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Citation

Totsika, V., Hastings, R. P., Dutton, Y., Worsley, A., Melvin, G., Gray, K., ... Heyne, D. A. (2020). Types and correlates of school non-attendance in students with autism spectrum disorders. *Autism : The International Journal Of Research And Practice*, 24(7), 1639-1649. doi:10.1177/1362361320916967

Version: Publisher's Version

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Downloaded from: <https://hdl.handle.net/1887/3142535>

Note: To cite this publication please use the final published version (if applicable).

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Autism

1–11

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DOI: 10.1177/1362361320916967

journals.sagepub.com/home/aut



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Abstract

School non-attendance in autism spectrum disorders has received very little attention to date. The study aimed to provide a comprehensive description of school non-attendance in students with autism spectrum disorders. Through an online survey, parents of 486 children (mean age: 11 years) reported on school attendance over 1 month and reasons for instances of non-attendance. On average, students missed 5 days of school of a possible 23 days. Persistent non-attendance (absent on 10%+ of available sessions) occurred among 43% of students. School non-attendance was associated with child older age, not living in a two-parent household, parental unemployment and, especially, attending a mainstream school. School refusal accounted for 43% of non-attendance. School exclusion and school withdrawal each accounted for 9% of absences. Truancy was almost non-existent. Non-problematic absenteeism (mostly related to medical appointments and illness) accounted for 32% of absences. Non-problematic absenteeism was more likely among those with intellectual disability, school refusal was more likely among older students and school exclusion was more likely among students from single-parent, unemployed and well-educated households. Findings suggest that school non-attendance in autism spectrum disorders is a significant issue, and that it is important to capture detail about attendance patterns and reasons for school non-attendance.

Lay abstract

Our study aimed to describe school non-attendance in students with autism. We conducted an online survey. Parents of 486 students (mean age: 11 years) indicated which days their child had missed school (over a period of 1 month). If the child had missed a day, the parent was asked to select a reason from a list of 15 possible reasons (this is a measure of types of school non-attendance called SNACK (School Non-Attendance CheckList; Heyne et al., 2019)). On average, students missed 5 days of school of a possible 23 days. Missing over 10% of school is known as persistent absence, and in our study, 43% of students experienced persistent absence. Older students, who attended mainstream schools, who did not live in a two-parent household and whose caregiver was unemployed were more likely to miss school. Looking at the reasons for absence, school refusal was the most frequent reason, accounting for 43% of absences. Nine percent of absence was due to school exclusion. Nine percent of absence was due to school withdrawal. Truancy was almost non-existent. A final reason describes non-problematic absence that is mostly due to medical appointments and illness. This type of absence accounted for 32% of absences in our study, and it was more likely in student with intellectual disability. School refusal was more likely among older students. School exclusion was more likely among students from single-parent, unemployed and well-educated households. Findings from this study help us to understand better the difficulties students with autism experience attending school.

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Keywords

autism, intellectual disability, school exclusion, school non-attendance, school refusal, school withdrawal, truancy

Missing school has a negative impact on children's academic skills (Hancock et al., 2013) and mental health (Epstein et al., 2019). It increases the risk of dropping out of school (Schoeneberger, 2012), which in turn is linked to adverse life outcomes such as substance abuse (Townsend et al., 2007) and mortality (Lleras-Muney, 2005). In England, in 2017–2018, students missed 4.8% of all available school sessions (Department for Education (DfE), 2019b). Persistent absence, defined as missing over 10% of available sessions, involves 1 in 11 students (11.2%) (DfE, 2019b). Absence and persistent absence are at higher rates in special schools (10.2% absence and 29.6% persistent absence) and among students with special educational needs across any type of school (6.9% absence and 19.6% persistent absence; DfE, 2019b). This phenomenon of increased rates of school non-attendance in children with special needs may be exacerbated in cases where educational needs are associated with difficulties in social skills and social communication, such as those with autism spectrum disorders (ASD; Able et al., 2015) with rates of absence and persistent absence of 6.9% and 18.4%, respectively (DfE, 2019b).

Research on school non-attendance in students with ASD is scant, despite emerging evidence of negative school experiences that hinder these children's full participation in education (Brede et al., 2017; Goodall, 2018). Two studies on non-attendance in ASD populations have focused on school refusal behaviours (SRBs; Kurita, 1991; Munkhaugen et al., 2017). Kurita (1991) studied school refusal in 135 Japanese children and adolescents with ASD and/or intellectual disability (ID). Parent-reported school refusal (which Kurita defined as absence from school because of child reluctance to attend in the knowledge of the parent and in the absence of antisocial behaviour) was present in 23.7% of the sample, and significantly higher among those who did not have an associated ID (Kurita, 1991). Munkhaugen and colleagues (2017) studied 'SRB' using a broader definition than that for school refusal in Kurita's study including absence which others have classified as truancy rather than school refusal (e.g. Heyne et al., 2001). They found that students in mainstream education in Norway with ASD ($N=78$) had a higher rate of teacher-reported SRB compared to students without ASD (42.6% vs 7.1%) (Munkhaugen et al., 2017). It is important to note, that unlike Kurita (1991), Munkhaugen et al. (2017) excluded children with ID. These two studies highlight the issue in available research on school non-attendance in children with ASD of substantial differences in the definition of school refusal, the methodological approach (e.g. inclusion/exclusion of ID, reporting source) and the lack of consideration of other types of non-attendance.

To fully describe school non-attendance, researchers have divided non-attendance into non-problematic (e.g. child attending a medical appointment) and problematic non-attendance (Heyne et al., 2019). A number of different criteria have been proposed for problematic non-attendance, but one of the most frequently used is missing over 10% of available sessions. This criterion is used by the UK DfE (2019a; termed persistent absence) and the US Department of Education (2016; termed chronic absenteeism). At this 10% level, absenteeism has been shown to increase the risk of school drop-out by up to 28% (Schoeneberger, 2012). Heyne et al. (2019) further specified four types of non-attendance problems. School refusal refers to non-attendance linked to the youth's emotional distress associated with attending school, in the knowledge of the parent, and despite reasonable efforts by the parent to ensure the child's attendance. School withdrawal is defined as non-attendance that happens in the knowledge of the parent, but it is linked to parental effort to keep the child at home or lack of parental effort to ensure the child's attendance. Truancy refers to absence without school permission and usually involves effort on the part of the child to conceal the absence from the parents. School exclusion refers to non-attendance that is initiated by the school either through inappropriate use of disciplinary policies, or because the school is unable or unwilling to accommodate the child's needs, or through discouragement of attendance (i.e. asking the child to stay at home). There are currently no data on school withdrawal, school exclusion or truancy among children with ASD.

From an ecological systems perspective, school absence or non-attendance is a phenomenon that is poorly described (Melvin et al., 2019). Part of the difficulty arises because the scientific community has yet to agree on a typology for describing school non-attendance problems (Heyne et al., 2019). Related to that school non-attendance is a complex phenomenon associated with multiple factors present at multiple levels of different systems. Melvin et al. (2019) recently proposed a conceptual multi-level framework that organises the factors likely to be associated with school non-attendance across an inclusive, nested bio-ecological framework. The framework uses the conceptual structure of Bronfenbrenner's bio-ecological model to organise factors known to be related to developmental outcomes across levels of influence that differ in their proximity to the child (Bronfenbrenner & Morris, 2006). At the closest level of influence (i.e. micro and meso-system), the framework identifies child characteristics (e.g. age, gender, physical health, disabilities), parent characteristics (e.g. parent stress, physical health, parenting style, attitudes towards education), family (e.g. family composition) and school

characteristics (e.g. school climate, relationships in school, inclusivity) that have been shown to be related to school attendance or academic engagement (Melvin et al., 2019). At the exosystem, Melvin and colleagues (2019) proposed that factors related to non-attendance include the availability of community support services, transport and school factors such as school type, school climate and organisational factors. At the macro-level, government policy on attendance, cultural values, neighbourhood characteristics (especially poverty and household size) were identified as factors related to school non-attendance (Melvin et al., 2019).

Viewing the phenomenon of school non-attendance in ASD through the framework proposed by Melvin et al. (2019) highlights the currently limited information on correlates of non-attendance in ASD. Kurita (1991) found that the presence of ID or lower intellectual skills were associated with a lower frequency of school refusal, but there was no association with demographic characteristics, medical history or maternal neuroticism. Munkhaugen et al. (2017) examined associations between school refusal behaviour and living in an urban area, renting, low maternal education, living with one parent, illness in other family members, attending a secondary school and having additional diagnoses. Of those factors, only illness in other family members was significantly associated with school refusal behaviour. Further analysis of the same sample revealed no association with child age, gender, total IQ score, comorbid conditions or severity of autism symptoms, but children with school refusal behaviour were more likely to have difficulties with executive functioning, emotional and behaviour problems (Munkhaugen et al., 2019).

The aim of this study was to provide a more comprehensive description of the school non-attendance of children with ASD. Drawing on data from an online survey of children with ASD (with and without ID) in the United Kingdom, we aimed to describe non-attendance at the broader level of school absence and investigate a wide range of potential correlates of non-attendance across different levels of influence (cf. Melvin et al., 2019). In addition, for the first time, we used a systematic typology to describe the types of non-attendance in children with ASD (Heyne et al., 2019). In the absence of previous research, and given the descriptive nature of the study, we had no specific hypotheses about the direction of study findings.

Method

Participants

Caregivers were invited to participate in an online survey if they had a child with ASD and the child was enrolled at school (or preschool). A total of 499 caregivers participated. After excluding participants whose children did not appear to meet inclusion criteria, the final sample

Table 1. Profile of students with autism spectrum disorders.

	N (%)
Total participants	486 (100)
Child gender	
Child with ASD is a boy	334 (69)
Child age	
Child is 12 years old or older	182 (41)
Co-occurring conditions	
Intellectual disability	102 (21)
Cerebral palsy	2 (0.4)
Down syndrome	2 (0.4)
Fragile X syndrome	1 (0.2)
Prader–Willi syndrome	1 (0.2)
Spina bifida	1 (0.2)
Tuberous sclerosis complex	1 (0.2)
Acquired brain injury	4 (0.8)
Physical health	
Sensory impairment (vision, hearing)	6 (1.2)
Epilepsy	15 (3.1)
Mobility issues (hemiplegia, paraplegia, quadriplegia, cerebral palsy)	2 (0.4)
Living arrangements	
Child lives at home with both parents	361 (75)
Child school	
Child attends mainstream school	392 (81)
School transport	
Child goes to school by family car	238 (50)
Caregiver characteristics	
Caregiver educated at university degree level or above	222 (46)
Caregiver has disability/illness	169 (35)
Caregiver is in paid employment	275 (57)

ASD: autism spectrum disorders.

comprised 486 participants (see Table 1). Children with ASD were on average 11 years old ($M = 10.71$, $SD = 3.38$, range: 2.75–18.17 years), and most of them were male (69%). Overall, 21% ($N = 102$) were reported to also have ID, but additional conditions and physical health problems were rare as can be seen in Table 1. The majority (75%) lived at home with both parents, and in all households, the language spoken was English (96%) or English with another language (4%). Responding caregivers were mostly parents: 461 mothers (95.6%), 13 fathers (2.7%), while those remaining were grandparents or other caregivers. About half of the caregivers were educated to university degree level or above (50%) and were in paid employment (57%).

Measures

School non-attendance. Parents were provided with a list of all school days in March 2017 and asked to indicate any day their child had been absent from school that day

(possible maximum was 23). This provided a measure of absence on any given day (school day missed or not), a total count of days missed during March 2017 (range: 0–23 days), as well as a binary indicator of persistent school absence defined using the 10% threshold (3 days or more) specified by the UK DfE (2019a).

Type of school non-attendance. The School Non-Attendance Checklist (SNACK; Heyne et al., 2019) is a scale designed to permit a systematic typology for school non-attendance. For each day missed, the parent selects one reason from a list of 14 reasons provided (and a 15th reason classed as Other). These reasons are classified into five types: non-problematic absenteeism (NPA; SNACK reasons 1, 2, 8, 9, 10, 11 and 14), school refusal (SNACK reason 3), truancy (SNACK reason 4), school withdrawal (SNACK reasons 5, 6, 7) and school exclusion (SNACK reasons 12, 13). SNACK items are accompanied by examples to make it easier for the parent to identify the most relevant reason for absence. As an example, SNACK reason 3 indicates, ‘My child was reluctant or refused’, for example, ‘he or she said it was hard to go to school or to stay there the whole day’; ‘he or she seemed upset/anxious/scared about school’.

When selecting SNACK reason 15 (other), parents were invited to provide a written description of the reason for absence. Two researchers (V.T. and R.P.H.) analysed the parent scripts to explore whether some of these reasons could be recoded into one of the other SNACK reasons and to identify the most frequently cited reasons for ‘other reason for absence’. Decisions were guided by a coding protocol our research team has developed using data across United Kingdom and Australia, and researchers jointly agreed on any recoding (protocol available on request by the first author (V.T.)).

Demographic characteristics of the child, family and school. Information was collected about the child with ASD (age, gender, associated ID (respondent reported only), physical health problems), the caregiver (their relationship with the child, educational qualifications, employment status) and the family (number of children at home, additional children with disabilities, language spoken at home, living arrangements for the child with ASD). We collected data on the type of school the child attends, whether the child had moved school and how the child gets to school in the morning (method of transportation). These data were recoded for the purpose of analysis. Child gender was recoded to identify boys, as compared to girls and children of other gender. The child’s living arrangement was recoded to identify children living in a two-parent household, compared to children living with a sole parent, or other relative or in residential care. The parent’s employment status was recoded to identify parents who were in paid employment (full-time, or part-time, or employed but

currently in long-term leave) compared to parents who were not in employment (and either looking for work or not looking for work). Parental educational qualifications were recoded to identify parents with a university degree or higher qualification, compared to parents with no qualifications or qualifications lower than a university degree.

The type of school attended was recoded into mainstream versus other type. Under mainstream, children attended a mainstream classroom in a mainstream school or a special unit/classroom attached to a mainstream school. Other types of schools included special school day time, special residential school, pupil referral units and other types (e.g. Vulnerable Learners’ Centre, online school). School move was a variable created to indicate whether the student had attended more than one school, excluding the natural transition between primary and secondary. Last, data on how the child goes to school were recoded to indicate whether the child travelled independently (walk, ride bike/scooter, public transport) or not (family car, carpool, taxi and school bus).

Procedure

The study was approved by independent reviewers across the Faculty of Social Sciences at the University of Warwick, UK. The month of March was selected as appropriate for the purposes of the study as during 2017 there were no school holidays scheduled. The survey was launched on 3 April 2017, the first working day following the end of the month for which we wanted to collect school attendance data, to ensure that the information could be remembered easily by caregivers. The survey was active for 6 weeks only, to ensure that data collection was not too temporally distanced from the phenomenon under study. The survey was advertised through social media (Twitter, Facebook) and mailing lists by the autism organisation supporting this study (Ambitious about Autism). The recruitment material focused on school attendance (as opposed to non-attendance), and parents were invited to indicate attendance for every day of the month, not just the days missed. Participation in the survey was completely anonymous, and participants provided written consent for their participation.

Approach to statistical analysis

Descriptive statistics were used to describe the level of non-attendance. Non-attendance was defined in three ways: (a) missing school on any one of the given days (day absence), (b) the total number of school days missed (0–23 range) and (c) the percentage of persistent absence (defined as missing over 10% of available sessions; DfE, 2019a).

We explored potential correlates of school non-attendance in multivariable regression models that included a series of child, family/caregiver characteristics as well as

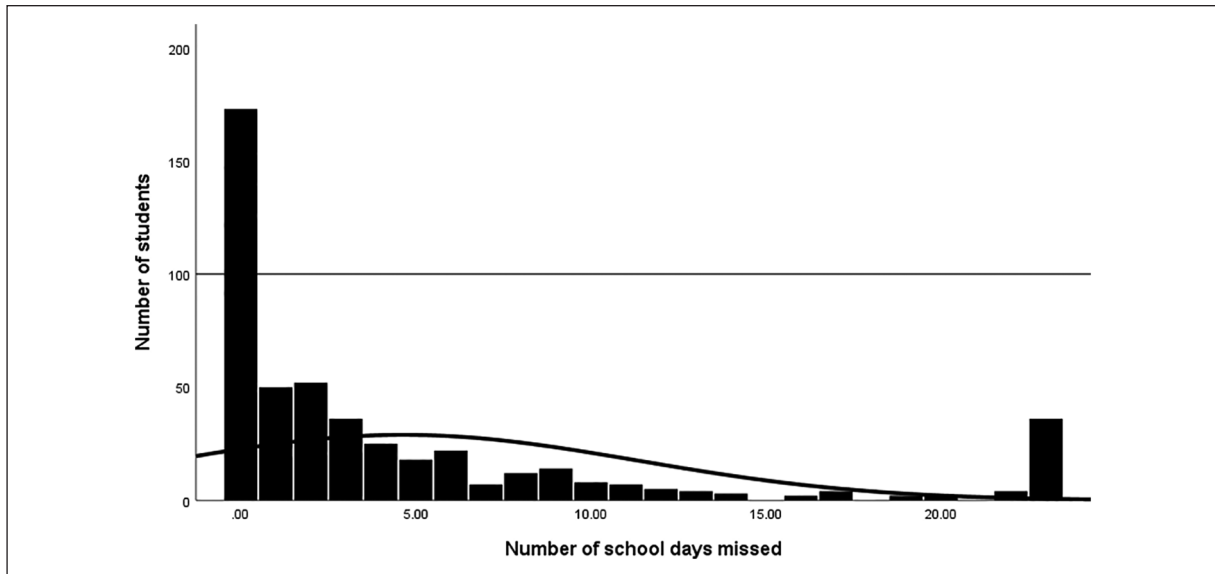


Figure 1. The distribution of the number of days students with ASD did not attend school during March 2017 (23 total school days).

school type and school access as predictors. The aim of these models was to generate an adjusted estimate of the association between non-attendance and child, family or school factors. The type of regression model differed depending on the nature and distribution of the outcome variable. The total number of days missed was modelled using a generalised linear model (GLM) with negative binomial link. Persistent absence was initially modelled using log-binomial GLM but, as this model did not converge, a Poisson GLM with log link was fitted (Knol et al., 2012). Finally, day absence data were fitted in a generalised estimating equation (GEE), which is the equivalent of GLM for repeated measurements. This last model included a further variable (whether the day missed was close to the weekend) in addition to all other predictors included. Exponential estimates derived from these models are interpreted as relative risks (RR; Knol et al., 2012).

Descriptive statistics described types of non-attendance, as identified by the SNACK (Heyne et al., 2019). We estimated the rate of absence for each type over the total number of days missed. Among children with at least 1 day absent, a Poisson GLM with log link examined potential correlates of school withdrawal. GLMs with negative binomial log link (to account for overdispersion) examined the association between child, family and school factors with NPA, school exclusion and school refusal.

Results

Overall levels of school non-attendance

Figure 1 presents the number of school days missed during the data collection period. Of the 23 school days in March

2017, participants missed on average 5 days ($M=4.65$, $SD=6.70$, range: 0–23). The median number of days missed was 2. Overall, 64% ($N=313$) missed 1 day or more. Seven percent of students ($N=36$) did not attend school on any of the 23 days. Persistent absence was reported for 43% of children in this study ($N=211$).

Factors associated with school non-attendance

To examine the association between child, family and school characteristics with school non-attendance, we fitted three multivariable models for each of the three non-attendance outcomes: (1) total number of days missed over the study period (range: 0–23), (2) persistent absence (child missed 10% or over of the available sessions) and (3) absence on any given day (day absence). Table 2 presents the adjusted RRs from these models along with 95% confidence intervals (CIs). Upper and lower CIs that do not cross 1 indicate a statistically significant RR (highlighted in bold font in Table 2). It is important to keep in mind that the design is cross-sectional, and that RRs do not confer information on the magnitude of risk, but indicate the magnitude of the association (i.e. the effect size). It is also important to note these effect sizes (RRs) are adjusted, as the multivariable models have accounted for the effect of the other potential covariates.

Interestingly, the same four variables were consistently associated with any non-attendance outcome: attending a mainstream school, not living in a two-parent household, parental unemployment and child age all increased the risk of school non-attendance. In particular, attending a mainstream school had the largest adjusted RR (ranging from 1.79 to 2.04), suggesting that the risk of non-attendance

Table 2. Potential covariates of total count of school days missed, persistent absence and school absence on any given day (absent/not absent).

	Total number of days missed	Persistent absence (10%+)	Day absence
	RR ^a (95% CI)	RR ^a (95% CI)	RR ^b (95% CI)
Child is a boy	0.91 (0.68, 1.20)	0.88 (0.71, 1.09)	0.89 (0.62, 1.27)
Child has intellectual disability	1.08 (0.78, 1.50)	1.01 (0.77, 1.31)	1.11 (0.72, 1.71)
Centred child age	1.07 (1.02, 1.11)	1.07 (1.03, 1.10)	1.08 (1.03, 1.14)
Not a two-parent household	1.59 (1.18, 2.14)	1.37 (1.10, 1.70)	1.75 (1.16, 2.64)
Parent not in paid employment	1.57 (1.18, 2.10)	1.52 (1.22, 1.89)	1.78 (1.22, 2.60)
Low parental educational qualifications	0.83 (0.63, 1.11)	0.88 (0.71, 1.09)	0.79 (0.56, 1.12)
Family has more children with disabilities	1.08 (0.77, 1.51)	0.94 (0.75, 1.19)	1.07 (0.70, 1.63)
Total number of children in household	1.10 (0.97, 1.25)	1.07 (0.98, 1.17)	1.14 (0.97, 1.34)
Child attends a mainstream school	1.79 (1.20, 2.66)	2.04 (1.14, 3.62)	2.00 (1.20, 3.31)
Child goes to school independently	0.83 (0.61, 1.12)	0.90 (0.71, 1.13)	0.82 (0.56, 1.20)
Child has changed schools	1.32 (1.00, 1.74)	1.01 (0.82, 1.25)	1.30 (0.90, 1.89)
Day missed was close to weekend	N/A	N/A	1.00 (0.92, 1.09)

RRs: relative risks; CIs: confidence intervals.

^aAdjusted relative risk from generalised linear model.

^bAdjusted relative risk from generalised estimating equation.

Bold indicates $p < 0.05$.

increased by 104% for persistent non-attendance, by 100% for total days absent and by 79% for total number of days missed. As the age of the child increased, the risk of not attending school increased by 7%–8% across non-attendance outcomes (RRs ranging from 1.07 to 1.08). Not living in a two-parent household increased the risk of non-attendance by 37%–75% (RRs ranged from 1.37 for persistent absence to 1.75 for absence on any given day). Similar associations were seen for parental unemployment. When the parent reported not being in paid employment, the risk of non-attendance increased by 52%–78%: the risk increased by 52% for persistent absence, 57% for total days missed and 78% for day absence (RRs ranged from 1.52 to 1.78).

Types of school non-attendance

SNACK data provided by the parents are summarised in Table 3. Table 3 presents data for each reason separately but also the summary typology proposed by SNACK that classifies non-attendance into NPA, school refusal, school exclusion, truancy and school withdrawal. Forty-three percent of days missed were missed because of school refusal, and this was the most frequent reason. More specifically, school refusal was mentioned as the reason for missing at least 1 day of school for 171 children (35%). For 19% of study participants, school refusal was the reason that accounted for all days missed.

The second most frequent reason for missing school was NPA (32%). Within NPA, having a medical appointment or illness accounted for 13% and 18% of days missed, respectively. School exclusion and school withdrawal each accounted for 9% of days missed. School withdrawal was selected as a reason for 42 children (see first column in Table 3, withdrawal was the reason provided for missing at

least 1 day for 42 children). School exclusion was the reason indicated for missing at least one school day for 26 children.

Table 4 presents the reasons provided in relation to persistent absence. For children with non-persistent absence, 47% of days were missed because of NPA and 31% of days were missed because of school refusal. Among children with persistent absence, school refusal was the most frequent reason, accounting for almost half of days missed (49%), whereas NPA accounted for a quarter of missed days (25%).

Taken together, parents indicated that school refusal was the most frequent reason for missing school, accounting for 43% of days missed. Almost half (49%) of the school days missed by children with persistent absence were missed because of school refusal. Conversely, about half of the school days missed (47%) by children with low levels of absence were missed due to NPA, mostly to attend a medical appointment or because the young person was unwell.

Factors associated with types of non-attendance

We examined potential correlates of NPA, exclusion, refusal and withdrawal. Truancy was not examined because it was very rare in the sample. GLM models included all the covariates also used in the non-attendance models (see Table 2) but here the sample was restricted to the 313 children who missed 1+ days of school. Among children who missed any school days, refusal was more likely in older children (RR: 1.12, 95% CI: 1.05, 1.19, $p < 0.001$), whereas no other covariates were associated with refusal. School withdrawal was not associated with

Table 3. Parent-reported reasons for non-attendance and associated types of non-attendance.

SNACK reason	N of students ^a	Min–Max days	% days missed because of . . .	N of students who missed all days because of . . .
1. Child had appointment	72	0–6	13	26
2. Child was sick	89	0–11	18	28
3. Child refused	171	0–23	43	94
4. Child truanted	4	0–3	<1	1
5. Parent gave child day off	26	0–9	5	8
6. Parent kept child at home	9	0–8	2	3
7. Parent arranged extra holidays	7	0–5	2	6
8. Family urgency	5	0–3	1	2
9. Family had other difficulties	3	0–1	<1	0
10. Religious holiday	0	0	0	N/A
11. School closed	4	0–7	<1	0
12. School sent child home	26	0–10	4	7
13. School asked that child stay home	27	0–23	5	6
14. Weather	0	0	0	n/a
15. Other reason	23	0–23	5	9
Type of non-attendance				
Non-problematic absenteeism	148	0–11	32	67
School refusal	171	0–23	43	94
Truancy	4	0–3	<1	1
School withdrawal	42	0–9	9	17
School exclusion	26	0–23	9	16

SNACK: School Non-Attendance CheckList.

^aN of students for whom reason/type was recorded.**Table 4.** Type of school non-attendance in relation to persistent absence.

	Students with persistent absence (%)	Students with non-persistent absence (%)
Non-problematic absenteeism	25	47
School refusal	49	31
Truancy	<1	1
School withdrawal	6	14
School exclusion	11	6

any of the variables considered. NPA was less likely when the child had moved schools (RR=0.65, 95% CI: 0.45, 0.94, $p=0.02$), but more likely when the child had an associated ID (RR=1.64, 95% CI: 1.11, 2.40, $p=0.01$).

School exclusion was marginally more likely in mainstream schools (RR: 2.76, 95% CI: 1.01, 7.55, $p=0.05$), more likely when the child did not live in a two-parent household (RR: 2.55; 95% CI: 1.25, 5.21, $p=0.01$), but less likely when parental educational qualifications were low (RR=0.45, 95% CI: 0.22, 0.96, $p=0.03$). The last RR was in a direction opposite than would have been expected on the basis of the previous statistical models on school non-attendance. This suggested that a likely interaction might be present. We explored this possibility by fitting a three-way interaction term between parental employment status, educational qualifications and not living in a two-parent household. GLM results suggested

that there was a significant interaction (Wald chi-square=26.02, $p<0.001$): children who missed the most days because of exclusion (adjusted marginal mean of days: 3.90, SE: 2.58) were those who did not live in a two-parent household, where the parent was unemployed and where the parent also had high educational qualifications. After accounting for this interaction, attending a mainstream school was no longer associated with a significant RR (RR: 2.70, 95% CI: 0.99, 7.40, $p=0.053$).

Discussion

To our knowledge, this is the largest and most comprehensive investigation of school non-attendance in children with ASD. Prior studies had a narrower focus on school refusal (Kurita, 1991) or school refusal behaviour (Munkhaugen et al., 2017, 2019), whereas we investigated

overall non-attendance and types of non-attendance (NPA, school refusal, truancy, school withdrawal and school exclusion) using a new measure called the SNACK (Heyne et al., 2019). We used an inclusive framework (Melvin et al., 2019) to examine factors associated with non-attendance and made a first attempt to explore correlates of non-attendance types among students with ASD.

On average, students with ASD missed five school days over a school month (23 days in March 2017). Over 60% of students missed at least 1 day. Persistent absence, defined as at least 10% absence, was highly prevalent (43% of participants). To contextualise this, persistent absence in the same academic year (2016–2017) across *all* students in England was 10.8% and 17.3% for students with ASD (DfE, 2018). The level of persistent absence in our study was significantly higher than both national figures for England ($p < 0.001$). Differences between the English national data and our data might be attributed to our sampling design and the way ASD is defined in each case. In relation to sampling design, our study recruited across the United Kingdom, not just England, and was based on convenience sampling. Parents with more experiences of school non-attendance may have been more likely to respond to the survey, despite an advertisement focus on school attendance, rather than non-attendance. In terms of ASD definition, the English national data on ASD include just those students with ASD as the primary need in an Education, Health and Care Plan (EHCP) or a Statement of Special Educational Needs (SEN). An EHCP, and its predecessor the SEN, is effectively the formal means of identification of any need in the English educational system. One need is designated as primary in the EHCP or SEN, and in this case this would be ASD. Any national data on ASD would identify just this group of students. However, not every student with ASD may also have an EHCP (or SEN); their additional educational needs may be addressed through a lower level of support which is known as School Support. Our study included students with ASD regardless of whether they also had EHCP or SEN. So we may have included students with ASD without EHCP whose attendance is not recorded in the national ASD data. Furthermore, we included students with additional developmental disabilities (e.g. ID) whose persistent attendance rates might be captured under different groupings in national figures. For example, persistent absence for children with ID as the primary need is much higher in national data, ranging between 18.5% and 44.6% depending on ID severity.

Informed by Melvin et al.'s (2019) framework, we collected data on child, parent, family and school characteristics. Whichever way non-attendance was defined (absent on any one day, total days absent and persistent absence), the same four factors were associated with higher levels of non-attendance: attending a mainstream school, being older, not living in a two-parent household and parental

unemployment. Evidence from populations without ASD supports findings of associations with older child age (Skedgell & Kearney, 2018), single-parent households (Ferrell, 2009) and parental unemployment (Thornton et al., 2013). Gottfried and colleagues (2017) reported that students with disabilities in mainstream schools were less likely to be absent from school. The direction of this effect is in the opposite direction to present findings, but in Gottfried et al. (2017), children attended primary schools and data from students with ASD were not examined separately. Among students with disabilities, persistent non-attendance may be higher in secondary education compared to primary (US Department of Education, 2016). The profile of students who attend mainstream schools may differ from the profile of students who attend special schools, and these differences may also in part account for the association between non-attendance and type of school seen in this study. More studies are needed to examine the association between non-attendance and type of school to confirm whether attending mainstream school increases the risk of non-attendance among students with ASD. Qualitative evidence suggests that students with ASD experience mainstream school settings negatively (Goodall, 2018).

We found no associations with low parental education which has been linked to non-attendance in the general student population (Balkis et al., 2016). Furthermore, there were no associations with independent transport to school, which might provide more opportunities for non-attendance.

Importantly, this study indicated that reasons for non-attendance were varied. School refusal was the most frequent reason for non-attendance, with 43% of all absences due to refusal. This is comparable to Munkhaugen and colleagues' (2017) finding of teacher-reported 'school refusal behaviour' in children with ASD without ID (42.6%) but lower than parent-reported 'school refusal behaviour' in the same sample (53.2%). It should be kept in mind that this Norwegian study defined 'school refusal behaviour' more broadly than Heyne and colleagues' (2019) conceptualisation of school refusal in the SNACK. In the current sample, non-attendance due to school refusal was higher than reported in an earlier Japanese study (27.3%; Kurita, 1991) of students with ASD and/or ID and defined school refusal in a similar way to the definition used here. This difference might be related to the fact that Kurita's sampling design was based on recruitment from clinical diagnostic services, not the community as in our study, and any changes in the conceptualisation and identification of ASD over time.

School refusal was only associated with older child age, out of all possible correlates explored. Previous studies identified very few correlates of refusal, most notably emotional and behaviour problems (associated with SRB; Munkhaugen et al., 2019). Depression and anxiety may precipitate school refusal or SRB (Kearney, 2008). Future studies are required to examine a wider range of potential correlates of school

refusal, including anxiety and depression that are highly prevalent in ASD (Simonoff et al., 2008).

The second most frequent type of absence was NPA, which accounted for 32% of all missed days. NPA mostly included absences due to illness and medical appointments. The high rate of NPA could be related to the increased likelihood of complex multi-morbidities in developmental disabilities (Doshi-Velez et al., 2014). Our finding of an association between NPA and ID supports the above hypothesis and highlights that children with ASD and ID are at higher risk of non-attendance for health reasons, especially non-persistent absence. The notion that NPA is not problematic for the child's education and well-being is debatable particularly when it is persistent, thus justifying further study (Tonge & Silverman, 2019).

Truancy was almost non-existent, as it accounted for less than 1% of absences, even though its prevalence in the general student body is likely higher (between 4% and 6%; Egger et al., 2003; Hancock et al., 2018). The very low prevalence in our study may relate to the fact that the data source was the parent who may not know the true extent of a child's truancy (Gentle-Genitty et al., 2015; Heyne et al., 2019). Future studies on truancy need to include data from self-reporting students with ASD, or from teachers.

School exclusion accounted for 9% of missed days. Studies into the experience of exclusion in ASD have identified significant difficulties for students with ASD that arise because of the way school environments are set up (e.g. linked to sensory difficulties for students, lack of predictability), difficulty relating to teachers and peers (including bullying experiences), teachers' lack of understanding of the needs of a child with ASD and unsuccessful attempts to deal with students' behaviour (Brede et al., 2017; Sproston et al., 2017). In the overall student population, the association between poverty and exclusion is well established (e.g. Lereya & Deighton, 2019), but our data provide a more nuanced picture of socioeconomic correlates of school exclusion. We found a higher risk of school exclusion among single-parent, unemployed and well-educated parents. This pattern of findings may reflect parent capacity to become involved with school exclusion processes (i.e. more time or more educational resources) or teacher perceived parent capacity to do so (Gazeley, 2012; Kulz, 2015). Qualitative evidence on exclusion experiences from staff indicates attributions of parent behaviour that are classed (see Gazeley, 2012, p. 305), suggesting that parents with more knowledge of the education system are more likely to confront the school about the child's needs. Future research should seek to replicate the association between exclusion and interacting parent socioeconomic characteristics, as this will help determine whether the current findings were a statistical fluke or a pattern in this population.

Finally, school withdrawal accounted for 9% of absences. Overall, parent-initiated withdrawal of a child

from school is a phenomenon that is less well-researched than other types of non-attendance. In our study, school withdrawal was not associated with any parent, child, family or school factors we investigated, suggesting that other factors need to be explored. As a phenomenon, school withdrawal may be more frequent than the present findings suggest because it could include children being permanently withdrawn from school, in some cases to be home-schooled (i.e. groups not included in our study). Parents of children with ASD often report that they withdraw their children from school to home-school them because they feel the school cannot adequately meet their child's needs (Kendall & Taylor, 2016).

In addition to the design limitations mentioned in the paragraphs above, further limitations relate to the lack of data on the presence of developmental conditions – other than ID – (e.g. attention-deficit hyperactivity disorder (ADHD), specific learning disabilities) which may further impact on school attendance patterns. In the interest of brevity, our survey did not investigate several factors that may also be associated with non-attendance (child emotional and behaviour problems, parental mental health or factors in other levels of the bio-ecological framework) and, in particular, did not describe the severity of autism symptoms, the extent of communication or social interaction difficulties or the spectrum of adaptive skills. Future studies need to include such measures as they may help us identify subgroups of students with ASD who may be at higher levels of risk for non-attendance. The (temporal) closeness of the survey to the period investigated may lend some confidence that parents reported correctly patterns and reasons for attendance, but does not preclude the possibility of memory errors. Future research could explore whether a daily diary method could provide more accurate data.

Finally, 7% of students in our study were reported to have missed the entire month (all 23 days). A post hoc exploration of their profile indicated that these students were not different from the remaining students in terms of any of the demographic characteristics we measured. However, students presenting with refusal or exclusion included those who missed the entire month (Table 3). Three students missed all 23 days because of school exclusion and 21 because of school refusal. While our findings do not suggest that this group of students was different from other students, future longitudinal research should explore the trajectory of students with prolonged non-attendance as it may be a particularly vulnerable group in terms of educational experiences and outcomes.

Conclusion

This study suggests that school non-attendance is common among students with ASD, and levels of persistent non-attendance are concerning. Older students from mainstream schools living in households with single or unemployed

parents are more likely to miss school. Approximately 4 in 10 missed days were due to school refusal. Findings highlight that supporting students in mainstream schools with high levels of persistent absence is a priority, especially students with school refusal but also those with NPA. Multi-component support models that incorporate psychological support in school have shown promise with adolescents with ASD (e.g. Brouwer-Borghuis et al., 2019) and need to be further tested. School withdrawal and school exclusion were less prevalent, but at 9%, their levels are worrying as they are significant societal problems with far-reaching consequences for the students and their families. Stakeholders are concerned about increases in undocumented home-schooling and exclusion of children with ASD (SEN Policy Research Forum, 2019). Solutions are beginning to be explored (e.g. Obsuth et al. (2017) conducted a large-scale trial trying to improve rates of school exclusion in schools in the United Kingdom), but we need to accelerate the rate of testing potential solutions through rigorous designs, such as randomised trials. Importantly, we need to tailor proposed interventions to our current knowledge about non-attendance drivers in ASD.



Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship and/or publication of this article.

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