.3)	22,485 (97.2)	0.97 (0.97, 0.97)
No	279 (4.9)	1,425 (2.5)		132 (5.7)	645 (2.8)	
Specialist school						
Yes	546 (9.5)	111 (0.2)	49.19 (40.71, 59.43)	609 (26.3)	63 (0.3)	96.54 (75.26, 123.83)
No	5,178 (90.5)	57,129 (99.8)		1,704 (73.6)	23,067 (99.7)	
Te Kura						
Yes	120 (2.1)	123 (0.2)	9.76 (8.05, 11.83)	48 (2.1)	30 (0.1)	15.98 (10.74, 23.78)
No	5,604 (97.9)	57,117 (99.8)		2,268 (97.9)	23,100 (99.9)	
Home school						
Yes	147 (2.6)	531 (0.9)	2.77 (2.51, 3.05)	30 (1.3)	186 (0.8)	1.61 (1.31, 1.98)
No	5,577 (97.4)	56,709 (99.1)		2,286 (98.7)	22,944 (99.2)	
Attendance						
Regular attendance						
Yes	2,898 (50.6)	35,643 (62.3)	0.81 (0.81, 0.82)	1,062 (45.9)	13,581 (58.7)	0.78 (0.77, 0.79)
No	2,826 (49.4)	21,597 (37.7)		1,254 (54.1)	9,549 (41.3)	
Irregular absence						
Yes	1,206 (21.1)	11,586 (20.2)	1.04 (1.02, 1.06)	504 (21.8)	5,022 (21.7)	1.00 (0.98, 1.03)
No	4,518 (78.9)	45,654 (79.8)		1,812 (78.2)	18,108 (78.3)	
Moderate absence						
Yes	453 (7.9)	2,916 (5.1)	1.55 (1.49, 1.62)	192 (8.3)	1,395 (6.0)	1.37 (1.29, 1.46)
No	5,271 (92.1)	54,324 (94.9)		2,124 (91.7)	21,735 (94.0)	
Chronic absence						
Yes	423 (7.4)	1,656 (2.9)	2.55 (2.43, 2.69)	198 (8.5)	873 (3.8)	2.27 (2.10, 2.44)
No	5,301 (92.6)	55,584 (97.1)		2,118 (91.5)	22,257 (96.2)	
Funding Supports and services						
ORS						
Yes	1,305 (22.8)	366 (0.6)	35.66 (32.16, 39.54)	1,155 (49.9)	168 (0.7)	68.66 (59.01, 79.89)
No	4,419 (77.2)	56,874 (99.4)		1,161 (50.1)	22,962 (99.3)	
SHHNF						
Yes	156 (2.7)	228 (0.4)	6.84 (5.94, 7.88)	54 (2.3)	87 (0.4)	6.2 (4.85, 7.92)
No	5,568 (97.3)	57,012 (99.6)		2,262 (97.7)	23,043 (99.6)	
IR						
Yes	120 (2.1)	174 (0.3)	6.9 (5.85, 8.13)	27 (1.2)	69 (0.3)	3.91 (2.87, 5.31)
No	5,604 (97.9)	57,066 (99.7)		2,289 (98.8)	23,061 (99.7)	
Early intervention						
Yes	720 (12.6)	798 (1.4)	9.02 (8.40, 9.69)	342 (14.8)	336 (1.5)	10.17 (9.1, 11.36)
No	5,004 (87.4)	56,442 (98.6)		1,974 (85.2)	22,794 (98.5)	
Behaviour service						
Yes	498 (8.7)	561 (1.0)	8.88 (8.15, 9.67)	120 (5.2)	189 (0.8)	6.34 (5.42, 7.42)
No	5,226 (91.3)	56,679 (99.0)		2,196 (94.8)	22,941 (99.2)	
Communication service						
Yes	432 (7.5)	924 (1.6)	4.68 (4.37, 5.01)	231 (10.0)	390 (1.7)	5.92 (5.32, 6.58)
No	5,292 (92.5)	56,316 (98.4)		2,085 (90.0)	22,740 (98.3)	
RTLB						
Yes	492 (8.6)	792 (1.4)	6.21 (5.78, 6.68)	180 (7.8)	336 (1.5)	5.35 (4.76, 6.01)
No	5,232 (91.4)	56,448 (98.6)		2,136 (92.2)	22,794 (98.5)	
Attendance services						
Yes	135 (2.4)	924 (1.6)	1.46 (1.35, 1.58)	48 (2.1)	558 (2.4)	0.86 (0.76, 0.97)
No	5,589 (97.6)	56,316 (98.4)		2,268 (97.9)	22,572 (97.6)	

ORS = Ongoing Resourcing Scheme; SHHNF = School High Health Needs Fund; IRF = Interim Response Fund; RTLB = Resource Teacher Learning Behaviour.