

Relationships with Peers and Use of the School Environment of Mainstream Secondary School Pupils with Asperger Syndrome (High-Functioning Autism): A Case-Control Study

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ABSTRACT

This study is of the in-school social relationships with peers of mainstream secondary school pupils with Asperger syndrome/high-functioning autism (AS/HFA) and of matched controls. Fifty-seven pupils participated in the study (30 with AS/HFA and 27 controls), ranging from school years 7-13 (age 11-18 years). By comparison with controls, pupils with AS/HFA engaged in fewer social interactions during the school day, both in and out of lessons, spent break and lunch times inside in quieter more closely adult supervised areas of the school, reported having fewer friends, were less physically active, were more likely to be the targets of bullying but had equally good school attendance records. Implications for further research are discussed.

Keywords: adolescents, Asperger syndrome/high-functioning autism, bullying, mainstream secondary school, social relationships.

RESUMEN

Este estudio trata de las relaciones sociales con los iguales dentro de las escuelas integradas de secundaria por parte, por un lado, de alumnos con síndrome de Asperger/autismo de alto funcionamiento (SA/AAF) y por otro, de sus casos controles emparejados. Han participado 57 alumnos (30 con SA/AAF y 27 controles), entre los cursos 7 y 13 (11-18 años). Los resultados sugieren que en comparación con los casos control, los alumnos con SA/AAF participan en menos interacciones sociales durante la jornada escolar, tanto dentro como fuera de clase, pasan los recreos y las horas de comida dentro, en áreas más tranquilas y más supervisadas por adultos, reconocen tener menos amigos que los casos control, son significativamente menos activos físicamente y son blanco más probable de maltrato por los iguales, pero sus registros de asistencia son igual de buenos que los de sus compañeros. Se discuten las implicaciones para investigaciones futuras. *Palabras clave:* adolescentes, Síndrome de Asperger/autismo de alto funcionamiento, maltrato entre iguales, escuelas integradas de secundaria, relaciones sociales.

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Sixty percent of children and adolescents with Autistic Spectrum Disorders (ASDs) in England ($N= 27890$) are educated in mainstream school settings (Department for Education and Skills, DfES, 2006), a proportion which is probably similar in many of the more developed countries in the world. Every individual on the autistic spectrum shows evidence of a triad of social impairments, that is impairments in interpersonal interaction, communication, and imagination (Wing, 1988). Unlike others on the spectrum people with Asperger syndrome (AS) have no significant impairment in general understanding or in language ability. In many parts of the world, including the United Kingdom (UK), the terms AS and high-functioning autism (HFA) are often used interchangeably (Baird, Cass, & Slonims, 2003; Strock, 2004). For this reason we shall refer to this disorder as AS/HFA.

Most of the 60% of children with ASDs educated in mainstream school settings in the UK have AS/HFA although most of them will also be classed as having a Special Educational Need (SEN), which recognises that they have greater difficulty in learning (associated with their social rather than cognitive functioning) compared with their peers (Her Majesty's Government, 2004). In the UK pupils with SEN are usually given extra support to assist their learning. With this support, most pupils with AS/HFA cope with the academic demands of mainstream schooling since they typically have average or above levels of intelligence. At the same time, they often do not cope well with the social demands of school which include interactions with peers, understanding rules and codes of conduct (Attwood, 1998), and what to do at break and lunch times when they are typically left to their own devices (Wing, 1996). These arguments need to be set against the findings of Csikszentmihalyi and Larson (1984) that school is the place where adolescents spend, on average, 32% of their time. This represents around six hours a day for 180 days a year. Around one-third of this school time is spent outside formal classrooms (e.g., in the school yard, dining room, and corridors) (Nelson, 2004). So far, nevertheless, there has been very little research on the social integration of adolescent pupils with AS/HFA in mainstream schools.

Of the few studies that have been conducted all have been qualitative and small-scale (Barber, 1996, $N= 1$; Carrington & Graham, 2001, $N= 2$; Carrington, Papinczak, & Templeton, 2003, $N= 5$; Connor, 2000, $N= 16$; Granizo, Naylor, & del Barrio, 2006, $N= 5$). Collectively, these studies suggest that the social integration difficulties of pupils with AS/HFA with their peers, typically in engaging appropriately in conversation (Church, Alisanski, & Amanullah, 2000), begin when social life becomes more important and complicated towards the start of adolescence. As well as being difficult, social interaction can also be stressful and anxiety-provoking for pupils with AS/HFA (Carrington *et al.*, 2003) not least because they often lack adequate understanding of the social hierarchy that exists in schools (Sainsbury, 2000), and because they often exhibit behaviours perceived as "odd" (Carrington & Graham, 2001; Carrington *et al.*, 2003; Sainsbury, 2000), which probably often results in their alienation by peers.

Some confirmation that this interpersonal behavioural "oddness" of pupils with AS/HFA is a causal factor in their common social alienation and exclusion comes from the study by Granizo *et al.* (2006). These researchers found that all of their 15-17-year-old boy participants with AS/HFA reported that they were verbally abused and socially

excluded on a daily basis by their peers. These boys also reported, which was independently confirmed by their mothers, that this experience made them avoid social contact during break and lunch times. This is probably because these are times in school which are relatively unsupervised by adults (Wing, 1996) and so are times when they are most likely to be abused and excluded.

These social integration difficulties of adolescents with AS/HFA are exacerbated if dyspraxia or developmental 'clumsiness' is also present, as is often the case (World Health Organisation, 2007). Dyspraxia may result in adolescents with AS/HFA being disinclined to engage in physical activities such as sport because they enjoy little success and because their efforts may be ridiculed by their peers. Social impairment may further worsen the performance of a person with AS/HFA in team games. Parents and other carers often report that pupils with AS/HFA are regularly verbally abused because of their social integration difficulties and physical clumsiness. The present study aimed to investigate the accuracy of these anecdotal reports in a systematic study.

We take bullying to be "the systematic (repeated) abuse of power" (Smith & Sharp, 1994) and to include physical and verbal abuse, and acts of indirect aggression (Björkqvist, Lagerspetz, & Kaukiainen, 1992) characterised by gossiping, spreading malicious rumours and social exclusion (deliberately not allowing a person into a group, Lagerspetz, Björkqvist, & Peltonen, 1988). Amongst other effects, there is strong evidence that being bullied and experiencing social rejection by peers increases the likelihood of school refusal (Myklebust, 2002; DeRosier, Kupersmidt, & Patterson, 1994; Kochenderfer & Ladd, 1996). So it is reasonable to suppose that pupils with AS/HFA are disproportionately bullied compared with other pupils and that as a result they have poorer school attendance compared with other pupils.

Based on the literature review previously outlined the following research questions were examined, all by comparison with controls, without AS/HFA: (1) How do pupils with AS/HFA socially spend their school day, both in and out of lessons?; (2) Where in the school environment do pupils with AS/HFA spend their break and lunch times?; (3) How much do pupils with AS/HFA enjoy school and lessons and is this enjoyment reflected in their school attendance records?; (4) What are the perceptions of pupils with AS/HFA of their friendships, and do these pupils think that they are bullied?; (5) How physically active are pupils with AS/HFA?

METHODS

The study used a case-control design in which participating pupils were interviewed at the end of a school day using a structured interview schedule about their social interactions with their peers during that school day. A case-control design was chosen because of the relative rarity of AS/HFA in mainstream schools. For example, Scott, Baron-Cohen, Bolton, and Brayne (2002) estimate that the prevalence of ASDs in children aged 5-11 in mainstream schools in Cambridgeshire, UK, is 0.6%. The alternative approach of using a cohort study could result in an unbalanced sample based on the kind of prevalence observed.

Sample

Bearing in mind the prevalence of ASDs, recruitment into the present study used a snowball sampling strategy (personal contacts were used to build the sample). This strategy is particularly useful when the characteristics required of participants are rare such as those with AS/HFA (Stat Pac Inc., 1997). For logistical convenience, participants were recruited by sending letters to the Special Educational Needs Coordinators (SENCOs) in 32 mainstream secondary schools in Sheffield and Rotherham, UK. Of these, 10 schools agreed to take part. In an attempt to recruit a larger sample of participants, letters were sent to mainstream schools further a field. Once schools had provided their in principle agreement to participate, the SENCOs were asked to identify the pupils in their school with a diagnosis of AS/HFA and to match each one with one of two types of control pupil without the disorder. So that we might investigate the possibility that having any SEN is a risk factor for being the target of social isolation and other aspects of bullying and that there is no particular risk factor in having AS/HFA, one control group was of pupils without AS/HFA but who have a diagnosis of dyslexia (another SEN), and the other control group was of pupils with no identified SEN. Dyslexia “is evident when fluent and accurate word identification (reading) does not develop, or does so very incompletely” (BPS, 1999).

Dyslexia was chosen as the SEN control condition for the following reasons: The most prevalent groups of pupils with SEN in mainstream secondary school are those with an Emotional, Behavioural and Social Difficulty, and those with a Moderate Learning Difficulty (29% and 27% respectively) (DfES, 2006). However, these are not clearly defined “pure” categories in that, for example, they contain many pupils with multiple SEN, including AS/HFA and dyslexia. Of the other categories of SEN represented in mainstream schools dyslexia is one of the more prevalent (5%) and so should make case-control matching less difficult than if we were to select another rarer SEN. To avoid overburdening children with tests, dyslexia was ascertained by relying on information supplied by SENCOs about recent assessments completed by competent school professionals (e.g., educational psychologists).

Each case-control dyad was matched on the variables of age, gender, academic ability, physical size, lessons attended during the research day, and where possible, socio-economic background and ethnicity. Letters of invitation to participate were then distributed by the SENCO to each pupil and his/her parent outlining the details of the project and asking for signed consent from both the pupil and the parent. In excess of 90 letters to parents and pupils were sent out.

Ethical approval for the study was granted by the University of Sheffield’s Research Ethics Committee.

Procedure

Data were collected between April and May 2006, between March and June 2007 and also in November 2007. On the research day for each pupil dyad, each pupil was met for a brief 10 minute period by a researcher (University of Sheffield medical

student) before the school day started. The researcher fitted each pupil with a pedometer (see below), outlined the study and obtained verbal consent to continue. Towards the end of the school day, an individual, face-to-face interview was conducted with each pupil for a maximum of 30 minutes.

Measures and instruments

School attendance. Official school records for each participating pupil's attendance for the 50 days preceding his/her data collection day have been analysed on a case/control group basis to examine the relationships between school attendance, bullying and levels of school enjoyment.

Social experiences during the school day. A structured interview schedule was written specifically for the purpose and piloted by the medical students using role-play. This schedule focused on the social interactions of the pupil during the research day using four themes: travel to and from school; lessons - subject, who s/he sat with, how much s/he liked each lesson and why; break and lunch times - what s/he did, who with, and where; and, friendship - who in his/her class s/he likes, who s/he thinks does not like him/her, and why s/he thinks this.

Responses to interview questions were matched to the most appropriate category of answer on the schedule, using the "other" or "not applicable" categories as appropriate.

Physical activity. To measure the amount of physical activity of each participant during his/her school research day, s/he was asked to fit and wear a pedometer. The researcher recorded the time at which the pedometer was fitted. Each pupil was asked to go about the school day as s/he normally would in an attempt to ensure that the pedometer (and all other) data collected were ecologically valid. She/he was asked to wear the pedometer for the whole day, until meeting the researcher again, unless s/he was involved in an activity in which the teacher deemed it unsafe to wear the pedometer, for example, when trampolining. The pedometer was collected from each pupil by the researcher immediately before the one-to-one interview towards the end of the school day. The researcher recorded the time of removal of the pedometer and its reading. The mean number of recorded movements per hour for each pupil was calculated to take account of the varying lengths of school days for different members of the sample.

Data analysis

Responses were entered into SPSS (Statistics Package for the Social Sciences, Version 12.0). Every entry into the database was checked against the hardcopy data by an independent researcher to ensure that there were no inputting errors or missing data. As appropriate to the qualities of the separate data sets, statistical analysis was by either non-parametric (Chi-Square test of association, Mann-Whitney *U* test, Wilcoxon Paired Sign Rank Test) or parametric testing (*t*-test) and assessed for significance using the $p < .05$ criterion.

RESULTS

Data were collected from 57 secondary school pupils, 30 with AS/HFA, 3 with dyslexia and 24 without any SEN. As very few pupils with dyslexia were recruited by SENCOs into the study the analyses are between pupils with AS/HFA and those without AS/HFA. Only 30 pupils (15 dyads) were correctly matched by SENCOs on all of the criteria including the lessons attended during the day. The three unmatched pupils all had diagnoses of AS/HFA but were not paired due to the control pupils being absent from school on the research day. Analyses were performed using all 57 pupils except where the lessons attended by the pupils are likely to have had an impact on the responses. For example, "Who did you sit with (in your lesson)?", and, "Did you have a good day at school today?" For these questions data were analysed using the case-control matched dyads. The demographic characteristics of the sample are in Table 1.

Outcomes for research questions all by comparison with controls are described below.

How do pupils with AS/HFA socially spend their school day, both in and out of lessons? Pupils with AS/HFA reported spending 53% of their time in lessons sitting with their friends, compared with 81% of the controls, a difference which is statistically significant [$t(14) = 2.668, p = .018$ (two-sided)]. At break time, 33% of pupils with AS/

Table 1. School year, age group and gender of the total pupil sample and the 15 matched dyads.

Year Group (Age range in years)	<i>n</i>	%
Total pupil sample (<i>N</i> = 57)		
7 (11-12)	17	29.8
8 (12-13)	18	31.6
9 (13-14)	8	14.0
10 (14-15)	9	15.8
11 (15-16)	3	5.3
12 (16-17)	0	0.0
13 (17-18)	2	3.5
Gender		
Male	55	96.5
Female	2	3.5
15 matched dyads (<i>n</i> = 30)		
7 (11-12)	12	40.0
8 (12-13)	10	33.3
9 (13-14)	6	20.0
10 (14-15)	2	6.7
11 (15-16)	0	0.0
12 (16-17)	0	0.0
13 (17-18)	0	0.0
Gender		
Male	28	93.3
Female	2	6.7

HFA reported spending their time alone, compared with 0% of the control pupils, which is also significant [$\chi^2(1, N= 57)= 10.915, p= .001$]. Similarly, at lunch time 27% of pupils with AS/HFA reported spending their time alone, compared with 4% of the control pupils [significant: $\chi^2(1, N= 57) = 5.635, p= .027$]. Pupils were also asked who they ate their lunch with: 30% of AS/HFA pupils reported eating alone, compared with 11% of control pupils [N.S.: $\chi^2(1, N= 57)= 3.051, p= .109$].

Where in the school environment do pupils with AS/HFA spend their break and lunch times? Ideally, these data (Figures 1 and 2) would have been analysed using the Chi-Square test, but the assumptions of this test were not met in that some cells contain less than five respondents. Figures 1 and 2 show that a larger number of control pupils spent their time outside the school building at break and lunch time than did those with AS/HFA, who mostly spent these times in classrooms or the school library.

How much do pupils with AS/HFA enjoy school and lessons? Using data from the 15 matched dyads, analyses were performed on the responses to: “Did you have a good day at school today?” (responses coded: Yes/No) and “Did you look forward to school today?” (responses coded: Yes/No). Of the pupils with AS/HFA 20% reported that they had not had a good day, compared with 7% of the control pupils [$\chi^2(1, N= 30)= 1.154, p= .598$], and 40% of the those with AS/HFA said they had not looked forward to the school day compared with 27% of the controls [$\chi^2(1, N= 30)= .600, p= .700$]. Neither outcome is statistically significant.

On a five-point scale (5= very good, 4= good, 3= OK, 2= bad, and 1= very bad), pupils were also asked to rate how good or bad they found each lesson. The mean rating for pupils with AS/HFA was 3.4, compared with 3.6 for controls. These data were analysed using the Wilcoxon Paired Sign Rank Test but the difference between the case and control dyads is not significant ($Z= -1.321, p= .186$, two-sided).

The mean attendance for pupils with AS/HFA was 95.08% ($SD= 5.66$) and for controls it was 93.98% ($SD= 6.21$). The Kolmogorov-Smirnov test of normality was used to assess whether or not these data are normally distributed. Since this test produced a non-significant result [$Z= .721, p= .677$ (2-sided)], the data can be assumed to be normally distributed and so an independent samples *t*-test was used to assess the case-control mean attendance differences; the outcome is not statistically significant [$t(51)= -.672, p= .504$ (2-sided)].

What are the perceptions of pupils with AS/HFA of their friendships, and do they think they are bullied? Pupils were asked to estimate how many good friends they had at school. The mean number for the pupils with AS/HFA is 8 ($SD= 5.906$) and for controls it is 25 ($SD= 22.143$). This difference is statistically significant [$t(29.328)= 4.024, p= .001$ (two-sided)]. Pupils were then asked: “Do you have a best friend at school?” Of the pupils with AS/HFA 70% said they had, compared with 78% of controls, which is not statistically significant [$\chi^2(1, N= 57)= .443, p= .506$]. Respondents were also asked to estimate on a four-point scale (everyone, most, few, none) how many people in their class they: “Spoke with”; “Do not like”; and “Think do not like you”. The responses to these questions are in Table 2.

The case and control responses to these questions were compared using a series of Mann-Whitney *U* tests with these outcomes: “Spoke with” (significant: $U= 214.000$,

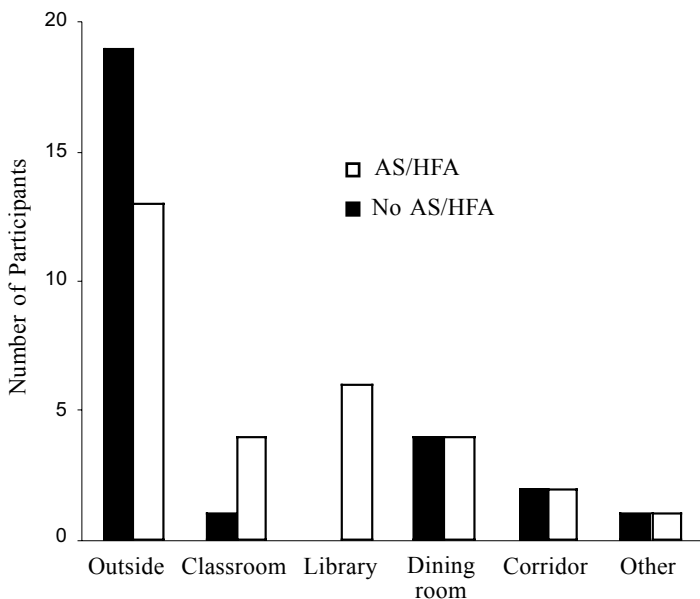


Figure 1. Where do you go at break?

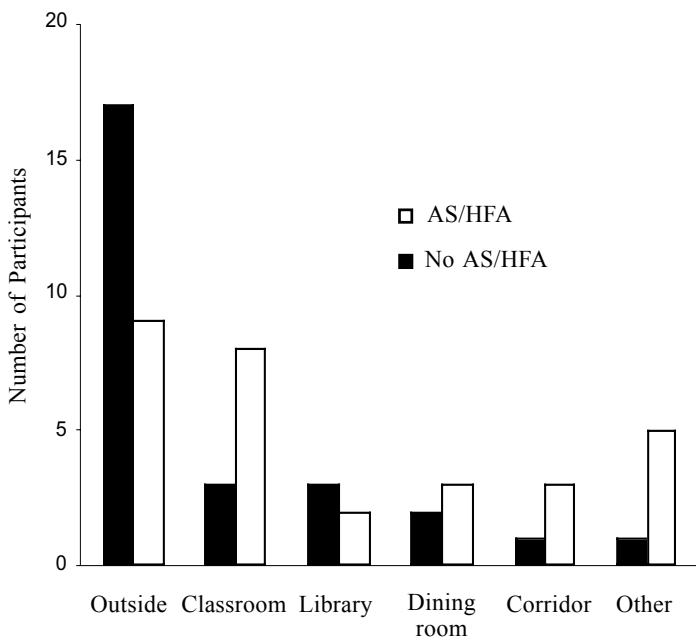


Figure 2. Where do you go at lunch?

Table 2. How many people in your class do you: speak to, not like, and think not like you? (AS/HFA $n = 30$; No AS/HFA $n = 27$).

	How many people do you speak to in your class?				
	Everyone	Most People	Few People	None	Don't Know
AS/HFA	3	10	15	2	0
No AS/HFA	8	15	4	0	0
	How many people do you not like in your class?				
	Everyone	Most People	Few People	None	Don't Know
AS/HFA	0	6	18	6	0
No AS/HFA	0	3	15	9	0
	Do you think there are any people in your class who do not like you?				
	Everyone	Most People	Few People	None	Don't Know
AS/HFA	1	5	20	1	3
No AS/HFA	0	2	15	10	0

$Z = -3.270, p = .001$); “Do you not like” (N.S.: $U = 333.00, Z = -1.300, p = .194$), “Think do not like you” (significant: $U = 298.000, Z = -1.962, p = .050$). Finally, pupils were asked: “Has anyone upset you today?” (responses coded: Yes/No), to which one control (4%) and four pupils with AS/HFA (13%) responded “Yes” [N. S., $\chi^2(1, N = 57) = 1.647, p = .356$].

There were two follow-up questions (both designed to elicit information about respondents' perceptions of being bullied) to the stem question: “Do you think there are any people in your class who don't like you?” One of these follow-up questions asked: “What gives you the impression that they don't like you?” (responses were coded as: Ignore me; Name call/tease me; Shout at me; Physically abuse me; Don't know). With the exception of “Don't know”, all responses were categorised as bullying. The other follow-up question asked: “How often does this happen?” (responses, all categorised as

Table 3. What gives you the impression that they don't like you? (AS/HFA $n = 30$; No AS/HFA $n = 27$).

	Ignore me	Called names/Get teased	Shout at me	Physically abuse me	Don't know	N/A (not bullied)
AS/HFA	5	15	2	5	0	3
No AS/HFA	3	10	1	1	0	12
	How often does this happen?					N/A (not bullied)
	Daily	2-3 times per week	Once a week	Fortnightly	Once a month or less	
AS/HFA	12	10	4	0	1	3
No AS/HFA	4	6	3	2	0	12

bullying, coded: Daily; 2-3 times a week; Once a week; Fortnightly; Once a month or less). If pupils responded to the stem question that nobody in their class disliked them, "not applicable" was selected as the response to the two follow-up questions. Descriptive data outcomes for each of these follow-up questions are in Table 3.

Responses to the follow-up question "What gives you the impression that they don't like you?" have firstly been dichotomised into Bullied/Not bullied and respondents with AS/HFA by comparison with controls were more likely to report that they are bullied [$\chi^2(1, N= 57)= 8.695, p= .003$]. Regarding frequency of occurrence of being bullied there is also a significant difference between the case and control groups [$U= 218.000, Z= -3.089, p= .002$ (two-sided)] with cases reporting that they are bullied more frequently than controls. Analysis by type of bullying for the case/control groups reveals no significant outcomes.

How physically active are pupils with AS/HFA? Using pedometers the numbers of steps of pupils made during the day were recorded. The mean number of steps per hour for the pupils with AS/HFA was 923 ($SD= 319.303$) compared with 1245 ($SD= 372.331$) for the controls [significant: $t(12)= -2.406, p= .033$ (two-sided)].

DISCUSSION

We begin by considering the data outcomes for each of the research questions before discussing the limitations of the present study, and making suggestions for further research in the field.

How do pupils with AS/HFA socially spend their school day, both in and out of lessons? Our expectations that pupils with AS/HFA would spend less time with friends and would engage in fewer social interactions during the school day have been supported. This is most likely due to the difficulties they experience in communication (Wing, 1988, 1996; Attwood, 1998; American Psychiatric Association, 2000; World Health Organisation, 2007) and the fact that this social impairment can make it difficult for peers to relate to pupils with AS/HFA resulting in them being socially excluded by peers.

Where in the school environment do pupils with AS/HFA spend their break and lunch times? Most of the case pupils said that they had spent their break and lunch times inside the school buildings whereas the majority of controls spent these times outside. This could be because pupils with AS/HFA try to avoid areas of the school which are busy and require good communication skills preferring areas more closely supervised by adults to minimise their risk of being bullied. Also, the activities that often occur outside the school buildings during break and lunch times and particularly for boys, typically involve games such as football. These games could pose particular difficulties for pupils with AS/HFA for two reasons. Firstly, physical team games are heavily dependent on non-verbal communication and gestures, and secondly, the motor co-ordination demands for successful participation in these activities and, therefore, to be accepted as a valuable member of the peer group is often substantial. Both of these demands typically present difficulties for pupils with AS/HFA.

How much do pupils with AS/HFA enjoy school and lessons? Despite the

socialisation and communication difficulties of pupils with AS/HFA, having fewer friends, experiencing more episodes of being the targets of bullying and of social isolation from peers, no significant differences between our cases and controls have been found for reported levels of enjoyment of school and for “looking forward to school.” These outcomes would seem to be confirmed by the finding that there is no significant difference in school attendance for the cases compared with the controls. This is surprising since other studies have found that pupils who are bullied are more likely than those who are not bullied to be absent from school more often (Myklebust, 2002; DeRosier *et al.*, 1994; Kochenderfer & Ladd, 1996).

It may be that the case pupils used different criteria from their controls in making a judgement about their enjoyment of school. Pupils with AS/HFA may make this decision based on academic criteria whereas other pupils may tend to make their decision based on their social experiences. Another possible explanation is that by comparison with other pupils more of those with AS/HFA report that they had enjoyed school because they think that they should, even in the face of being socially badly treated by their peers. In other words, it may be that pupils with AS/HFA compared with other pupils have a greater tendency to offer socially desirable responses. A further possible explanation resides in the general tendency of people with AS/HFA to be weak at reflecting on their feelings and emotions, as observed by D. Tantam (personal communication, September 27, 2007), and so their judgement of whether or not they enjoy school may have been less accurate than for controls.

What are the perceptions of their friendships of pupils with AS/HFA, and are they bullied? Our pupil respondents with AS/HFA said that they had significantly fewer friends and spoke to fewer class peers than did controls, but were just as likely to have a best friend at school. This is interesting as it suggests that friendship is important to pupils with AS/HFA, which provides some confirmation for Granizo *et al.*'s findings (2006). It suggests that by comparison with controls, pupils with AS/HFA do not have such an extensive social network. Another possible conclusion, suggested by our finding that more of the respondents with AS/HFA compared with controls reported that they spent their break and lunch times alone, is that the friendships of teenagers with AS/HFA compared with others are less intense (Church *et al.*, 2000; Carrington *et al.*, 2003).

As we predicted, cases compared with controls were significantly more likely to report that they have class peers “who do not like them” and that they are bullied (using our definition) on a regular basis, most commonly through being verbally and physically abused, and “ignored” (socially excluded).

How physically active are pupils with AS/HFA? As we predicted, by comparison with controls, our pupil respondents with AS/HFA have been found to be significantly less active (as measured by pedometers), which is confirmed by our finding that these pupils also spend more of their free time inside the school buildings in sedentary activities. We suggest that these physical (in)activity findings can be explained in terms of the relative social integration difficulties and clumsiness of the cases, probably combined with a fear of being bullied in the relatively adult unsupervised environment outside the school buildings at break and lunch times. So it may be that pupils with AS/

HFA are both excluded by their peers (peer-exclusion) and exclude themselves (self-exclusion) from engaging in physical activity, but further studies are needed to test this hypothesis.

There are a number of limitations of the present study. One concern is that it relies heavily on a self-report measure -our structured interview schedule. As with all self-report measures used alone there is no way of being able independently to confirm what respondents say. We tried to minimise the risk that respondents produced socially desirable responses by asking them to "answer as honestly as possible" and by reducing the memory burden placed upon them by questioning only about the recent past (today in school, which may, of course, have been atypical and therefore leads to other problems of validity). Further research in the field should consider gathering in addition to self-report data other types and sources of data, including from observational methods, so that they can be triangulated.

Another limitation is that the pupils with AS/HFA were case-control matched by their SENCOs and we were therefore reliant on these teachers for the quality of the pairings. In some schools it was clear that the SENCO had not applied the matching selection criteria sufficiently carefully, which is why of the total sample of 57 participants only 15 dyads have been used in many of the analyses. This therefore limits the sample size for some of the investigations.

A further limitation is that we have relied on information held by schools regarding the diagnoses of AS/HFA. Collectively, these diagnoses will have been provided by a number of professionals including paediatricians, psychiatrists and educational psychologists, with each of these groups almost certainly using different diagnostic instruments and professional cultural norms in producing their diagnoses and, therefore with different outcomes. We suggest that further studies should attempt to confirm or disconfirm SENCO supplied diagnoses by using a standardised measure such as the Autism Diagnostic Interview-Revised (ADI-R) (Lord, Rutter, & Le Couteur, 1994).

Another limitation derives from our inability to recruit controls with dyslexia and therefore having to conduct our analyses using the two groups of those with AS/HFA and those without a SEN. Thus, we are unable to rule out the possibility that the differences that we have found between cases and controls are not related to the specific symptoms of AS/HFA, but to having a non-specific SEN. In defence however, it should be noted that the differences in the findings for cases and controls are marked and consistent in direction and so we suggest that they are robust.

Finally, findings of the present study suggest that further research is needed regarding two issues. Firstly, we suggest there is a need to examine the relationships between physical activity, body-mass index and social exclusion in young people with AS/HFA compared with others. It may be that disproportionately more people with AS/HFA compared with others are overweight because of their relative physical inactivity, which may be self-imposed or imposed by their social exclusion by peers. Whichever of these possibilities is true, there are serious implications for their physical as well as mental health, in part at least, as a consequence of being bullied, and for the design and implementation of interventions to address these people's relative inactivity. Secondly, by comparison with other mainstream secondary school pupils, it seems that having

AS/HFA is a particularly powerful risk factor for being the target of peer bullying. This hypothesis warrants careful study. A third, possibly fruitful line of enquiry, concerns enjoyment of school (and maybe other spheres of life) of pupils with AS/HFA compared with others. Such a study might understand the different ways in which each of these groups define “enjoyment”, “happiness”, “friendship”, and “bullying”.

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